B Physics
B2 . *Common subdivisions*
* Add to B2 numbers 2/9 in Auxiliary Schedule 1, with the additions modifications given in AY2 2/9; eg
B22 . . *Forms of presentation*
B23 G . . . Serials
NL . . . Tables of constants
P . . . Technical data
. . Persons in the subject
B24 . . . Physicists
* See also Biography B292
C . . . . Profession
* For Education, see B26A.
B25 . . Organizations in physics
L . . Communication & information in physics
B26 A . . Education, study & teaching of physics
* Alternative (not recommended) is to locate in JK Education.
C . . Research
* This position is used only to qualify classes preceding B32.
B27 . . History of physics
B29 2 . . Biography of physicists
A . Social aspects of physics, physics & society
* Add to B29 letters A/X following AY2 9; eg
X . Physics as a discipline, physics methodology (broadly)
* For methodology narrowly, see B32 C (see notes at AY2 9X.
* Add to B29 X numbers & letters 5/Y following AY2 9X.
* Add to B2 letters A/X following A in classes AA/AX; eg
B2A . . Philosophy of physics
CKL . . . Atomism
GHV . . . The Absolute
GLS . . . Complementarity
* See also Quantum theory B8M
GM . . . Cosmology
* See also Particle physics theory BM8 B
GQD . . . Causality
GQE . . . . Irreversibility
GQF . . . . Indeterminacy, uncertainty
GSW . . . Analogy, similarity
* See also Dynamic similarity (dimensions) B9B K
B2M . . Mathematical methods in physics
6D . . . Numerical analysis
7H . . . Computation
86 . . . Approximation
8L . . . Functions
8N . . . . Named functions, A/Z
9L . . . Equations
9N . . . . Named equations, A/Z
9P . . . Inverse problems
B2N B . . . Non-linear (mathematical physics)

Physics B
Physics as a discipline B29 X
. Mathematical methods in physics B2M
. . Non-linear B2N B

B2P 2 . . *Systems of individual mathematicians*
* For principles, systems, etc. of named persons; eg Hamiltonian principles B2P 2H.
B2R B . . Sets
CN8 U . . . Fractals
B2S A . . Groups
B2V UYJ R . . Differential topology
B2W 6Y . . Variational calculus
G . . Partial differential equations
IOR . . Dynamical systems
B2X . Statistics & probability
8 . . Statistical methods
FY . . Probability
N . . . Stochastic processes
NW . . . Ergodic processes
O . . . . Markov processes

Operations & agents in physics
* Add to B numbers & letters 2YM/8 following AY; eg
B2Y Q . Organization & management of work in physics
B32 . Research operations (general)
* See note at AY3 2; much of the literature will be at B4/B7, under instrumentation, physical methods, etc.
* Add to B3 numbers & letters 2/X following AY3; eg
B . . Procedures & methods in physics research
* For theoretical physics, see B8B.
C . . . Methodology (narrowly)
Q . . . Comparative investigations

B36 . Practical physics, investigatory procedures
* All procedures other than theoretical physics. See note at AY3.
* Add to B numbers 36/7 following AY.
B37 . . Unwanted effects & safety
B3B . . Equipment & materials
. . . *Operations on*
B3C . . . . Handling techniques
. . . *Properties*
B3J G . . . . Accuracy
B3R . . . Materials in general
B3U . . . Equipment & plant
B3X . . . . Laboratories
B4 . . . . Instrumentation
B45 . . . . . Instrument components
B4A . . . . . *By energy system*
* Details here are taken from Technology U/V (not yet published, so notation is provisional); eg
B4K . . . . . Switching devices, converters
B4L . . . . . Transducers
B5 . . . . . *Types of instruments*

Mechanical techniques

Physics B
Practical physics B36
Equipment & materials B3B
. . . Types of instruments B5

Operations

B62 . Investigative techniques in physics
. . *Operations serving all techniques & objectives*
B63 . . . Data processing & recording
B64 D . . . . Computer programs
* Arrange A/Z; e.g. REDUCE B64 DR
. . *Operations by scale*
B67 . . . Microtechniques in physics

B69 . . Physical methods in investigation
* Operations acting on physical phenomena, using various physical processes, properties, etc. as agents of investigation.
* This class takes works on these techniques only when they are used in physics. Completely general works on them go in AY6 9. When considered as agents in the investigation of a particular problem in physics, class under the problem.
* Add to B6 numbers & letters 9,A/W following B in B9/BW with the adjustments indicated (eg at B6I B, which is divided like Technology U).
B . . . Dimensional techniques
B6A T . . . Transport techniques (general)
* For heat transfer, see B6R GS
B6B . . . Mechanical techniques
IM . . . . Torque (techiques)
J . . . . Pressure (techniques)
* For vacuum techniques, see B6Q X.
K . . . . Deformation (techniques)
UN . . . . . Torsion (techniques)
B6C B . . . . . Elasticity (techniques)
E . . . . Inertial force (techniques)
EG . . . . . Centrifugal force (techniques)
H . . . . Static forces (techniques)
K . . . . Weight (techniques)
KL . . . . . Tare techniques
L . . . . Density (techniques)
. . . . *Techniques using forms of motion*
B6D C . . . . . Velocity (techniques)
CP . . . . . High speed techniques
* In microseconds or shorter.
D . . . . . Acceleration (techniques)
LV . . . . . Ballistics (techniques)
N . . . . . Rotation (techniques), gyroscopic techniques
B6E . . . . . Vibration (techniques), oscillation (techniques), sonic techniques
* For radiological techniques, see B6L WY.
B6G G . . . . . Sonic techniques

Physics B
Investigative techniques in physics B62
Physical methods in investigation B69
Mechanical techniques B6B
Techniques using forms of motion
. . Sonic techniques B6G G

B6G H . . Acoustic techniques
* For acoustoelectric techniques, see B6I XR; for thermoacoustics, see B6G PGH; for photoacoustics, see BGR LGH; for acoustic holography, see B7K GH
H7S . . . Acoustic signal processing
. . . Emission
HFG . . . . Acoustic emmission techniques, acoustic radiation techniques
. . . Absorption
HFL . . . . Acoustic absorption techniques
. . . Resonance
HFO . . . . Acoustic resonance techniques
. . . Interference
HFR . . . . Acoustic interference techniques, acoustic wave interferometry
. . . Scattering
HFT . . . Acoustic scattering techniques
N . . . Ultrasonic techniques
P Thermal techniques
* Techniques using thermal energy (ie heat possesed by substances, bodies, etc. in the form of molecular vibrational energy).
P3U . Equipment
P3W . . Furnaces (thermal techniques)
PGH . Thermoacoustic techniques
PQ . Quantity of heat
Q76 . . Calorimetry
Q78 R . . . Bomb calorimetry
Q78 S . . . Microcalorimetry
T . Cooling techniques
U . Heating techniques
. Temperature
V76 . . Thermometry
W . . Low temperature techniques, cryogenic techniques
X . . High temperature techniques, pyrometric techniques

Electromagnetic & electronic techniques

Physics B
Practical physics B36
Investigative techniques in physics B62
Physical methods in investigation B69
Mechanical techniques B6B
. . . High temperature techniques B6G X

B6G Y Electromagnetic & electronic techniques
B6H I . Electrical techniques
* For electrochemical techniques, see electrolytic techniques, see B6X L.
N . . Electrostatic techniques
B6I B . Electronic techniques
* See also particle physics techniques using electrons B7N P.
* Add to B7I letters following UL Electronic engineering (notation provisional); eg
BM . . Vacuum tube techniques
BS . . Gas discharge tube techniques
C . . Semiconductor techniques
* Add to B6I C letters A/C following BVI.
* Add to BCI D letters D/Q following B if applicable.
* Add to B6I letters E/G following BVI; eg
E . . . Charge carriers
HB . . . Semiconductor devices
HC . . . . Point contact devices
HD . . . . Junction devices, bipolar devices
HE . . . . Diodes (semiconductors)
HG . . . . . Point contact diodes
HJ . . . . . Junction diodes
J . . . . Transistors
JP . . . . . Point contact transistors
K . . . . . Junction transistors
L . . . . . N-p-n transistors
M . . . . . P-n-p transistors
N . . . . . Four layer transistors
O . . . . . Field effect transistors, bipolar transistors
* For those with an optical input and/or output, see Optics BL.
P . . Superconductor techniques
* Add to B6I P letters A/Y following BVI P.
RN . . Electrical resistance (techniques using)
S . . . Dielectric techniques
* Add to B6I S letters A/M following BVI S.
SLH . . . . Electro-optical techniques
. . *Interactions of electric with other energy forms*
* Add to B6I U letters B/L following BVI U; eg
UB . . . Electromechanical techniques
UC . . . . Piezoelectrical techniques
UGH . . . . Acoustoelectrical techniques
UGP . . . Thermoelectric techniques
UL . . . Photoelectric techniques
B6J . Magnetic techniques
FO . . Magnetic resonance techniques
* For magnetic resonance imaging, see Imaging B7I O.
FP . . Magnetic polarization techniques

Physics B
Investigative techniques in physics B62
Physical methods in investigation B69
Electromagnetic & electronic techniques B6G Y
Magnetic techniques B6J
. Magnetic polarization techniques B6J FP

B6J U . Magnetic field effects (techniques)
VB . . Magnetomechanical effects (techniques)
VC . . . Magnetostriction techniques, piezomagnetism techniques

B6K Radiation techniques (electromagnetism), wave techniques (electromagnetism)
* For tracer techniques, see B7P.
76 . Measurement
78S . . Dosimetry
78T . . . Dosimetry below 5 MeV
78U . . . . Electron dosimetry
78V . . . Microdosimetry
FM . Refraction techniques, refractometry
. . Instrumentation
FM4 . . . Refractometers
FMF C4 . . Transmission refractometry
FQ . Diffraction techniques, diffractometry
* Analysis of structure of matter by the diffraction of x-rays, neutrons, etc. in crystals.
* More detail may be taken from crystallography, at BW6 KFQ.
. . Instrumentation
FQ4 . . . Diffractometers
FQ4 FT . . . Prisms
FQ4 FV . . . Diffraction gratings
. . *By type of radiation*
* See the radiation or particle at B6K U/B6Q; eg X-ray diffraction B6L XFQ.
FR . Electromagnetic wave interferometry
. . Instrumentation
FR4 . . . Interpherometers
* Arrange A/Z; eg
FR5 V . . . . Etalons
FR5 W . . . . . Microinterferometers
. . *By type of radiation*
* See radiation; e.g. acoustic wave interferometry B6R GHF R.
FT . Scatter techniques
* Using irregular reflection, dispersal, etc. of particles or waves.
. Pulses
FX . . Pulse techniues
. Beams
GB . . Beam handling (general), beam techniques (general)
* Add to B6K GB letters D/G following AY7 I (Beam handling in imaging); eg
GBF G . . . Beam modulation

Stimulated emission techniques

Physics B
Physical methods in investigation B69
Electromagnetic & electronic techniques B6G Y
Radiation techniques B6K
Beams
. . Beam modulation B6K GBF G

By result of action

B6K J . Ionizing radiation techniques, radiology
J4U . . *Equipment*
J4Y B . . . Bubble chambers
J4Y D . . . Spark chambers
J4Y F . . . Counters
J83 . . Production
JP . . Irradiation
JPQ . . . Microirradiation

By wave length/frequency

M . Radiofrequency techniques
Q . Microwave & optical techniques (together)
QM . . Stimulated emission techniques, induced emission techniques, quantum optic techniques
R . . . Maser techniques (general), microwave amplification by stimulated emission
* Add to B6K R letters A/T following B6K S (with additions & modifications).
. . . . Instruments
R4 . . . . . Masers
. . . . *Types*
RLP . . . . . Pulsed masers
RST . . . . . Gas masers
S . . . Laser techniques, lasing process, light amplification by stimulated emission (techniques)
. . . . Instruments
S4 . . . . . Lasers
. . . . . *Components*
S4D S . . . . . Cavity resonators
S5 . . . . . *Types of instruments*
* See B6K SL
. . . . *Processes & properties*
SBD . . . . . Energy states
SBD L . . . . . Population inversion
. . . . . Excitation
SFI N . . . . . Stimulated emission of light
SFI O . . . . . Laser pumping, optical pumping, electronic pumping, pumping (lasers)
. . . . . Interference
SFR . . . . . Laser interferometry
SGB . . . . . Beam handling
SGB P . . . . . Light beam pulsing & switching
SGB Q . . . . . Light beam modulation
. . . . *Types of laser action*
. . . . . *By energy*
SLH . . . . . High energy lasing process, Q_switching

Physics B
Radiation techniques B6K
Microwave & optical techniques B6K Q
. . Laser techniques B6K S
. . . Types of laser action
. . . . . High energy lasing process B6K SLH

. . . *Types of lasers*

B6K SLP . . . . Pulsed lasers
SLQ . . . . Continuous lasers
. . . . *By radiation or particle*
* Add to B6K S letters LU/Q following B; eg
SLU . . . . . Infra-red lasers
SLV . . . . . Visible light lasers
SLW . . . . . Ultra-violet lasers
SO . . . . . Nuclear-powered lasers
. . . . *By medium*
SR . . . . . Lasing action media
ST . . . . . Gas lasers
STV . . . . . Inert gas lasers
STW . . . . . Other gas laser
* Arrange A/Z.
SU . . . . . Liquid lasers
SV . . . . . Solid lasers
SVV W . . . . . Semi-conductor lasers, diode lasers
SVX B . . . . . Ruby lasers
SVX G . . . . . Glass lasers
SVX J . . . . . Fibre lasers
SVX M . . . . . Chemical lasers
. . . . *By action of laser*
SX . . . . . Surface emitting lasers, SEL
* Key component of optic-electric integrated circuits.
T . . . . . Quantum well lasers
TV . . Non-linear optical techniques
* Effect of very intense light beams on matter throught which they are propagated. Utilizing the optical effects of laser radiation interacting with non-linear materials.
* See also Quantum optic techniques B6K QM
U Microwave techniques
* For masers, see B6K R.
UX Millimetre wave techniques

B6L Optical techniques
* For quantum optic techniques see B6K QM; Non-linear optical techniques B6K TV; for optical techiques in bulk matter, see B6R L.
FC . Optical transmission techniques
FCT . . Fibre optic techniques
FL . Absorption techniques
FM . Refraction techniques
FMJ . . Birefringence techniques, double refraction techniques
* For photoelastic stress analysis, see BVB KL6 LFM J.
FN . Reflection techniques
FP . Polarization techniques, polarized light techniques
FQ . Diffraction techniques (light)
FQS . . Schlieren techniques

Radiation techniques

Physics B
Electromagnetic & electronic techniques B6G Y
Radiation techniques B6K
By wave length/frequency
. . Diffraction techniques B6L FQ
. . . Schlieren techniques B6L FQS

B6L FR . . Interference techniques, interferometry
FRL . . . Interference fringes (techniques)
FT . . Scattering (optical techniques)
GH . . Acoustooptic techniques, photoacoustics
L . . Luminosity (techniques)
M . . Colour (techniques)
PF . . Coherent light techniques
* For stimulated emmission of light, see B6K S (lasers)
. . *Types of optics by wavelength*
U . . . Infra-red techniques
V . . . Visible light techniques
W . . . Ultra-violet techniques
WY Radiological techniques (general)
* Applications of X-rays, gamma rays and other penetrating radiation, ionizing or non-ionizing.
X . X-ray techniques
XFQ . . X-ray diffraction
XFQ R . . . Bragg method (X-ray diffraction)
XFQ S . . . Laue method (X-ray diffraction)
XFQ W . . . Weissenberg method (X-ray diffraction)
Y . Gamma ray techniques
B6M Particulate radiation techniques, particle physics techniques
* Add to B6 letters M/Q following B; eg
FQ . Particle diffraction
FR . Particle interferometry
GB . Particle beam techniques
B6N DC . Cosmic ray techniques
GO . Photon techniques, photonics
P . Electron techniques
* For beta ray techniques, see nuclear radioactivity techniques B6O FKR
PFQ . . Electron diffraction
PFR . . Electron interferometry
PGB . . Electron beam techniques, electron optics techniques
* See also Electron optics imaging B7I NP
V . Proton techniques
W . Neutron techniques
WFQ . . Neutron diffraction
B6O . Nuclear reaction techniques
* For gamma ray techniques, see B6L Y.
FK . . Radioactivity techniques
FKM N . . . Radioactivation analysis
* Studies artificially created nuclei in order to elucidate the isotopes produced by bombardment.
* For activation analysis, see Chemical analysis C.
* For radioactive isotope techniques, see Tracer techniques B7P.

Physics B
Investigative techniques in physics B62
Physical methods in investigation B69
. Electromagnetic & electronic techniques B6G Y
. . . . Nuclear reaction techniques B6O
. . . . . Radioactivation analysis B6O FKM N

B6O FKR . . . . Alpha radiation techniques
FKS . . . . Beta ray techniques
FO . . . . Nuclear resonance techniques
* For nuclear magnetic resonance imaging, see B7I O
B6P . . . . Atom techniques
B6Q . . . . Molecular techniques
U . . . . Ion techniques
. . . . . *Special procedures*
U7S . . . . . Ionic implantation
U7T . . . . . Ion exchange techniques
. . . . . *Processes & properties*
UEX . . . . . Ion irradiation techniques, ion bombardment techniques
UFQ . . . . . Ion diffraction
UGB . . . . . Ion beam analysis
X . Vacuum techniques
B6R . Bulk matter techniques
N . . States of matter
NR . . . Phase transition techniques, thermodynamic phases (techniques)
B6T CW . . . Gas dynamics techniques
* For electrical discharge techniques, see B6I BS.
B6U CH . . . Hydrostatic techniques
CW . . . Hydrodynamic techniques
B6W . . . Crystallographic techniques
B6X C . . Chemical techniques in physics
E . . . Electrochemical techniques in physics
L . . . . Electrolytic techniques
P . . Biological techniques in physics
B6Y . *Techniques special to a context*
Techniques by action on phenomenon
* Add to B7 numbers & letters 2,A/S following AY7; eg
B72 . Control techniques
B73 . Production techniques
B74 G . Detecting & indicating techniques
L . . Indicating
N . . . Telemetry
T . Recording techniques
V . . Scanning techniques
B75 . Counting in physics, calculation
B76 . Measurement in physics
B7A . Testing & evaluation in physics
B7C . . Monitoring
B7F . Modelling & simulation
B7G . Prediction, forecasting

Investigative techniques in physics

Physics B
Practical physics B36
Investigative techniques in physics B62
Prediction B7G

B7H Visualizing & imaging techniques
L . Visualizing techniques (general)
B7I . Imaging techniques
O . . Magnetic resonance imaging, nuclear magnetic resonance, NMR
B7J . . Microscopy
. . . *By wavelength*
L . . . Optical microscopy
LX . . . X-ray microscopy
M . . . Particle microscopy
P . . . . Electron microscopy
SO . . . Nuclear magnetic resonance microscopy, nuclear magnetic resonance imaging
SU . . . Ion microscopy
B7K . . Holography (techniques), wavefront reconstruction imaging
GH . . . Acoustic holography
T . . Photographic techniques in physics
B7L . . Radiography in physics
V . . Tomography
B7M Spectroscopy, spectrography, spectrum analysis
. *By spectrum*
L . . Optical spectroscopy
LX . . X-ray spectroscopy
M . . Particulate spectra techniques
* For mass spectroscopy, see B7O P.
NGO . . . Photon correlation spectroscopy
NP . . . Electron spectroscopy, electron emmission spectroscopy
O . . . Nuclear spectroscopy
P . . . Atomic spectroscopy
QU . . . Ion spectroscopy
. *By various physical constants*
B7N . . Spectrometry
* See note under Spectroscopy AY7 M; if in doubt, prefer B7M.
S . . Spectrophotometry
* Measures intensity of wavelength in optical spectra.
B7O P . . Mass spectroscopy
* Measures atomic mass by separating beam of ions into components reflecting different mass/charge ratios. Not strictly spectroscopy, since does not utilize the separation of wavelengths.
B7P . Tracer techniques, radioactive isotope techniques
B7Q *Techniques special to a context*
* For example, BWQ D7S Crystal defects - Doping.

Physics B
Practical physics B36
Investigative techniques in physics B62
. Techniques by action on phenomenon
. . Techniques special to a context B7Q

. *Special forms of enquiry*
B7W L . . Special environments (investigative techniques)
B7X . . . Vacuums (research environments)
H . . . High altitude (research environments)
J . . . Space (research environments)
N . . Non-experimental research (physics)
B7Y B . . . Scientific expeditions (physics)
B82 . . Experimental physics (general)
* If distinguished from practical physics.
* See notes at AY3 2 regarding relations between experimental research and practical scientific work. For practical work in physics (which includes experimental methods, equipment, etc.), see B36.
. . *By broad objective*
B85 . . . Fundamental research in physics
B87 . . . Oriented research in physics
B8B Theoretical physics
* For practical physics, see B36.
. *Particular theories in physics*
* Theories relating to a specific field, large or small, go with that field. Provision of notation at this point allows the qualification of any specific subject by its special theories; eg BGR 8TB Falling body theory of gravity.
* Some major theories in general physics are often (and in some cases usually) referred to for historical reasons as theories of mechanics (eg classical mechanics, quantum mechanics). The preferred arrangement is to locate them here.
* An alternative (not recommended) is to locate them under mechanics specifically, at BB8. In such cases, their classmark will have an additional initial B; eg quantum theory becomes BB8 M.
B8D . . Classical physics, classical mechanics, Newtonian mechanics, ensemble theory, non-quantized physics (Am.)
* The term 'mechanics' on its own usually assumes this.
N . . . Newton's laws
B8E . . Statistical mechanics, many particles systems, statistical thermodynamics
* Basic 19th century theories, applicable mainly to bulk matter (BR).
* See also Quantum theory B8M
R . . . Ergodic theory
B8F . . Field theory (general)
* For unified field theory, see particle theory BM8 FG.
. . . *Properties*
97 . . . . Potential (field theory)
D . . . Classical theory
DM . . . . Maxwell theory (field theory)
G . . . Unified field theory
* For grand unified theory, see BM8 FJ.
L . . . . Supersymmetry theory

Quantum theory

Physics B
Practical physics B36
Theoretical physics B8B
Field theory B8F
. Unified field theory B8F G
. . Supersymmetry theory B8F L

B8F R . Gauge theory
S . . Gauge transformation
T . . Gauge invariance
B8G P Non-field theories
B8H Relativity theory, relativistic mechanics
* See also Gravitation BGR; Astronomy & astrophysics DA
* For relativistic treatment of specific phenomena, see the phenomenon; eg relativistic scattering theory (elementary particles) BMF T8H.
Q . Space-time continuum, four-dimensional continuum
R . . Interval (space-time)
S . . Events (space-time)
B8J . General relativity
* See also Cosmology DA
B8K . Special relativity
B8M Quantum theory, quantum mechanics
* Further details are given at BM8 M Particle physics. Details from there may be used here if necessary. Examples are given below.
* For quantum theory of specific phenomena, see the phenomenon; eg quantum electrodynamics BNG 8M; quantum chromodynamics BNR 8M.
27 . History
27E . . Early period
27F . . . Planck quantum theory
27H . . Later period
* 1924 onwards.
27J . . . Einstein quantum theory
27K . . . Bohr quantum theory
. Statistics
2X . . Quantum statistics
* See also Elementary particles - Energy levels BMB D
2XY AB . . . Bose-Einstein statistics
2XY AF . . . Fermi-Dirac statistics
. Constants
9CN . . Planck constant
. Particular quantum theories
D . . Classical theory
DT . . . Semi-classical quantum theory
DV . . . Non-relativistic quantum theory
. . Field theory
* For Gauge field theory, see BM8 MFR.
F . . . Quantum field theory, quantified fields, quantized fields
* For quantum field theory of specific phenomena, see the phenomenon - e.g. meson field theory BNS 8MF.
FN . . . . Non-linear field theory
FX . . . . Axiomatic field theory

Physics B
Practical physics B36
Quantum theory B8M
Particular quantum theories
. Field theory
. . . Axiomatic field theory B8M FX

B8M H . Relativistic quantum theory
HF . . Relativistic quantum field theory
Quantum properties
N . Quantization
P . Complementarity
R . Quantum number (theory)
* For quantum number properties, see Particles BMM D.
RW . . Correspondence principle
S . . Pauli exclusion principle
* See also Periodic table CH; Spin (particles) BMM K
T . . Principal quantum number
B8N *Special quantum properties, quantum numbers*
* This allows the qualification of a particular property if its quantization is the subject.
B8O *Special quantum effects*
* For example, BRQ BBQ 8O Surfaces - Potential energy - Potential barrier - Tunnellling.
V Two-state quantum theory
B8P Wave mechanics (quantum theory), corpuscular waves (quantum theory)
2M . Mathematics
2M8 GE . . Perturbation theory (quantum mechanics)
2M8 L . . Wave functions
. . . Named functions
2M8 NH . . . . Hamiltonian functions, Hamiltonians
. . . Named equations
2M9 NS . . . . Schrodinger wave equation
2TB . Matrices
. Particular theories
QU . . Bohr theory (wave mechanics)
S . . Schrodinger wave mechanics
U . . Uncertainty principle, indeterminacy principle, Heisenberg principle
B8R B Matrix mechanics
B8V . Heisenberg representation

Physics B

Operations & agents in physics
. . . . . Heisenberg representation B8R B8V

General processes/properties in physics
* Classes B92/99 are for use only as qualifiers. See explanatory note at AY9.
* Add to B9 numbers 2/9 following AY9 and letters G/S following AY (with the additions indicated); eg

B92 D . Distribution
E . . Incidence
F . Invariability, constancy
G . . Constants
H . Variation, change
J . . Rate of change
K . . Decrease
L . . Increase
N . . Cyclical change
B94 . Conditions, parameters, environments, influences
C . . Critical point, critical state
E . . Volume conditions
F . . . Constant volume
G . . . Decreasing volume
H . . . Increasing volume
J . . Pressure conditions
JC . . . Critical pressure
K . . . Constant pressure conditions, isobaric conditions
L . . . Decreasing pressure conditions
M . . . Increasing pressure conditions
O . . Velocity conditions
P . . Thermal conditions
PC . . . Critical temperature
Q . . . Constant temperature, isothermal conditions
R . . . Adiabatic conditions
S . . . Decreasing temperature conditions
V . . . Increasing temperature conditions
B95 . . Electrical & magnetic field conditions
B96 . . . Electrical field conditions
B97 . . . Magnetic field conditions

Special properties

Physics B

B9B Physical dimensions, dimensions of a physical quantity
* For mass, see BCJ; for measurement, see B76.
2X . Dimensional analysis
. *Processes*
92L . . Contraction
92M . . Expansion
. *Dimensional properties*
G . . Degree of dimension, number
* Use for any qualification or degree of a dimension - e.g. double, very, optimal.
H . . Nodes, points (dimension)
I . . Indexes
IV . . Dimensionless groups
J . . Similarity
K . . . Dynamic similarity, similarity principle
* See also Similarity parameters (fluid flow) BSB 9BK
Q . . Frames of reference
R . . . Inertial reference frame
. . *By number of dimensions*
T . . . One-dimensional
U . . . Two-dimensional
V . . . Three-dimensional
W . . . Multi-dimensional
* More than three dimensions.
B9C . Time
* The dimension of the physical universe which at a given place orders the sequence of events.
* See also Space-time continuum B8H Q
. . Measurement
86 . . . Horology (physics)
. . . *Processes*
9FC . . . . Reversibility (time)
* See also Relativity theory B8H
9FE . . . . Irreversibility (time)
9FG . . . . . Arrow of time
9TC . . . . Contraction (time dimension)
9TD . . . . Expansion (time dimension)
E . . Time conditions
EN . . . Ante, prior
EP . . . Post (time)
F . . . Rate (time)
G . . . . Slow
H . . . . Fast
I . . . Duration, life
* For lifetime as a quantum property, BMM FH
J . . . . Momentary, transient
K . . . . Short duration
L . . . . Long duration
M . . . . Mean life
N . . . . Half life
P . . . Time intervals
Q . . . . Frequency (time dimension)
QS . . . . Short intervals
QU . . . . Long intervals

Physics

Physics B
Physical dimensions, dimensions of a physical quantity B9B
Time B9C
. . Time intervals B9C P
. . . Long intervals B9C QU

B9C R . . Instantaneous, immediate
S . . Continuous
T . . Discontinuous, discrete
U . . Periodic
V . . . Isochronous
B9D Space, spatial dimension, size
* See also Space-time continuum B8H Q; Shape, configuration B9J V
. *Processes*
92K . . Contraction (space dimensions)
92L . . Expansion (space dimensions)
. *Constituents*
D . . Aether, ether
* Hypothetical medium once thought to fill all space.
E . Direction
EG . . Orientation
EK . . Isotropic
EL . . Anisotropic
EP . Position, location
* For example, back, front, side, end.
F . One-dimensional spaces, lines, linear dimensions
G . . Distance
H . . . Mean free path
I . . Length
J . . Width, breadth
JN . . Height
K . . Radius
L . . Diameter
M . . . Chord (dimensions)
N . . Perimeter, circumference
P . Two-dimensional spaces, planes
PQ . . Angles
PR . . Area
PS . . . Sectors (space dimensions)
PU . . Surfaces (dimensions)
Q . Three-dimensional spaces, bodies
R . . Cross section
RT . . Edge conditions
S . . Volume
S94 C . . . Critical volume
SP . . Solid bodies
SQ . . Hollow bodies
SS . . Homogeneous bodies
ST . . Non-homogeneous bodies, heterogeneous bodies
T . . Physical field
* For fields of force, use BBH.
* See also Field theory B8F
. Multidimensional
V . . Hyperspace, multidimensional space
* More than 3 dimensions.
* For space-time (3-d space + time), see Relativity B8H Q.

Physics B
Special properties
. Physical dimensions, dimensions of a physical quantity B9B
. . . . Hyperspace B9D V

B9D X . . . . Non-Euclidean space
B9G . Systems characteristics
C . . Systems behaviour
E . . . Disturbance, perturbation
G . . . . Temporary disturbances, transients
P . . . State of system
T . . . . Constancy, invariance
V . . . . . Conservation laws
* For specific laws, see thing conserved; eg conservation of mass & energy BAE 9GV.
* See also theory of elementary particles BNB 8B
B9H . . . . Variability
H . . . . . Change of state of system
J . . . . . Periodic change
* For periodic motion, see BDS.
K . . . . . Cycles (periodic change)
N . . . . . Response systems
Q . . . . . Hysteresis
R . . . . . Autonomous events
U . . . . Stability of systems
V . . . . . Homeostasis, self-regulation
W . . . . Instability of systems
B9I H . . . . Adaptive behaviour
B9J . . Structure of systems (physics)
S . . . Symmetry, homogeneity
* For symmetry reflecting invariance principle in particles, see BMM B
T . . . . Parity, space reflection symmetry, mirror symmetry
T9G V . . . . . Conservation
* For P invariance (parity conservation), see BMM E9G V.
V . . . Shape, configuration
W . . Networks (systems)
. *Types of systems*
B9K V . . Continuous systems
X . . Discontinuous systems, discrete systems
* See also Quantum mechanics B8M
B9L R . . Linear systems
B9M . . Non-linear systems
B9N P . . Adaptive systems
BAE Energy & matter (together)
* Energy is the capacity for doing work. Interconversion between its different forms (potential, kinetic, electrical, chemical, etc) can occur only in the presence of matter. Energy can only exist in the absence of matter when it is in the form of radiant energy.
* Matter is a specialized form of energy having the attributes of mass and of extension in space and time. For general works on matter per se, see BLY.
* For Mechanical energy, see BBB M; for Matter, see BLY.
. Conservation

Energy interactions & forms

Physics B
Energy & matter BAE
. Conservation

BAE 9GV . . Conservation of mass & energy
9GW . Equivalence of energy & matter

BAF Energy interactions & forms
BAG . Thermodynamics
* Interactions between energy systems and their effect on the states of those systems.
* For thermal phenomena and heat in general, see Bulk matter physics BRG P.
* For statistical theory of thermodynamics see B8E.
. . Particular theories
8D . . . Classical thermodynamics, reversible thermodynamics, ideal processes, reversible processes (classical theory)
8DP . . . Equilibrium thermodynamics
92N . . . Cycles
* See BAP Y
9G . . Systems characteristics
9IC . . . Reversible processes
* See BAP D
9IE . . . Irreversible processes
* See BAP E
BAH . . Principles, laws
BAI . . . Zeroth law of thermodynamics
BAJ . . . First law of thermodynamics, conservation of energy
BAK . . . . Enthalpy
BAL . . . Second law of thermodynamics
BAM . . . . Entropy
* See also irreversible thermodynamics BAP E
J . . . . . Entropy of substances
BAN . . . Third law of thermodynamics, Nernst heat theorem
. . *Thermodynamic processes & properties*
* For internal energy, see BBB V.
* See also Thermal properties (bulk matter) BRG P
BAO . . . Fluctuation phenomena, variables (thermodynamics)
BAP D . . . Reversible thermodynamics
E . . . Irreversible thermodynamics, non-equilibrium thermodynamics
* Extension of classical theory to cover real dynamical processes; eg in biology.
* See also Entropy BAM
H . . . Critical state, critical point phenomena
J . . . Internal energy, thermodynamic energy
N . . . Free energy, thermodynamic potential, Gibbs function
Q . . . Adiabatic processes
T . . . Isothermal processes
V . . . Isentropic processes
W . . . Polytropic processes

Physics B
Energy interactions & forms BAF
Thermodynamics BAG
. . Polytropic processes BAP W

BAP Y . . Thermodynamic cycles
BAQ . . . *Named cycles*
* Arrange A/Z; eg
CA . . . . Carnot cycle
BAT . . Transport processes (general)
* Transfer of mass, momentum or energy in a system.
* For transport processes & properties in particular energy systems, see the system - e.g. electrical conductivity, neutron transport, dielectric relaxation, viscosity (fluids).
. . . Theory
8ES . . . . Kinetic theory (general), molecular theory (kinetic theory)
* See also Kinetic theory of gases BTD E8B
92N . . . Cycles (transport processes)
BAU . . . Scattering (general)
D . . . Dissipation
BAV . . . Diffusion (general)
BAW . . . Viscosity
* See Fluids BSA W
BAX . . . Mass transfer
* See also Heat transfer BRG Q

BB Mechanics
* Study of the behaviour of physical systems under the action of forces, especially with the motion and equilibrium of bodies in a particular frame of reference. Sometimes used with wider meaning, to include the behaviour of all physical systems under all interactions, when it is barely distinguishable from physics as a whole.
BB2 M8L . Mathematical functions
M8N H . . Hamiltonian functions, Hamiltonians
M9L . Equations
M9N H . . Hamilton's equations
M9N L . . Lagrangian equations
. *Named systems*
P2H . . Hamiltonian systems
P2L . . Lagrangian mechanics
S . . Geometric mechanics
BB8 B . Theory
. . Particular theories
* Classical theory, relativity theory, quantum theory, etc are treated as theories of general physics (see B8D/Y).
* An alternative (not recommended) is to subordinate them here,to mechanics. If this option is taken:
* Add to BB8 letters D/Y following B8; eg
D . . Classical mechanics

Force(s)

Physics B
Energy interactions & forms BAF
Mechanics BB
Theory BB8 B
. Classical mechanics BB8 D

Continuous systems

BB9 KV . Continuous mechanics, classical mechanics of continuous matter, continuous media (mechanics)

KVK . . Mechanical contact

Discrete systems

KX . Classical mechanics of discrete systems

KXK . . Few-body theory

KXM . . . Two-body problem

KXP . . . Three-body problem

KXR . . N-body problem, many-body problem

BBB Energy
* Capacity of a body or system for doing work.
* For activation energy, see Chemistry C; for energy levels and energy bands, see Elementary particles BMB D.

92D . Distribution of energy

9GV . Conservation of energy
* See Thermodynamics BAJ

M . Mechanical energy
* A measure of a system's capacity to do work.

P . . Potential energy, energy of space, energy of position

T . . Kinetic energy, energy of motion
* For motion, see BCS.
* See also friction BVQ CA

V . . Internal energy, thermodynamic energy
* Sum of the potential and kinetic energies of molecular interactions.

BBC . . Energy ranges
* See particle physics, BMB C

BBD . . Energy levels
* See particle physics, BMB D/E

BBF . . Energy bands
* See condensed matter BTX BF

N . *Energy concepts special to a subject*
* Eg Nuclear collisions - Excitation energy BOF SBF N.

Physics B
Energy interactions & forms BAF
Mechanics BB
Energy BBB
. Energy concepts special to a subject BBF N

BBG Force(s)
* Any action which alters or tends to alter a body's state of rest or of uniform motion in a straight line.
* For an expansion of this general class, see nuclear forces BOB G. For Gravity, see BGR.

BBH . Fields of force
* A 3-dimensional space throughout which forces can act and in which energy is available.

J . . Gradient (fields)

K . . Strength of field

L . . Field interaction

O . . Field effects

Q . . Lines of force

BBI G . Work
* Result of the exchange of energy between field and body experiencing forces.

H . . Power
* Rate of doing work.

HM . . . Turning moment

J . . Mechanical efficiency

JM . . . Velocity ratio, mechanical advantage

K . . Virtual work

M . Moment, torque, turning effect
* The moment of a force about a point is the product of the force and the perpendicular distance of its line of action from the point or axis of rotation.
* For moment of momentum, see Angular momentum BDN CV.

N . . Centrifugal moment

P . . Moment of inertia

W . Lines of force, force fields

W2U . . Graphs

W2V . . . Force polygons

W2W . . . Catenaries

. *Types of forces*

Y . . Generalized force
* Quotient of all forces acting in a system.

BBJ . . Pressure
* Force acting per unit area.
* For compressibility, see Elasticity BCB; for load, see BBQ.

92D . . . Distribution

94 . . . . Pressure conditions

94E . . . . . Critical pressure

94K . . . . . Constant pressure, isobaric conditions

. . . *Properties*

BH . . . . Pressure fields

BHJ . . . . . Pressure gradients

BHK . . . . . Pressure gradient force

MP . . . . Pressure effect

NN . . . . . Centre of pressure

NP . . . . . Compression

NQ . . . . . Head of pressure
* See BSB JO (fluids)

Force(s)

Physics B
Mechanics BB
Force(s) BBG
Pressure BBJ
. Properties
. . . Head of pressure BBJ NQ

. *Types of pressure*

BBJ P . . Low pressure
Q . . High pressure
* For high pressure physics, see BRB JQ
S . . Other
* Add to BBJ S letters B/N following BSB JS if applicable; eg BBJ SF Induced pressure.
TC Conservative force
TD Restoring force
TE Elastic force
* See Elasticity BCB
TI Impulsive force
U . Impact, collision of bodies
* Physical effect of impulsive force.
* See also Ballistics BGR G
VP Propulsion, thrust, push
VR Traction, pull
VS Central force, Single force
VU Multiple force
VW Parallel forces, non-parallel forces
W External forces
* Transmitted throughout a body
WK . Impressed force, action (mechanics)
WL . Reaction (mechanics)
WM . Body forces
WN . Surface forces
WP . Integral forces
* Between neighbouring parts of a body.
BBK . Deforming forces, deformation, distortion
* The detailed schedule for this class is given in bulk matter physics (at solid state BVB K), to which it is largely applicable.
* Add to B letters BK/CD following BV (Solids) so far as applicable; eg
L . . Stress-strain relationships
N . . . Limit of proportionality
P . . . Strength (stress-strain)
Q . . . . Yield point
BBL . . Stress (general)
* Deforming force per metre.
* For Creep, see Bulk matter BVB YK.
V . . . Stress components
* Internal forces between contiguous parts of a body.
* For normal stress, see BBO.
X . . . . Tension
. . . *Types of stresses*
BBM T . . . . Bending stres
BBO . . . . Normal stress
T . . . . . Tensile stress
* For compression, see BBJ NP; for compressibility, see BSB QS.
BBP . . . . Shear stress

Physics B
Force(s) BBG
. Types of forces
. . External forces BBJ W
. . . . Stress BBL
. . . . . Types of stresses
. . . . . Shear stress BBP

BBQ . . . . . Loading, load
* Force, external to a machine, which the work output must overcome.
* The detailed schedule for this class is given under Gases (bulk matter) BTB Q.
* For load as weight, see BCK; see also Stress BBL.
S . . . . . Compressibility
BBT . . . . Strain
BBU N . . . . . Torsion
BBV E . . . . . Elastic deformation
BBW P . . . . . Plastic deformation
BBY D . . . . . Failure (strain)
BCB . . . . Elasticity
* Property of a physical system allowing it to return to the original physical state after removal of a stress.
E . . . . . Modulus of elasticity, elastic constants
* Ratio of stress to strain.
BCD . . Internal forces
BCE . . Inertial forces, effective forces, kinetic reactions
* For inertia, see BCI
* See also Dynamic equilibrium (statics) BCO V; Acceleration BDD
G . . . Centrifugal force
H . . . . Coriolis force
J . . . . Centripetal force
L . . Couple, coupling
* Two equal & opposite parallel forces acting on body.
N . . Attraction, attractive force, potential (attraction)
R . . Repulsion
BCF . *Forces special to a context*
BCH Statics
* Behaviour of bodies at rest relative to a given frame of reference; the forces acting on them cancel each other out and produce a state of equilibrium in which the bodies are stationary or moving with constant velocity; i.e. acceleration and torque are zero.
* See also Hydrostatics BUC H ; Torque BBI M
2X5 8 . Graphical methods
2XU S . . Analytical statics
. Moments
BIM . . Static moment
BCI . Inertia
* Ability of a body to resist changes in its state of rest or of uniform motion in a straight line.
* For rotational inertia, see rotary motion BDN CI.
* See also motion BCS; Hysteresis (general) B9H Q
BIM . . Moments of inertia
BIN . . Angular inertia
BIP . . Products of inertia

Mechanics

Physics B
Energy interactions & forms BAF
Mechanics BB
Statics BCH
. Inertia BCI
. . Products of inertia BCI BIP

BCJ . Mass
. . Relativity theory
8H . . . Relativistic mass
BCK . Weight, load (weight)
* See also Gravity BGR
BCL . Density, API gravity, bulk density
L . . Specific gravity, relative density
P . . Low density
T . . High density
W . . Wet density
BCM . Composition & resolution of forces
* See also Stress BBL; Couple BCE L
BCN . . Equilibrium
* State of a body at rest or moving with constant velocity.
* For Phase equilibrium, see States of matter BRN T.
P . . . Balancing
T . . . Parallelogram of forces, polygon of forces
U . . . Parallel forces
V . . . Non-parallel forces
W . . . Quasi-equilibrium
X . . . Non-vanishing equilibrium
Y . . . Neutral equilibrium, indifferent equilibrium
BCO . . . Stable equilibrium, static equilibrium
P . . . . Least energy principle
Q . . . . Neutral equilibrium
U . . . Unstable equilibrium
V . . . Dynamic equilibrium
BCP . . Stability
* General property of systems whereby the system returns to state of equilibrium after disturbance.
Q . . . Absolute stability
R . . . Asymptotic stability
S . . . Static stability
BCQ . . . Dynamic stability
BCR . . Instability
* For balancing, see BCN P
S . . . Dynamic instability
U . Suspending
V . Equalizing
BCS Motion
* A continuous change of position of a body.
. Principles, laws
S . . Newton's laws of motion
T . . Hamilton's principle (motion)
U . . D'Alembert's principle
V . . Principle of least constraint, constrained motion

Physics B
Energy interactions & forms BAF
Mechanics BB
Motion BCS
. Principles, laws
. . Principle of least constraint BCS V

BCS W . . Principle of least action
W2M 9 . . . Equations
W2M 9N . . . . Named equations
* Arrange A/Z; eg
W2M 9NL . . . . . Lagrange's equations of motion
. *Properties & processes*
BCT . . Immittance (mechanics)
S . . . Mechanical admittance
* Reciprocal of impedance.
T . . . Mechanical impedance
* Ratio of driving force to response.
U . . . . Mechanical resistance
V . . . . Mechanical reactance
BCU . Momentum, linear momentum, vector momentum
* Quantity of motion of a body; product of mass and velocity.
* For angular momentum, see Rotation BDN CV.
Q . . Impulse (momentum)
BCV . . Angular momentum
BCW . Flux
* A measure of the strength of a field of force (eg a rate of flow) through a given area.

BCX Dynamics, force & motion
* Deals with the forces which change or produce the motions of bodies.
. *Properties*
9BQ . . Frames of reference
9BS . . . Rotational frames of reference
9M . . Non-linear dynamics
E . Initial value problem, transient problem
* Value which determines subsequent state of a system.
G . Steady state problem
* State of the system remains unchanged in time after all the transients resulting from changes have been removed.

Kinematics

Physics B
Energy interactions & forms BAF
Mechanics BB
Dynamics BCX
Steady state problem BCX G

BDA Kinematics, pure motion
* Motion independent of considerations of mass or force; geometry of motion.
* See also Kinetic theory (general) BAT 8ES

S . Speed
* A scalar quantity; use only if this is significant. Otherwise, use Velocity BDC.

BDB . Displacement
* Change of position.

. . Principles

E . . . Laws of virtual displacement

BDC . Velocity

92D . . Velocity distribution, velocity gradient

E . . Principle of virtual velocity

G . . Linear velocity

H . . Angular velocity

J . . Relative velocity
* See also Doppler effect BFA DCK

M . . Terminal velocity

N . . Low speed

O . . Medium speed

P . . High speed

BDD . Acceleration, change of motion
* See also Force BBG

F . . Increase in speed
* 'Acceleration' in the popular sense.

H . . Deceleration

J . . Linear acceleration

L . . Angular acceleration
* See also Rotation BDN

N . . Coriolis acceleration

BDE . Kinetics
* Effect of forces or torques on motion.
* Definition of this term varies; sometimes it is equated with kinematics, sometimes with dynamics.
* For kinetics as rate of chemical reaction, see C; for kinetic theory (general), see BAT 8ES; for kinetic theory of fluids, see BSD E8B.

Physics B
Energy interactions & forms BAF
Mechanics BB
Dynamics BCX
Kinematics BDA
Kinetics BDE

Forms of motion
* Many of these relate almost entirely to particular states of matter (e.g. fluid flow). Classes are expanded where necessary for very specialized forms; e.g. attitudes in aerodynamics.
* For Acceleration, see BDD; for acceleration due to gravity, see Gravitation BGR DD.

. *By entities in motion*

BDK B . . Motion of points

C . . Motion of extended figures

D . . . Rigid figures (motion), rigid bodies (motion), solid bodies (motion)

E . . . Deformable figures (motion)

G . . . One-dimensional figures (motion)

L . . . Two-dimensional figures (motion), moving planes

LKH . . . . Rigid

LKJ . . . . Deformable

M . . . Three-dimensional figures (motion)

MKH . . . . Rigid

MKJ . . . . Deformable

Q . . . . Articulated systems (motion)
* 3-d. deformable figures with rigid elements.

T . . Collective motions
* See particle physics BNU DKT

BDL A . Pressure-affected motion
* For fluid flow, see Fluids BSB.

C . Linear motion

E . One-dimensional motion

L . Relative motion

N . Angular motion

R . Rectilinear motion
* See also Rays BGC

T . Translation (motion), sliding motion
* For friction, see Solids - Surfaces BVQ CA.

U . Curvilinear motion

V . . Ballistic motion
* For ballistic motion as a property of gravitation, see BGR G.

BDM . Circular motion, circulatory motion

U . . Uniform circular motion

W . . Orbits (general)

BDN . . Rotation, gyration, pre-rotation, revolution, revolving, rotatory motion
* For internal rotation, see molecular motion BQB DQM.

. . . Inertia

CI . . . . Rotary inertia

. . . Momentum

CV . . . . Angular momentum, moment of momentum

CX . . . . . Complex angular momentum plane

Periodic motion

Physics B
Kinematics BDA
Circular motion BDM
. Rotation BDN
. . Momentum
. . . . Complex angular momentum plane BDN CX

. . *Properties*
BDN P . . . Radius of gyration
Q . . . Euler angles
S . . Spinning, spin
T . . . Nutation
* Periodic variation in spin.
U . . . Precession
W . . Whirl
WP . . Prewhirl
BDP . Vortices, vortex motion
* Usually implies bulk matter.
* Add to BD letters P/Q following BSD so far as applicable; eg
BDQ R . . Threee-dimensional vortex motion
BDR Irrotational motion
* Special to fluids.
S Planetary motion
T Coplanar motion

BDS Periodic motion, harmonic motion
* Repetitive, periodic change in displacement with respect to a reference point.
* There is relatively little literature on specific properties and processes treated completely generally (i.e. in mechanical vibration, radiation and wave phenomena, etc. together). So the detailed enumeration of properties and processes is given at BF Wave motion (much the biggest class in terms of literary warrant) and this may then be drawn on for synthesizing classes in the other contexts, as instructed below at BDU, BDV, BE and BF.
* Add to BDS letters A/D following B;
* Add to BDT letters B/W following BF;
* Add to BDT X letters A/G following BG so far as applicable; eg
92N . Cycles (periodic motion)
BB . Energy
* For radiant energy in general, see Radiation BEY.
BDT B . Harmonics
. . Generation
B73 D . . . Harmonic generation
. . *Elements*
BH . . . Nodes
BJ . . . Antinodes
. . *Types*
BM . . . Simple harmonic motion, SHM
* The standard component of all vibrations.
BN . . . . Damped simple harmonic motion
BQ . . . Anharmonics
BR . Isochronism, regular periodicity
C . Transmission

Physics B
Mechanics BB
Dynamics BCX
Kinematics BDA
Periodic motion BDS
Transmission BDT C

BDU Oscillation (general)
* See note at BE. Use only if distinguished from vibration; if in doubt, prefer the joint heading at BE.
* Add to BDU letters A/V following BE; eg
B . Harmonics
C . Transmission
VVE V . Large amplitude oscillations
WC . Torsional oscillations
BDV Vibration (general)
* See note at BE. Use only if distinguished from oscillation; if in doubt, prefer the joint heading at BE.
* For mechanical oscillation, see Bulk matter BRE.
* Add to BDV letters A/V following BE; eg
B . Harmonics
C . Transmission
VVE V . Large amplitude vibration
WC . Torsional vibrations
BE Vibration & oscillation
* Usage varies: in much of the literature oscillation and vibration are treated as synonymous; often, oscillation is used in relation to the wave motion of radiation whereas the term vibration is used for the same phenomenon in bulk matter (see BRE). See notes at BDU and BDV above.
* Add to BE letters A/VV following BF; eg
BEB . Harmonics
BEC . Transmission, propagation
BED . Frequency
D . . Mode
BEP Y . Interactions
BER U . . Coupling
. *Types of vibration & oscillation*
BEV V . . *By property*
* Add to BEV V letters D/V following BFV V, so far as applicable; eg
VEV . . . Large amplitude vibration & oscillation
W . . *By directional & transient factors, etc.*
* See also BRE W (vibration in bulk matter) for amplification of some of these types of vibrations.
* Add to BEV W letters C/V following BFW so far as applicable;
* Add to BEV X letters A/Q following BFX so far as applicable;
* Add to BEW letters B/X following BFY so far as applicable;
* Add to BEW Y letters A/E following BG if applicable. applicable; eg
WC . . . Isotropic oscillations
X . . . Pulse oscillations
BEW D . . . Torsional vibrations
J . . . Linear oscillations
L . . . Non-linear oscillations

Periodic motion

Physics B
Kinematics BDA
Periodic motion BDS
Vibration & oscillation BE
. . By directional & transient factors, etc. BEV W
. . . Non-linear oscillations BEW L

BEW R . . . Transverse vibrations (general)
S . . . . Shear vibrations
U . . . Longitudinal vibrations (general)
V . . . . Axial vibrations
. . *By degrees of freedom*
BEX C . . . One degree of freedom (vibration)
D . . . Two degrees of freedom (vibrations)
E . . . Three or more degrees of freedom
. . *By origin as to internal/external*
G . . . Free vibration, natural frequency vibration
H . . . Forced vibration
* For resonance, see BFO.
J . . . . Transients (forced vibration)
* Frequency is determined by the natural frequency of the system.
* For transients as transmission disturbances, see BFC F.
K . . . . Steady component
L . . *By origin as to action*
* For example, by vibrating body.
* See Bulk matter BRE XL

BEY Radiation (general)
* Energy from vibration propagated as rays, waves or a stream of particles. Often treated as synonymous with electromagnetic wave propagation.
* Use this position only when a distinction is drawn between radiation and wave motion; also, in particular, for general works on the special energy features of radiation. If in doubt, prefer BF Waves.
* For types of radiation defined by a specific energy form, see the latter; eg electromagnetic waves BK; sound waves BRG H.
* For ionizing radiation, see BKJ.
. Energy
BB . . Radiant energy
BB9 2D . . . Distribution
BCW . . . Radiant flux (rate), radiant power, radiant energy flux
* See also Opacity BRL FIL; Luminous flux BRL LBB F
BCW L . . . . Radiant flux density, irradiance, radiant exitance, power density
BCW M . . . . . Radiance (irradiance)
BCW P . . . . Radiation intensity
* For luminous intensity, see BRL LBB G.
BCW Q . . . . . Radiance (intensity)
* Radiation intensity in a specified direction.
F . *Processes & properties*
* Add to BEY F letters B/V folowing BF so far as applicable; eg
FJ . . Decay

Physics B
Kinematics BDA
Periodic motion BDS
Radiation BEY
. Processes & properties BEY F
. . Decay BEY FJ

. *Types of radiation*
* Add to BEY letters VV/W following BE so far as applicable; eg
. . *By property*
BEY VVP . . . Polarized radiation
. . *By direction, etc.*
VWC . . . Isotropic
WJ . . . Linear

BF Waves, wave motion
* Add to BFA letters A/DR following B.
* Classes BFB/BFF may be used to qualify retroactively classes BFC/BFV by dropping the initial 2 letters (BF); eg BFO D Resonant frequency. Retroactive qualification within classes BFG/BFY should use G as an intercalator; eg BFS D Collision frequency, but BFS GL Collision absorption.
. *Operations*
BF7 2 . . Control (wave motion)
2D . . . Damping
* For damping as a natural process, see Decay BFC N.
3D . . Generation of waves
3K . . . *By source, medium*
* For example, Sound- -Vibrating bodies BRG H73 LB.
. Energy
BFA BB . . Wave energy, radiant energy (waves), radiative power (waves)
* Add to BFA BB letters F/J following BEY BB; eg
BBF . . . Radiant power
. . . . Radiant flux density
BBG . . . . . Magnitude (waves), power density (waves)
. Force
BH . . Field
BHK . . . Field strength
. Stability
CP . . Relaxation (wave stability)
DA . Kinematics
DCJ . . Relative velocity
DCK . . . Doppler effect

Waves

Physics B
Kinematics BDA
Periodic motion BDS
Waves BF
Kinematics BFA DA
. . Doppler effect BFA DCK

Properties & processes

BFB . Harmonics
* Add to BFB letters A/R following BDT B; eg
H . . Nodes
BFC . Transmission (radiation), propagation (radiation)
. . Coefficients
2QK . . . Transmission coefficient, transmittance
* Reciprocal of opacity (see Optics BRL FIL).
BHK . . Field strength
F . . Transients (transmission)
* Temporary disturbances. For transients as types of vibration, see BEX J.
FR . . Propagation anomaly
* See also Resonance BFO
FS . . . Spreading anomaly, spreading loss (waves)
G . . Propagation loss
* See also Attenuation loss BFC MG; Scattering loss BFT CG
H . . Transmittance
I . . Transmittivity
K . . Modulation
* Changes in various parameters.
L . . Amplification, gain
LP . . . High gain
LQ . . . Low gain
M . . Attenuation
* Reduction of a radiation quantity.
MG . . . Attenuation loss, dissipation
N . . . Damping (waves)
P . . Transmission modes
PU . . . Multimodes
. . *Types of propagation*
Q . . . Unguided propagations
R . . . Guided propagation
RR . . . . Network-guided propagation
RS . . . . Conductive lines guided propagation
RV . . . . Non-conductive lines guided propagation
RX . . . . Hollow conducor guided propagation
S . . . *Special to a context*
* For example, Solar propagation BKM CS; Baryon photoproduction BNT FCS.
BFD . Frequency
* See also electro-magnetic waves by frequency BKL/BL
D . . Mode
DS . . Frequency shift
E . . Frequency bands, frequency ranges
EN . . . Band width
EP . . . Basebands
ER . . . Broad bands
ET . . . Narrow bands
F . . Cut-off frequency

Physics B
Kinematics BDA
Periodic motion BDS
Waves BF
Frequency BFD
. Cut-off frequency BFD F

BFD G . Critical frequency
HB . Variable frequency
HD . Difference frequency
HL . Double frequency
HS . Single frequency
L . Low frequency
N . Medium frequency
O . High frequency
P . . Very high frequency
* For short waves, see BKO.
BFE . Spectra (general)
* For spectroscopy, see Physical methods B7M.
* For spectra of particular processes, see process; eg absorption spectra BFL E.
. . *Conditions, influencing factors*
94J . . . Pressure
94P . . . Temperature
94Y . . . Electrical & magnetic fields
G . . Continuous spectra
H . . Line spectra
J . . Band spectra
L . . Raman spectra
M . . Mass spectra
. Special attributes in frequency
N . . Pitch
* See Acoustics BRG HFE N
Q . . Tone
R . . Beat
S Amplitude
. Processes
SCN . . Damping
SL . Level (amplitude)
T . Small amplitude
U . Medium amplitude
V . Large amplitude
X Phase
Y . Phase conjugation
BFF . Coherence
N . . Coherence time
R . . Coherence length
BFG Emission
E . Emission spectra
EG . . Continuous emission spectra
J . Emissivity
K . Exitance, emittance
* For stimulated emission of radiation, see Techniques B6K QM; for excitation, see BFI N; for lasers, see B6K S.
N . . Radiant exitance, radiant emittance
* Radiant flux leaving a surface per unit area.
* See also Luminous exitance BRL FGO

Physics B
Periodic motion BDS
Waves BF
Emission BFG
. Exitance BFG K
. . Radiant exitance BFG N

BFG Q . Incandescence
* See BRL FHQ (optics)
R . Prompt emission, delayed emission
* See BOF GR (nuclei)
T . Secondary emission
U . Thermionic emission
* See BQU FGU (ions)
BFH . Luminescence
* See electromagnetic radiation BKF H; light luminescence BRL FH
V Wavetrain
W Wavefront, primary wavefront
* See also Rays BGC
X Secondary waves, wavelets, secondary emissions, re-emissions
. Theory
X8I . . Huygen's principle
BFI Transparence
* For optical transparence, see BRL FI
K Translucence
L Opacity
* Reciprocal of transmittance.
N Excitation, stimulation
* See also Collision (particles) BMF S
Q . Deexcitation
S . Self excitation
T . Excited state
U . . Metastable state
* For example, in radiowaves.
V . Cascade reaction
* See BMF IV (particles)
BFJ Decay
* For damping (waves) see BFC N
BFK QF . Half life
BFL Absorption
E . Absorption spectra
E2Q K . . Absorption coefficient
* For extinction coefficient, see C Chemistry.
M . Absorpance
N . Absorptivity
S Saturation
SFL . Saturable absorption
X Refraction & reflection (together)
BFM . Refraction
* When wave crosses boundary betweeen two media in which its phase velocity differs.
. . Modulus
9BI . . . Refractive index
H . . Refractivity
I . . Anomalous refraction

Physics B
Periodic motion BDS
Waves BF
Refraction & reflection BFL X
. Refraction BFM
. . Anomalous refraction BFM I

BFM J . . Double refraction, birefringence
* See also Polarization BFP
K . . . Ordinary ray
L . . . Extraordinary ray
. . *By medium*
R . . . Refraction in ideal medium, standard refraction
S . . . Refraction in real medium
T . . Subrefraction
U . . Super-refraction
BFN . Reflection
H . . Reflectance, reflectivity
I . . . Specular reflectance
J . . . Diffuse reflectivity, non-specular reflection
K . . . Total reflectivity
L . . Total internal reflection
LH . . . Total internal reflectivity
M . . Surface reflection
* For Fresnel reflection, see Optics BRL FNM R.
N . . Reverberation
* See Acoustics BRG HFN R
Q Imaging
* Formation of a figure of an object by reflected or refracted rays.
* See also Imaging (techniques) B7I
BFO Resonance
* Maximum response to a mechanical system undergoing forced vibration by periodic forces at or near to the natural frequency of the system.
* See also Magnetic resonance BJF O
. Frequency
D . . Resonant frequency
H . Double resonance
L . Combination resonance
S . Dissonance
* See Acoustics BRG HFO S
BFP Polarization (waves)
* Special to transverse waves.
* For Birefringence, see Double refractions BFM J; for Electric polarization, see Dielectrics BVI SFP.
R . Relaxation time
S . Plane polarization
T . Circular polarization, circulatory polarization
U . Elliptical polarization
Y Interactions (radiation)
BFQ . Diffraction
T . . Fresnel diffraction
V . . Fraunhofer diffraction
BFR . Interference
* See also Standing waves BFY G
H . . Beat frequency
J . . Interference patterns
L . . . Interference fringes

Waves

Physics B
Periodic motion BDS
Waves BF
Properties & processes
. . Interference BFR
. . . . Interference fringes BFR L

BFR M . . . . Moire effect
N . . . . Inclusion pattern interference
U . . Coupling
* Interaction between different properties of a system or between two or more systems.
X . . Inclusive interactions
BFS . . Collision
* Interaction in which momentum is conserved.
* For capture, see particles BMF UR.
H . . . Cross section (collisions)
* More detail is given at BMF SH (collision between particles).
L . . . Elastic collision
M . . . Inelastic collision
T . . . Action at a distance
BFT . . Scattering
* Irregular reflection or dispersal of waves or particles.
* See also Collision (particles) BMF S
. . . Propagation loss
CG . . . . Scattering losses
H . . . Shadows
* Interference of incident & scattered waves.
. . . *Types of scattering*
* These are usually special to a particular radiation or particle. This class is amplified for particles at BMF T and for light at BRL FT and details from these may be added here if necessary:
* Add to BFT letters J/Y following BRL FT and BMF T; eg
JS . . . . Coherent scattering
BFU F . . . Diffusion (waves)
* For diffusion in general, see Transport processes BAV.
G . . . . Self diffusion
P . . Dispersion
R . . Capture
* See Particles BMF UR
BFV . . Annihilation
* See BMF V (particles)
Types of waves
* For waves defined by energy form, see latter (eg electromagnetic waves BKL/BL).
V . *By property*
* Add to BFV V letters D/V following BF; eg
VEV . . Large amplitude waves
VP . . Polarized waves

Physics B
Kinematics BDA
Periodic motion BDS
Waves BF
By property BFV V
. Polarized waves BFV VP

By directional & transience factors
BFW C . Isotropic waves
D . Anisotropic waves
L . Waveforms
LT . . Waveform correction
M . . Sine waves, sinusoidal waves
N . . Square waveform
P . . Sawtooth waveform
Q . . Rectangular waveform
R . . Spherical waveform
S . . Cylindrical waveform
V . Wavegroups
* Intermediate between pulses & pure sine waves.
BFX . . Pulses (wave motion)
9B . . . Dimensions
9DJ . . . . Pulse width
FD . . . Frequency
FDH . . . . Pulse repetition frequency
Q . . . Giant pulses
BFY B . Time dependent waves
C . Random waves
D . Torsional waves
E . Plane waves
F . Oscillating waves
G . Standing waves, stationary waves
* See also Interference BFR
GFQ . . Diffraction
H . Continuous waves
J . Linear waves
L . Non-linear waves
N . . Solitons, solitary waves
* See also magnetic monopoles BNI
P . Rotational waves
R . Transverse waves (general)
S . . Shear waves
U . Longitudinal waves (general)
V . . Axial vibrations
BGA . Shock waves
* Usually refer to bodies moving at high speed in a compressible fluid. See BSG A for a detailed schedule.
R . Blast waves
BGB . Beams (radiation/waves)
* Radiation travelling nearly unidirectionally.
. . *Properties & processes*
M . . . Collimation
N . . . Focusing (beams)
O . . . Modulating (beams)
P . . . Pulsing (beams)
Q . . Reference beams
R . . Crossed beams

Energy interactions & forms

Physics B
Energy interactions & forms BAF
Mechanics BB
. . . . . Types of waves
. . . . . Beams BGB
. . . . . Crossed beams BGB R

BGB S . . . . . Low energy beams
T . . . . . Refractory beams
TV . . . . . Doubly refractory beams
BGC . . . . . Rays, rectlinear propagation (wavefront)
* Geometrical path normal to wavefront.
BGD . . . . . *Other types of waves*
* Should any other concepts from the schedule in bulk matter prove applicable here, proceed as follows:
* Add to BGD letters GC/M following BS (Fluids); eg ripple waves BGD GNR.
BGH . . . . . Acoustics
* See bulk matter BRG H
BGP . . . . . Thermal properties
* See Bulk matter BRG P
BGR Gravitation, gravity
* For Weight, see Statics BCK.
* See also General relativity B8J
2M . Mathematics
2PL . . Lagrangians (gravitation)
. Particular theories
8FG . . Unified field theory
8H . . Relativity theory
8M . . Quantum theory of gravitation
8MF . . Quantum field theory of gravitation
8S . . Supersymmetry theory (gravity)
* For gravitons, see Elementary particles BMP GN
8ST . . . Supergravity
8TB . . Falling body theory
8TD . . Continuous media gravity
8TE . . . Mixed gravitational systems
8TL . . Alternative theories of gravity
. Constants
92G . . Gravitational constants
9GV . Conservation laws
BB . Energy
BBP . . Gravitational potential
. Force
BH . . Gravitational field
* For ballistics, see BGR G.
CS . Motion
DA . . Kinematics
DD . . . Gravitational acceleration
. . Waves
F . . Gravitational waves, gravitational radiation
* For gravitons, see Elementary particles BMP GO.

Physics B
Energy interactions & forms BAF
. . Motion BGR CS
. . . Gravitational waves BGR F

BGR G . . . Ballistics (gravitational field)
* Study of the dynamics of the path taken by an object moving under the influence of a gravitational field.
* For ballistics as a form of motion, see BDL V.
* See also Impact BBJ U
GJ . . . . Trajectories (gravitation)
GL . . . Free fall (gravitation)
. . *Properties, effects*
H . . . Centre of gravity
H9D F . . . . Centre of gravity of lines
H9D P . . . . Centre of gravity of planes
H9D S . . . . Centre of gravity of volumes
L . . Gravity, absolute gravity
M . . Mixed gravitational systems

Special energy forms
BGX . Relations between energy forms

BGY . Electricity & magnetism
* Field, wave, particle and dynamic aspects, not necessarily associated with a particular state of matter.
* Many major concepts of electricity and magnetism are dependent on bulk matter and most of the literature implies it (and in particular, its solid state). So the main schedule is given under Solid state at BVH. The detail there may be used as required here and under each of the states of matter at BR/BW.
* Add to B letters GY/J following BV when applicable.
* For electromagnetic waves and radiation, see BK.
BH . . Electromagnetism
* Study of electric and magnetic fields and their interaction with electric charges and currents.
* For electromagnetism as a form of magnetism, see BVJ PX.
BHB H . . . Electromagnetic field
* For electric fields, see BHI BH; for magnetic fields, see BJB H.
* See also Electrostatics BHN
. . . . *Properties*
HJ . . . . . Gradient
HK . . . . . Field strength
HL . . . . . Field interaction
HM . . . . . Excitation
HN . . . . . Deexcitation
HO . . . . . Field effects

Electricity & magnetism

Physics B
Electricity & magnetism BGY
Electromagnetism BH
. . . Field effects BHB HO

BHI Electricity, electrical properties
BH . Electric field
* Usually implies electrostatic field; see BHN BH.
BHJ C . Electrical quantities, electrical variables
* For electric intensity, see electric field strength BVH JN.
. . *Input-output relations*
G . . . Gain
L . . . Loss
BHK . . Charge, electric charge
L . . . Electrification
* See also Electrostatics BHN
NT . . . Attraction
NV . . . Repulsion
O . . . Electric moments
P . . . Polarity
Q . . . Electric dipoles
R . . . Positive charge
S . . . Negative charge
V . . . Hypercharge
BHL . . Voltage, potential difference
X . . Capacitance
BHM C . . Electrical power
* See bulk matter BRH MC. The detailed schedule is under solid state (BVH MC).
BHN . Electrostatics, static electricity
* Phenomena associated with electric charge at rest, as compared with current electricity.
* For electrodynamics, see BHO.
BG . . Electrostatic forces
BH . . . Electrostatic field
* See note at BHI BH.
. . Charge
K . . . Electrostatic charge
KL . . Electrification
* For Frictional electrification, see BVH NKN
KM . . . Inductive electrification, electrostatic induction
. . *Special field properties*
N . . . Edge effect
BHO . Electrodynamics
P . . Electromagnetic induction
* For alternating currents, see BVH Y.
R . . . Inductance
S . . . . Self inductance
U . . . . Mutual inductance
BHP . . Current (electricity)
* See bulk material, BVH P
BHS . . . Circuits
X . . . . Admittance
BHU . . . . . Conduction (electrodynamics)
BHV . . . . Impedance
BHW B . . . . . Resistance (electrodynamics)
. . . *Types of currents*
* See Bulk matter BVH XB.

Physics B
Electricity & magnetism BGY
Electricity BHI
. Electrodynamics BHO
. . . Types of currents

BIU . *Interactions of electricity with other energy forms*
* For interactions in which electricity is the agent & not the recipient of the action, see the latter; eg electrooptics BLH (in which it is the optical properties which are affected).
* Add to BI letters U/V following BVI; eg
BIV . . Photoelectric effect, photoelectricity
BJ Magnetism
* See note at BGY re magnetism and bulk matter.
* Add to BJ letters A/Y following BVJ where applicable; eg
BJB H . Magnetic field
. *Processes & properties*
IM . . Magnetic moment, dipole moment
BJC P . . Relaxation
BJF O . . Resonance
BJK . . Magnetic flux
S . . . Susceptibility
BJL . . Magnetization
. *Field components*
BJN . . Magnetic monopoles
Q . . Dipoles
. *Forms of magnetism*
BJQ . . Diamagnetism
BJR . . Paramagnetism
BJU . *Interactions with other energy forms*
B . . Magnetomechanical effects
C . . . Magnetostriction

BK Electromagnetic radiation (general), electromagnetic waves (general)
* For waves in general, see BF; for audio frequency waves, see Bulk matter BRG H.
* Many properties & processes applicable to all or most forms of e-m radiation are more usually considered under Optics (see BL). But all the properties, etc. given under waves in general at BF are available here.
. Investigative techniques & agents
BK7 3 . . Production techniques, generation
3K . . . Sources
3KC . . . . Positive sources
3KD . . . . Negative sources
3KE . . . . Ray sources
3KG . . . . . Positive ray sources
3KH . . . . . Negative ray sources
3KM . . . . Particle sources
3KN . . . . . Positive particle sources
3KO . . . . . Negative particle sources
3KP . . . . . Electrons (electrical sources)
3KQ . . . . . Ions (electrical sources)
3KR . . . . . Positive ion sources
3KS . . . . . Negative ion sources

Electromagnetic radiation

Physics B
Electricity & magnetism BGY
Electromagnetic radiation BK
Investigative techniques & agents
. Production techniques, generation BK7 3
. . . . . Negative ion sources BK7 3KS

. Measurement
BK7 6 . . Radiometry
64 . . . Radiometers
Energy
BKB B . Radiant energy
BKC W . . Radiant flux, radiant power
WL . . . Radiant flux density, irradiance
BKD C Velocity
* For Speed of light see BLD C.
BKF C Transmission
G Emission
* For stimulated emission, see Techniques B6K QM.
H . Luminescence (radiation)
* Usually implies optics, BLF H.
Wavefront
IW . Primary radiation
IX . Secondary radiation
O Polarization
T Scattering
TN . Thomson scattering
* See also Thermoelectric effect BVI UGP
BKG *Electromagnetic processes & properties*
* Add to BKG letters H/J following B so far as applicable.
Types of radiation by property
* Add to BKH letters A/Y following BF;
* Add to BKI letters A/F following BG; eg
BKH F . Coherent radiation
* See also maser & laser techniques B6K QM
P . Polarized radiation
PT . . Circulatory polarized radiation
X . Pulse radiation
By product
BKJ . Ionizing radiation (general)
* Electromagnetic or particulate radiation which turns a neutral target (particle or bulk matter) into a charged one.
* For particular forms, see the wave or particle causing it.
* For the process in a particular medium, see medium.
* For the subject of the charged target itself, see Ion physics BQU.
* See also Class E/H Biology (including human biology and medicine) for ionizing radiation as agent in pathology, therapy, etc; for deionization, see BKJ S.
. . Energy
BBP . . . Ionization potential
. . Propagation
FC . . . Ionization, ionized state
* See also states of matter; eg Gases - Ionization BTM KJF C
. . . . Collision
FSH . . . . . Ionization cross section

Physics B
Electromagnetic radiation BK
By product
. Ionizing radiation BKJ
. . Propagation
. . . . . Ionization cross section BKJ FSH

BKJ FSH S . . . . . Ion surface impact
P . . Irradiation
* Exposure to ionizing radiation.
PQ . . . Microirradiation
S . . Deionization
SR . . . Ion recombination
. . *Types of ionization*
T . . . Photoionization
U . . . Cosmic ray ionization
V . . . Low level ionizing radiation
BKK B . Non-ionizing radiation (general)
Types of radiation by energy state
D . Transition radiation

By frequency & wavelength
BKL . Long waves (general)
BKM . Radiowaves, radio frequency waves, Hertzian waves
FC . . Propagation
FCS . . . Atmospheric propagation (RF)
FCT . . . Scatter propagation, horizon propagation
* See also Scattering BFT
FCU . . . . Ionospheric propagation (RF), sky waves
FCU J . . . . Magnetoionic propagation (RF)
FCV . . . . Tropospheric propagation
FCW . . . Groundwave propagation (RF), terrestrial propagation (RF)
FCX . . . Multipath propagation (RF), mixed path propagation (RF)
GB . . . Radio beams
. . . *By origin*
R . . . . Extraterrestrial radiowaves
S . . . . . Solar radiation (RF)
T . . . . . Cosmic radiation (RF), galactic radiowaves
. . *RF waves by specific frequency*
BKN J . . . Audiofrequency radiowaves
* c. 30 Hz/20kHz.
K . . . Very low frequency, myriametric waves, VLF
* c. 30-3 kHz.
L . . . Low frequency, kilometric waves, LF
M . . . Heterodyne frequency
N . . . Medium frequency, MF, hectometric waves
BKO . . . High frequency, HF, short waves, decametric waves
BKP . . . Very high frequency, VHF, metric waves, millimetre waves

Optics

Physics B
Electricity & magnetism BGY
Electromagnetic radiation BK
Radiowaves BKM
. . Very high frequency BKP

BKQ Microwave & optical physics (together)
* For quantum optics, see BL8 M; for stimulated emission devices (masers and lasers), see physical techniques B6K QM.

BKU . Microwaves, mm waves, submillimetre waves
* From very short wave RF to infrared.

P . . P-band
S . . Centimetre wave frequency
U . . . Ultrahigh frequency, UHF
V . . . . L-band
X . . . S-band

BKV B . . . Superhigh frequency, SHF
M . . . . C-band
N . . . . X-band
P . . . J-band
Q . . K-band

BKW E . . Extremely high frequency, EHF, Millimetre wave frequency
G . . . Q-band
J . . . V-band
L . . . O-band
N . . . W-band
Q . Maximum observable frequency
S . Maximum usable frequency, MUF

BL Optics (general)
* Originally confined to the study of visible light, the term 'optics' is usually used to cover infrared, visible light and unltraviolet. But it is sometimes used to embrace most of the electromagnetic spectrum in one way or another (eg including the behaviour of electrons and neutrons in an optical context). Here, it is restricted to the frequencies from infrared to ultraviolet.
* Many of the concepts are dependent on bulk matter and most of the literature refers to visible light in that context (BLV). So the detailed schedule is given at BRL (Bulk matter optics) and details from that may be applied here as necessary.
* An alternative (not recommended) is to confound visible light with optics in general and use BRL 2/BRL Q for it (BL2/BLQ when applied here).
* Add to BL numbers & letters 2/Q following BRL; eg

. Theories

BL8 D . . Emission theory of light (Newton)
DS . . Wave theory of light (Huyghen, etc.)
FDM . . Electomagnetic theory of light (Maxwell)
M . . Quantum optics (general)
BL9 M . . Non-linear optics (general)

Physics B
Electricity & magnetism BGY
Electromagnetic radiation BK
Optics BL
Theories
. Non-linear optics BL9 M

BLA F Energy interactions & forms
BLB B . Energy
BLD A . Kinematics
. . Velocity
C . . . Speed of light
. *Special radiation properties & processes*
* For optical properties of materials (eg optical activity, optical rotation) see Bulk material BRL.
. . Wave motion

BLF . . . Physical optics (general), electromagnetic optics (general), light waves
* Light as electromagnetic waves; for geometrical optics, see Rays BLG C.

C . . . Propagation, transmission
* For optical fibres, see Optical transmission techniques B6L FC.

CM . . . Attenuation
D . . . Frequency
E . . . Spectra
EX . . . Phase
EY . . . . Optical phase conjugation
F . . . Coherence
* For coherent light, see BLP F.
G . . . Emission
H . . . Luminescence
* See Bulk matter BRL FH
L . . . Absorption
LX . . . Refraction & reflection (together)
M . . . . Refraction
MJ . . . . . Double refraction, birefringence, extraordinary rays
* See also Electrooptics BLH
N . . . . Reflection
P . . . Polarization
Q . . . Diffraction
R . . . Interference
T . . . Scattering
UF . . . Diffusion
UP . . . Dispersion
. . . *Types of light motion*
WR . . . . Spherical waves
WS . . . . Cylindrical waves
. . . . Rays

BLG C . . . . . Geometrical optics (general), rectilinear propagation (optics)
* Assumes rectilinear propagation of light, as rays, without reference to waves or the physical nature of light. The behaviour of light in optical instruments.
* See also Optical instruments BRL 4

Physics B
Electromagnetic radiation BK
Optics BL
. Energy interactions & forms BLA F
. . Special radiation properties & processes
. . . . . Geometrical optics BLG C

. . *Interactions with other energy forms*
BLH . . . Electrooptics, electric double refraction
* See also Dielectrics BVI S
BLJ . . . Magneto-optical effects
. . *Special optical properties & processes*
BLL . . . Luminosity
* See Bulk matter BRL L
BLM . . . Colour
* See Bulk matter BRL M
. . *Other special optical properties*
BLO B . . . Optical bistability
C . . . Optical multistability
. . *Types of light by property*
* Add to BLP letters C/Y following BF.
* Add to BLP Q letters A/D following BG; eg
BLP F . . . Coherent light
* For laser techniques, see B6K S.
M . . . Refracted light
N . . . Reflected light
P . . . Polarized light
WC . . . Isotropic light
WD . . . Anisotropic light
WP . . . Optical solitons, solitary waves (optics)
X . . . Light pulses
YH . . . Continuous light waves
BLQ B . . . Beams (light)
. . *By source*
N . . . Natural light
P . . . Artificial light
. . *By frequency & wavelength*
BLU . . . Infrared radiation
FE . . . . Spectra
N . . . . Near infrared radiation
R . . . . Far infrared radiation
BLV . . . Light, visible light
* See notes at BL above.
* For photons, see BNG O.
BLW . Ultraviolet radiation
N . . Long wave ultraviolet radiation
V . . Vacuum ultraviolet radiation, far ultraviolet radiation
Y Radiology
* Study of penetrating ionizing (or non-ionizing) radiation.
BLX . X-rays, Roentgen rays
* Penetrating electro-magnetic radiation, usually generated by accelerating electrons to bombard a solid body, or by inner shell transition of atoms.
FC . . Production
FE . . Spectra
FL . . Absorption
FN . . Reflection
FQ . . Diffraction

Physics B
Special energy forms
. . . . . X-rays BLX
. . . . . Diffraction BLX FQ

BLX FT . . . . . Scattering
N . . . . . Grenz rays, Infra-Roentgen rays
P . . . . . Continuous X-rays, Bremsstrahlung
Q . . . . . Cosmic ray X-rays
* For cosmic rays in physics (general), see BND C.
T . . . . . Gamma radiation
* High energy photons, especially as emitted by a nucleus in a transition between two energy levels.
U . . . . . Non-solar gamma radiation

BLY Matter
* For matter and energy treated together, see BAE.

BM . Particle physics, high energy physics
* Terminology varies. Sometimes, particle physics is used to mean elementary particles only and nuclear physics to mean the physics of the single nucleus per se (its structure and the reactions involving changes in it). But sometimes, both terms (especially nuclear physics) are used to cover both the nucleus & elementary particles. Use this class only for works reflecting this wider meaning.
BM2 M . . Mathematical models
SA . . . Groups
BM3 2 . . Research operations (general)

. . Practical & experimental particle physics
6 . . . High energy physics (experimental physics)
* Sometimes used more broadly, as synonymous with particle physics. In such cases, use BM.
7 . . . Unwanted effects & safety precautions
B . . . Equipment & materials in general
. . . . *Operation on*
BD . . . . . Design
C . . . . . Handling techniques
R . . . . Materials
U . . . . Equipment, plant
BM4 . . . . Instrumentation
5 . . . . . Instrument components
7 . . . . . Computers
8 . . . . . Control systems
85W . . . . . Filters
85Y E . . . . . Energizing units
. . . . . *By energy system*
AC . . . . . Electrical & electronic
AP . . . . . Circuits
AQ . . . . . Analogue circuits
AR . . . . . Pulse circuits
ART . . . . . Pulse height discriminators, kicksorters

Counting & detection

Physics B
Equipment & materials in general BM3 B
. . Instrument components BM4 5
. . . By energy system
. . . . Electrical & electronic BM4 AC
. . . . . Pulse circuits BM4 AR
. . . . . Pulse height discriminators BM4 ART

BM4 AS . . . . . Counters circuits
AST . . . . . Coincidence counters circuits
AT . . . . . Ratometers
FL . . . . Electrooptics
FN . . . . . Photomultiplier tubes
. . . *Components by internal function*
K . . . . Switching devices
L . . . . . Transducers
S . . . . Input devices
SS . . . . . Sensors
T . . . . Output devices
TR . . . . . Recorders
BM5 . . *Types of instruments*

Operations in investigation, techniques
. *Serving all other operations*
BM6 3 . . Data processing & recording
9 . Physical methods in investigation
B . . Mechanical techniques
H . . Electromagnetic techniques
IB . . . Electronic techniques
K . . . Radiation techniques
KFT . . . . Scatter techniques

. *By action on phenomena investigated*
BM7 3 . . Particle production
* For acceleration, see BM8 T.
3K . . . Sources
3L . . . . Velocity selectors
3P . . . Separation
4G . . Detecting & indicating (together)
* See also Visualization & imaging BM8 GY
4J . . . Detection of particles (general), radiation detection of particles (general)
* For track visualization, see BM8 H.
. . . . Monitoring
4J7 C . . . . . Dosimetry (particle detection)
4JL . . . . Angular correction techniques
4JN . . . . Coincidence techniques

Physics B
Matter BLY
Particle physics BM
Practical & experimental particle physics
Detecting & indicating BM7 4G
. . Coincidence techniques BM7 4JN

BM7 5 Counting & detection (particles), counting (particles)
. Instruments
54 . Counters & detectors
* Synthesis by AY5 is modified here:
* Add to BM7 5A numbers & letters 5/U following AY4 if applicable.
5B . . Gas ionization counters, ionization counters
5C . . . Ionization chamber counters
5CE . . . . Integrating ionization chamber counters
* With long response time.
5CF . . . . . Lauritson electroscope
5CH . . . . Non-integrating ionization chamber counters
5D . . . Proportional counters
5E . . . . Geiger-Muller counters
5EG . . . . . Self-quenching Geiger counters
5EJ . . . . . Non-self-quenching Geiger counters
5F . . . . Gas-flow counters
5G . . . Spark counters
5H . . Solid state ionization counters, crystal counters
5J . . . Semi-conductor counters (particles), photodiode counters
5K . . . . Intrinsic semiconductor counters
5KN . . . . . NaCl semiconductor counters
5KP . . . . . CdS semiconductor counters
5KR . . . . . Diamond semiconductor counters
5L . . . . Junction semiconductor counters
5LN . . . . . Diffused semiconductor counters
5LS . . . . . Surface barrier semiconductor counters
5M . . . . . Ion drifted semiconductor counters
5MP . . . . . Li drifted semiconductor counters
5MS . . . . . Silicon semiconductor counters
5MT . . . . . Germanium semiconductor counters
5N . . Scintillation counters, scintillators
5N5 . . . Hodoscopes
5NP . . . Inorganic activated scintillators
5NR . . . Organic activated scintillators
5NT . . . Liquid scintillation counters
5P . . Four-pi counters
5Q . . Cerenkov counters, Cherenkov counters
5R . . Electron multiplier counters
5S . . Neutron counters
* For scintillation counters, see BM7 5N.
5ST . . . Gas counter with nuclides
5SU . . . . BF3 filled gas counter
5SV . . . . Helium filled gas counters
5SW . . . . Fission chambers
5T . . . Fast neutron detectors
5V . Other detector & counters
* Not classifiable under above classes. Arrange A/Z; eg
5VC . . Coincidence counters
5VF . . Foil activation (particle detection)

Particle beam techniques

Physics B
Matter BLY
Particle physics BM
Practical & experimental particle physics
Counting & detection BM7 5
. . Foil activation BM7 5VF

BM7 6 Measurement
F Simulation & modelling

Visualization & imaging (together)
H . Track visualization (particles)
. . Instruments
H5V . . . Hodoscopes
. . *Techniques defined by equipment*
HJ . . . Cloud chambers, Wilson cloud chamber
HK . . . . Diffusion cloud chambers
HL . . . . Expansion chambers (cloud chambers)
HM . . . . . Bubble chambers
HN . . . . . Luminescence chambers, scintillation chambers
HP . . . . . Spark chambers
HPL . . . . . Filmless spark chambers
HPM . . . . . TV camera spark chambers
HPN . . . . . Sonic spark chambers
HPP . . . . . Wire spark chambers
HQ . . . Emulsion techniques
HU . . . . Nuclear emulsions (particle detection), particle sensitive emulsions, photographic emulsions (particle detection)
HV . Visualization techniques
I . Imaging
* Add to BM7 I letters C/G following AY7 I if applicable (for imaging techniques other than by particle beams).
IJ . . Particle beam techniques, particle optics (beam handling)
* Focusing of particle beams to form images, analogously to the formation of light beams in optics.
IJ4 . . . Instruments
IJ4 FV . . . . Lenses (particle optics)
IJ4 FVU . . . . . Quadrupoles
IJ4 FVV . . . . . Electrostatic lenses (particle optics)
IJ4 FVW . . . . . Magnetic lenses (particle optics)
IJ4 FX . . . . Electrodes (particle optics), probes (particle optics), guns, particle optics
IJ4 FYE . . . . Beam expanders
IJ4 FYG . . . . Beam resonators
IJD . . . *Target materials*

Physics B
Matter BLY
Particle physics BM
Imaging BM7 I
Particle beam techniques BM7 IJ
Target materials BM7 IJD

Operations
BM7 IJP . Beam defection
IJQ . . Injection (particle optics)
IJR . . . Guns (particle optics)
IJS . Extracting (particle optics)
IJT . . Repetitive cycling
IJU . Positioning (particle optics)
IJV . . Alignment (particle optics)
IK . Focusing (particle optics)
IKG . . Beam trapping
IKH . . . Self-trapping
IKJ . . Electrostatic focusing
IKK . . Magnetic focusing
IKL . . Bunching
IKM . . Phase focusing
IKN . . Radial focusing
IKP . . Axial focusing
IKQ . . Strong focusing, alternating gradient focusing, AG focusing
IKS . . Momentum focusing
IKV . . Velocity focusing
ILE . Resolution
ILF . Magnification
ILG . Modulating (particle optics)
ILH . Shaping
ILJ . Splitting
ILK . Separation (particle optics)
ILL . Stacking (particle optics)
ILM . Scanning (particle optics)
ILP . Projection
ILR . Beam pulsing & switching
Properties of beams
IME . Beam profile (particle optics)
IMF . Beam diameter
IMG . Beam angle
IMH . Beam edges
IMJ . Contrast
IMK . Divergence (particle optics)
IML . Flux density (particle optics)
IMM . Emittance (particle optics)
IMV . Velocity (beam handling)
By type of beam
* Add to BM7 IN letters B/Y following BN;
* Add to BM7 I letters O/Q following B; eg
INP . Electron beams, electron optics, optoelectronics, optical electronics
INP X . . Cathode rays (electron optics)
IO . Nuclear magnetic resonance imaging
IQU . Ion beams, ion optics

Particle accelerators

Physics B
Matter BLY
Particle physics BM
Visualization & imaging
Imaging BM7 I
. . . Ion beams BM7 IQU

BM7 T Acceleration (particle physics), accelerator techniques
* For high-energy physics, see Particles - Practical physics BM3 6.
. Equipment & plant
T3U . . Particle accelerators, generators (accelerators)
T3U 3R . . . Materials
. . . *Parts of accelerators*
TF . . . . Particle sources
TG . . . . . Primary acceleration
* Using another, simpler accelerator.
TH . . . . Power supply (accelerators)
THJ . . . . . Voltage multipliers, voltage amplifiers
TJ . . . . Magnets (accelerators)
TJP . . . . Coils (accelerators)
TJV . . . . Vacuum chambers (accelerators)
TJX . . . . Storage rings (accelerators)
TK . . . . Waveguides (accelerators)
TKR . . . . . Resonant cavities
TKS . . . . . Superconducting resonant cavities
TL . . . . Other accessories
* Arrange A/Z.
. . . *Types of accelerators*
* Any given type may be qualified as follows (where the hyphen represents its classmark):
* Add to - letters F/L following BM7 T
. . . . *By particle accelerated*
* The preferred arrangement when a particular particle is accelerated is to locate under that particle (in BN/BQ); eg Positron - Accelerators - Linear BNP RF7 UN.
* An alternative (not recommended) is to cite the kind of accelerator first; in this case use this position & proceed as follows (where the hyphen represents the type of accelerator in BM7 TN/V):
* Add to -N letters B/Y following BN; eg Linear accelerators - Positron BM7 UNN PRF.
* Add to - letters O/Q following B; eg Van de Graaf - Heavy ion accelerator BM7 UHT QUS.
. . . . . *Specific particles*
* For general works on these as objects of acceleration (if the alternative above is followed)).
* Add to BM7 T letters N/Q following B; eg
TNP . . . . . Electron accelerators
TNP RF . . . . . Positron accelerators
TNV . . . . . Proton accelerators
TQU . . . . . Ion accelerators
TQU S . . . . . Heavy ion accelerators

Physics B
Particle physics BM
Acceleration BM7 T
Particle accelerators BM7 T3U
By particle accelerated
. . . Heavy ion accelerators BM7 TQU S

By shape
BM7 TT . Linear accelerators (general), linacs
TU . Orbital accelerators (general)
By field
TW . Fixed field accelerators
TX . Varying field accelerators
By focusing gradient
UC . Weak accelerators
UE . Strong accelerators, alternating gradient accelerators
By push
UG . Single push accelerators, electrostatic generators
* Uses very high voltage to give direct acceleration.
UH . . Van de Graaf generator
* See also Heavy ion accelerators- -Van de Graaf BQU S7U H.
UJ . . Tandem generator
UK . . Cockcroft Walton generator, voltage multipliers (accelerators)
UM . Multipush accelerators, resonant accelerators
UN . . Linear accelerators
* See also particular particles accelerated: eg Heavy ion linear accelerators - Wideroe BQU S7U NW.
UO . . Orbital accelerators (multipush), cyclic accelerators
UP . . . Cyclotron, fixed field orbital accelerators
* Usually assumed.
UR . . . . Isochronous cyclotrons
US . . . . . Fixed field alternating gradient cyclotrons
* See also Electron cyclotrons BNP 7US; Ion cyclotrons BQU 7US.
UW . . . . Synchrocyclotrons, frequency-modulated cyclotrons
* See also Ion synchrocyclotrons BQU 7UW
UX . . . . Microtrons
* See also Electron microtrons BNP 7UX
VC . . . Synchrotons, varying field orbital accelerators
* See also Electron synchrotons BNP 7VC; Proton synchrotons BNV 7VC
VG . . . . Alternating gradient synchrotons
* For Betatrons, see Electron synchrotons BNP 7VG; for Fixed field alternating gradient ring accelerators, see BNV 7VH.
VJ . . . . Bevatrons
VK . . . . Cosmotrons
VL . . . Ring accelerators
* Induction accelerated.
VM . . . Separated orbit accelerators
* Usually for protons.
VN . . . Colliding beam accelerators
VNS . . . . Storage rings

Particle physics

Physics B
Matter BLY
Particle physics BM
Practical & experimental particle physics
Operations in investigation, techniques
. . . . . Storage rings BM7 VNS

BM8 B Theoretical physics
F . Field theories
FG . . Unification field theories, unified theories
FH . . . Standard model
FJ . . . Grand unified theories, GUTS
* Of the four fundamental interactions. May or may not include gravitational force.
FL . . . Supersymmetry grand unified theories
* Includes gravitationl force.
FR . . Gauge theory
* For Weinberg model, see electroweak interactions, BMP J3.
FS . . . Gauge transformations
FT . . . Gauge invariance
GP . Non-field theories
GS . . String theories
GT . . . Membrane theories
GU . . . Superstring theories
H . Relativity theory
HFG . . Unification theory
M . Quantum theory
* For quantum number properties, see BMM D.
MF . . Quantum field theory (particles)
. . . *Properties*
MFM . . . . Renormalization
MFN . . . Non-linear quantum theory, non-local quantum theory
MFR . . . Gauge theory
MFW . . . . Asymptotic freedom (gauge theory)
MFX . . . Axiomatic quantum field theory
MGC . . . Schwinger source theory
MGO . . . Nuclear field theory
MJF . . . Relativistic quantum field theory
* See also quantum electrodynamics BNR
. Other special theories & models
SB . . Diffraction model
SC . . Composite models
SE . . Many body theory
SG . . Spirality theory
SH . . Helicity theory
SJ . . Form factors (elementary particles)
SL . . . Bootstrap theory, bootstrapping
SN . . Duality models, dual models, dual resonance models
SNP . . . Veneziano model
SP . . Peripheral models, exchange models
SPQ . . . Multiperipheral models, multi-Regge models
SR . . Regge pole model
SS . . Pomeranchuk poles & trajectories

Physics B
Matter BLY
Particle physics BM
Practical & experimental particle physics
. . . Pomeranchuk poles & trajectories BM8 SS

General processes/properties in particle physics

BM9 C . Time
CI . . Lifetime
* See quantum properties BMM FH
D . Space
* See also quantum properties parity BMM E and spin BMM K.
DJ . . Width
DK . . Radius
G . Systems characteristics
GV . . Conservation laws
* See also Symmetry & conservation BMM AI; Equivalence of energy & matter BAE 9GW
J . . Structure
JS . . . Symmetry
* Use symmetry as a quantized property (BMM B).

Energy interactions & forms

BMA F . Interactions of particles (general)
* Exchange of energy between two particles or between a particle and an electromagnetic wave.
* For interactions between two particles, see BMP
F2X . . Statistical models
F8B . . Theory
* Theories & models centred on particular types of particles, properties, etc. go with the particle, property, etc.; eg QCD (quantum chromodynamics) goes umder quarks (at BNR 8M).
G . . Thermodynamics
T . . . Transport processes

BMB . . Mechanics
B . . . Energy
* For energy associated with spin, see Spin BMM K.
C . . . . Energy ranges
* See also Energy loss BMC F
CD . . . . . Low & intermediate energy ranges
* < 1 GeV.
CE . . . . . Thermal energies
* < 5 eV.
CF . . . . . Resonance energies
* 5 eV-0.01 MeV.
CG . . . . . Fast energies
* 0.01-30 MeV.
CH . . . . . High energies
* 30-100 MeV.
CI . . . . . Very high energies
* > 1 GeV.
CJ . . . . . Superhigh energies
* > 1 TeV.

Interactions of particles

Physics B
Particle physics BM
Interactions of particles BMA F
Energy BMB B
. Energy ranges BMB C
. . Superhigh energies BMB CJ

BMB D . Energy levels (general)
* The detailed schedule for this class is given under atoms, at BPB D. Details from it may be used to qualify this more general class or any particular particle or group of particles to which its concepts might apply.
* For energy levels of particular particles, see the particle; eg Molecules - Charge transfer state BQB EW;
* For energy bands, see condensed matter BTX BF.
* Add to BMB letters D/F following BPB; eg
. . *Properties*
D9D J . . . Energy level width
* Measure of the uncertainty of a specified level.
. . *Processes*
DN . . . Transitions (energy levels)
DQ . . . Isomerism (energy levels)
. . *Types of energy states*
* For types special to a particle, etc. see the particle.
E . . . Stationary state, quantum states, eigenstate, energy eigenstate
EG . . . Ground state, lowest energy state
EK . . . Excited state
EM . . . Bound state, discrete energy level
EP . . . Unbound state
EQ . . . Degenerate level
* Reflecting more than one quantum state.
EQP . . . . Degeneracy
* When two or more quantum states have the same energy.
ER . . . Fine state, fine structure
ES . . . Hyperfine state
* When a magnetic field is applied.
EU . . . Multiplets (energy levels)
* Sets of related, closely spaced energy levels or quantum states.
* See also multiplets treated as groups of particles; eg isospin multiplets (strong interactions) BNQ T.
EUK . . . . Spin-orbit multiplets
EV . . . . Doublets state
EW . . . . Triplets state
F . Energy bands
* See Condensed matter BTX BF
BMC F . Energy loss of particles, energy-range relations, particle range (energy loss)
* See also Electron energy loss spectroscopy B7M NPQ; Channelling effect BMD UL
FH . . Stopping power
* Measure of energy loss of substance when a charged particle passes through it.
H Statics
J . Mass
JL . . Mass difference

Physics B
Particle physics BM
Interactions of particles BMA F
Statics BMC H
. Mass BMC J
. . Mass difference BMC JL

BMC L . Density

X Dynamics
BMD C . Velocity
D . Acceleration
K . *Forms of motion*
MW . . Orbits
N . . Rotation
. . . Momentum
NCV . . . . Angular momentum
NCX G . . . . . Complex angular momentum plane
NCX L . . . . . Regge poles & trajectories
NCX P . . . . . Pomeranchuk poles & trajectories
NS . . . Spin
* See quantum numbers properties of particles BMM K
U . Oscillation
UL . . Channelling effect
ULD K . . . Transients
BME XH . . Forced vibrations
Y . Radiation
BMF . Wave properties
2M8 L . . Wave function
* For parity, see BMM E
C . . Transmission, propagation
* For particle production, see BMF UJ.
CM . . Attenuation
F . . Coherence
G . . Emission
IN . . . Excitation
* For excited state, see Energy states BMB EH.
* See also Polaritons BVE RU
IP . . . . Coulomb excitation
IV . . . . Cascade reactions
J . . Decay
* Transformation into a more stable particle.
* For radioactivity, see Nuclear interaction BOF K.
JFC N . . . Damping
KQF . . . Half life
L . . Absorption
* See also inelastic scattering BMF TM
N . . Reflection
O . . Resonance
* For magnetic resonance, see BVJ FO; for resonances as types of particles, see BND T.
P . . Polarization
RU . . Coupling
* For K-coupling, see under Capture BMF UQ.
RV . . . Russell-Saunders coupling, 1-s coupling
RVV . . . . Intermediate coupling
RW . . . J-J coupling

Interactions of particles

Physics B
Matter BLY
Particle physics BM
Interactions of particles BMA F
Coupling BMF RU
. J-J coupling BMF RW

BMF S Collision, impact phenomena (particles)
* Nearness of approach producing mutual interaction short of impact. For actual contact, see capture BMF UM.
* When qualifying specific particles, use Scattering BMF T; eg Beta ray - Scattering BNP RDO FT.
* For annihilation, see BMF V.

SH . Cross-section (collisions)
* Area presented to the incident particle as a measure of the probability of a particular collision process

SH9 DH . . Mean free path (collisions)
* Usually implies molecules.

SHI . . Integral cross sections
SHK . . Total cross sections
SL . Elastic collision
SM . Inelastic collision
SN . . Collisions of the first kind, endoergic collisions
SO . . Collisions of the second kind, exoergic collisions
SP . One-dimensional collision
SQ . Binary collision
T Scattering
. Matrix algebra
T2T B . . S-matrix theory
T8H . Relativistic scattering theory
. *Processes & properties*
* See also Cross-section BMF SH

TCG . . Scattering losses
TEP . . Amplitude
TGS . . Shadows
. *Types of scattering*
* For the scattering of particular radiations or particles, see latter; eg Light - Rayleigh scattering BRL FTQ; Photons - Scattering - Compton effect BNG OFT.

TJC . . Angular distribution (scattering)
TJF . . Forward scattering
TJH . . Back scattering
TJL . . Elastic scattering
TJM . . Quasi-elastic scattering
TJN . . Inelastic scattering, absorption (collision)
TJP . . Multichannel scattering, multiple scattering?
TJQ . . Many body scattering
TJS . . Coherent scattering
TJT . . Incoherent scattering
TJV . . Critical scattering
TK . . Resonance scattering
* Incident wave penetrates nucleus.

TKT . . . Potential scattering
* Incident wave reflected at nuclear surface.

Physics B
Interactions of particles BMA F
Mechanics BMB
. . . Scattering BMF T
. . . . Types of scattering
. . . . . Potential scattering BMF TKT

BMF TM . . . . *Types of scattering special to a radiation/particle*
* See the radiation or particle; eg Light - Stimulated scattering BRL FTM; Charged particles - Coulomb scattering BNG FTS.

UF . . . Diffusion
UH . . . Dispersion
* Dependence of wave velocity on frequency; a property of the medium in which the wave is propagated.

. . . . Symmetry
UH9 JS . . . . . Crossing symmetries
UHL . . . . N/D method (dispersion)
UHN . . . . Form factors (dispersion)
UHP . . . . Multivariable dispersion relations
UJ . . . Particle production (general)
UL . . . . Pair production
* See also annihilation BMF V

UM . . . Recombination
* See charged particles neutralization BNH WFU M

UR . . . Capture
* Acquisition of an additional particle by nucleus, atom, molecule or ion.

US . . . . Electron attachment
* Capture by atom molecule or ion.
* For radiative capture, see BOF KU.

UT . . . . . K-coupling
* Capture of K-shell electron.

V . . . Annihilation
* Conversion, on collision, of a particle and its corresponding anti-particle into radiation.

X . . . Pulses
. . . Beams
BMG B . . . . Particle beams
BMH Electromagnetic properties
* For QED, see BNG 8S.

I . Electrical
* For charge, see quantum properties BMM M.

BMJ . Magnetic
JC . . Magnetic moment

Particle physics

Physics B
Matter BLY
Particle physics BM
Interactions of particles BMA F
. . . Magnetic moment BMJ JC

Special particle processes/properties

BMM AI . Invariance principle, symmetry & conservation (together)
AS . . Conserved properties
AV . . Not-conserved properties
B . . Symmetry
B2M . . . Mathematics
B2S A . . . . Symmetry groups
* For SU2, see BNQ MIT; for SU3, see BNQ TT.
B2S J . . . . . Lie groups
B2S KXQ . . . . . Poincare groups
. . . Theory
B8B . . . . Invariance theory, symmetry law
B8V L . . . . . Lorenz invariance
B8V P . . . . . Poincare invariance
BT . . . Spontaneous symmetry breaking
* See also Higgs mechanism BMP JNR S ; Mass (quantum properties) BMM H
BX . . . Non-linear symmetries, spectrum-generating symmetries
CC . . . Discrete symmetries
CD . . . . Charge conjugation (symmetry)
CE . . . . Time reversal (symmetry)
CF . . . . C invariance
CG . . . . CP invariance
CH . . . . CPT invariance
CJ . . . . T invariance
CK . . . Dynamical symmetries
CL . . . Chiral symmetries, chirality
* Relationship between spin vector & momentum vector, especially of neutrinos.
CP . . . Supersymmetry
* Hypothesizes a corresponding boson for every fermion and vice versa. See notes at BNJ and BNK.
CS . . . Unitary symmetry
* See Hadrons BNQ MDS
D . Quantum number properties
* The possible values characterizing a property in a physical system when it has been quantized, i.e. the property has been found to take only certain discrete values.
* The preferred arrangement is to collect all quantum numbers together here, enumerating the most prominent ones and providing for the others by synthesis (at BMM D9).
* An alternative (not recommended) is to locate any property/process quantized at its normal position in BMA/BML and qualify it by the general class for quantum number at B8N; eg charge quantum number BMH KB8 N.

Physics B
Matter BLY
Particle physics BM
Quantum number properties BMM D

* The order of concepts is the same as that in the general schedule (BMA/BML) but the notation is enumerated.

BMM D9 . *Quantum numbers other than those enumerated below*
* Add to BMM D numbers & letters 9/L following BM as applicable.
E . Parity, space reflection symmetry, P (parity)
. . Conservation
E9G V . . . P invariance, parity conservation
EG . . G-parity
* Quantum number associated with elementary particles having zero baryon number and strangeness. Conserved in strong interactions only.
EK . . Charge conjugation parity, C-parity
* Quantum number associated with elementary particles having zero charge, baryon number and strangeness.
* See also mesons BNS
FH . Duration (quantum numbers)
FK . . Short lived (quantum numbers)
FL . . Long lived (quantum numbers)
FM . . Mean life (quantum numbers)
FN . . Half life (quantum numbers)
G . Size (quantum numbers), dimensions (quantum numbers)
GJ . . Width (quantum numbers)
GK . . Radius (quantum numbers)
H . Mass (quantum numbers)
* For symmetry breaking, see BMM BT.
I . Isospin (general), isotopic spin, isospin isobaric spin, i-spin
* Usually implies hadrons; see BNQ MI.
J . Angular momentum
K . Spin
* For isospin, see BMQ I
KB8 P . . Wave mechanics
. . . Hamiltonian functions
KB8 P2M 8NH . . . . Spin Hamiltonians
KFT U . . Diffusion
KFT W . . . Spin disorder resistivity
KME . . Parity
KR . . Helicity
KS . . Spin orbit interaction
KW . . Non-zero spin
L . Decay
M . Charge
* For charge conjugation parity, see BMM EK.
MP . . Electrical moment
MT . . Hypercharge (quantum numbers)
* Sum of baryon number and strangeness.

Basic interactions

Physics B
Matter BLY
Particle physics BM
Quantum number properties BMM D
. Charge BMM M
. . Hypercharge BMM MT

BMM NJ . Magnetic moment
NO . Magnetic resonance
. *Properties defined by particles in system*
* Add to BMM P letters B/Y following BN; eg
PM . . Lepton number
PT . . Baryon number
R . *Properties special to particular particles*
* This position allows features of particles to be treated as properties (for use as qualifiers) as distinct from using R (in instruction at BNB) to introduce them as specifiersr; eg Resonances - Charm (property) BND TMR U; but Resonances - Charmed (type) BND TRR U.
* Add to BMM R letters A/X following BN; eg
RS . . Colour (quantum numbers)
RU . . Charm (quantum numbers)
RW . . Strangeness
Interactions by energy expenditure
* Add to BMN letters D/J following BMB C with the additions indicated.
BMN J . Superhigh energy interactions
L . Inclusive interactions
N . Exclusive interactions
P . Large momentum transfer interactions
V Basic interactions, fundamental interactions
X . Exchange forces (particles), field particle exchange
* Forces acting between particles due to exchange of some property (charge, spin, etc).
. . *Agents*
BMO . . . Exchange particles (general), gauge bosons, field particles (general), virtual intermediate bosons
* Particles which mediate the interaction between the fundamental particles; carriers of the forces between material particles (see BND X). Their status as particles is somewhat problematical; they are sometimes considered as being constituents of the material particle and their action has been likened to that of pulses. Their general nature is closely dependent on the interactions they mediate and this is the reason for their location here.
* For particular exchange forces, see the type of interaction; eg Electomagnetic interactions - Photons BNG O.
BMP G . Gravitational interactions Generally speaking, particles are too small to be subject to gravitational forces. This position is provided for documents which consider these forces in relation to the other fundamental forces.
. . Exchange particles
GO . . . Gravitons

Physics B
Particle physics BM
Energy interactions & forms
. . Basic interactions BMN V
. . . Gravitational interactions Generally speaking BMP G
. . . . . Gravitons BMP GO

BMP J . . . Electroweak forces, electroweak interactions
J8W . . . . Weinberg-Salam theory
JHP . . . . Current
JHP 2RS . . . . . Current algebras (electroweak forces)
JHP 8B . . . . . Current theory (electroweak forces)
JHY X . . . . . Neutral weak currents, neutral current interaction
JM . . . . Quantum numbers
JMP M . . . . . Lepton number (electroweak forces)
. . . . Exchange particles
JO . . . . . W-bosons, intermediate bosons, intermediate vector bosons, IVBs, intermediate mesons
JON . . . . . Z-bosons
JOP . . . . . Higgs boson, Higgs field
JOP Q . . . . . Higgs mechanisms
* Generate mass for IVBs.
JOR . . . . . Goldstone boson
. . . . Electromagnetic forces (elementary particles)
* See under charged particles BNG
L . . . . Weak interactions
* Only quantum numbers Q (charge) and B (baryon number) are conserved.
LHY X . . . . . Neutral weak currents
. . . . . Exchange particles
LO . . . . . W-bosons, intermediate bosons
. . . Strong interactions
* See Hadrons BNQ PN
BMQ . . Interactions with another particle
* This position is used only when qualifying a particular particle.
* When dealing with reactants, the usual rule in BC2 is to cite the product first. However, in particle physics the exact relationships between the reactants are not always easily established and do not provide a basis for a consistent citation order. The rule is therefore to cite first the reactant which files latest in the schedule, followed by the second reactant; eg interaction between leptons (BNM) and hadrons (BNQ) is BNQ QM..
* Add to BMQ letters B/X following BN;
* Add to BMQ Y letters O/Q following B; eg Molecule - Atom interactions BQQ YP.
BMV *Parts of particles*
* Theoretically, elementary particles cannot exhibit constituent parts. But a number of theories relate to the possible possession of parts.
BMW . Composite particles, composite models
* Particles considered to be substructures or constituents of other particles.
* See also Exchange particles BMO; Partons BNU RBP; Quarks BNR.

Elementary particles

Physics B
Matter BLY
Particle physics BM
Parts of particles BMV
. Composite particles BMW

Types of particles

BNB . Elementary particles (types), fundamental particles (types)
* Do not qualify this general heading (BNB) by processes and properties, etc.; for these, see BMA/BMQ.
* Each type of particle (including its species, if any) may be qualified or specified in detail as follows (where the hyphen represents the particle's classmark):
* Add to - numbers & letters 2/9,A/Q following BM (for Processes & properties); eg Electrons - Emission BNP FG.
* Add to -QY letters V/W following BM (for Parts)
* Add to -R letters B/X following BN (for Types by other types of particle); eg Low energy electrons BNP RLD.
* Add to -S letters O/Q following B (continuing Types by other types of particle) if applicable.
* (Types special to the particle)
* Letters -T/Y are used for types special to the particle; eg BNT T Dibaryons.

B . . *Types by non-quantum property*
* Add to BNB letters B/L following BM if applicable.

V . . *Types by part*
* Add to BNB letters V/X following BM if applicable; at present this is only hypothetical.

BNC . . *Types by special & quantum number property*
* Add to BNC letters B/Y following BMM, except for those indicated below (which are enumerated separately); eg

AS . . . Conserved particles
* As in strong interactions.

AV . . . Not-conserved particles
* As in weak interactions.

CP . . . Supersymmetric particles
CQ . . . . Scalar particles
CR . . . . Sparticles
FH . . . *By lifetime, mean life*
* See BND RH

H . . . *By mass*
* See BNL Q...

K . . . *By spin*
* See BNJ...

M . . . *By charge*
* See BNF X...

. . *By origin, source*
* For works considering the properties, etc of these particles per se (in terms of particle theory). For works regarding the particles as features of their origins, see the relevant context; eg cosmic rays in D Astronomy.

BND A . . . Particle accelerator particles
* Produced by accelerators.

AR . . . Nuclear reactor particles
B . . . Atmospheric particles

Physics B
Matter BLY
Particle physics BM
Elementary particles BNB
By origin, source
. Atmospheric particles BND B

BND C . Cosmic rays
* See also Very high energy particles BNL G

D . . Showers (cosmic rays), bursts (cosmic rays)
DP . . . Penetrating showers
DQ . . . Soft showers
DR . . . Cascade showers
E . . Primary radiation (cosmic rays)
F . . Secondary radiation (cosmic rays)
G . . Radiofrequency cosmic rays
H . . Solar cosmic rays
* See also Cosmic ray photons BNG ORD C

K . *Source defined by a given radiation or particle*
* Use this position only when specifying a given particle.
* Add to BND K letters A/Y following BK;
* Add to BND L letters following BL;
* Add to BND letters N/Q following B; eg

KJ . . Ionizing radiation (source of particles)
LY . . Gamma rays (source of particles)
* Eg Neutrons - (By source) - Gamma rays BNW RDL Y.

OXH D . . Deuterons (source of particles)
* Eg Neutrons - (By source) - Deuterons BNW ROX C.

By aggregation

RC . Cluster aggregates (particles)
RD . Many-particles systems
RE . . Micelles
RF . . Few-particles systems

By lifetime, mean life

RH . Stable particles
* Photons, leptons, mesons, baryons.

RJ . Unstable particles
* With finite life, however long.

SL . . Long-lived particles
SN . . Short-lived particles
T . . . Resonances
* With greatly increased probability of interaction with colliding particles at the resonance energy.

TT . . . . Psi particles, J particles
TTM D . . . . . Quantum number properties
TTM RU . . . . . Charm (quantum number)
TU . . . . B resonances
V . . . Virtual particles, virtual quantum
* The uncertainty principle allows particles to be created for short periods in apparent violation of the energy conservation laws; eg pairs of virtual electrons and positrons in a complete vacuum.

Elementary particles

Physics B
Matter BLY
Particle physics BM
Elementary particles BNB
By lifetime, mean life
. . . Virtual particles BND V

By role in interaction
* For exchange particles (exchange forces), see BMO.

BND X . Material particles (general)
* Ultimate constituents of matter; usually assumed to be point-like, with 1/2 integral spin.
* Do not use to specify particular particles.

By relation between quantum numbers

BNF . Anti-particles, anti-matter, conjugate particles
* Retain mass and spin of their image particle, but all other quantum values are reversed. All particles except photons and pi-mesons have their anti-particle.
* See also Annihilation BMF V

By charge

X . Electromagnetic field particles & waves, electromagnetic forces (particle physics), charged particles (general)

BNG . . Electromagnetic interaction (particles)
. . . Quantum mechanics
8M . . . . Quantum electrodynamics, QED
. . . . . Matrices
8M2 M . . . . . Feynmann diagrams
. . . Scattering
FTS . . . . Coulomb scattering, electrostatic scattering
FTT . . . . Rutherford scattering
KJ . . . Ionizing radiation, nuclear radiation
. . . Exchange particles
O . . . . Photons
* For gamma rays (high energy photons), see BLY.
O36 . . . . . Practical & experimental
* See also applications of photon interaction; eg Photon correlation spectroscopy B7M NGO.
. . . . . Scattering
OFT . . . . . Compton scattering
OMC P . . . . . Supersymmetry
OMC Q . . . . . Photinos
OQ . . . . . *Interactions with other particles*
OQG O . . . . . Photon-photon interaction
. . . . . *Types of photons by source*
ORD C . . . . . Cosmic ray photons
* For cosmic ray X-rays, see X-rays BLX Q.
ORD H . . . . . Solar cosmic ray photons
ORL F . . . . . High energy photons
BNH . . Electrically charged particles
* See also Alpha particles (nuclei) BOX HH; Electrons BNP; Positrons BNP RF; Protons BNV; Ions BQU; Cerenkhov radiation BNL N.
U . . . Positive particles
V . . . Negative particles

Physics B
Particle physics BM
Elementary particles BNB
By charge
. . Electrically charged particles BNH
. . . Negative particles BNH V

BNH W . . Zero charge particles, neutral particles
. . . Recombination
WFU M . . . . Neutralization
BNI . . Magnetically charged particles, magnetic monopoles, magnetic particles
* Hypothetical particles, analogous to the electrical electron and proton, with north and south magnetic charges.
. . . Magnetic relaxation
JBL R . . . . Spin-lattice relaxation
MM . . . Quantum number properties
. . . . Magnetic moment
MMN T . . . . . Gyromagnetic ratio
* Ratio of magnetic moment to angular momentum.
* See also Nuclear magnetic resonance BMO NO

By spin

BNJ . Fermions (general)
* Have 1/2 integral spin and observe Fermi-Dirac statistics. Comprise Leptons (BNM) & Baryons (BNT); all elementary particles except bosons.
MCP . . Supersymmetry
MCQ . . . Fermion partners of bosons
* The names of these are formed by changing the terminal -on of the boson to -ino; eg photino BNG OMC Q

BNK . Bosons (general)
* All elementary particles except Fermions. Have integral spin and observe Bose-Einstein statistics.
* For gauge bosons, see Exchange particles BMO.
MCP . . Supersymmetry
MCQ . . . Boson partners of fermions
* The names of these are formed by prefacing the name of the fermion by s-; eg squarks BNR MCQ.
PJ . . Electroweak interactions
T . . Axions
* Hypothetical light bosons, postulated to explain features of quantum chromodynamics (BNR 8M).

By energy characteristics

BNL C . Monoenergetic particles
D . Low energy particles
* <1 GeV.
E . Intermediate energy particles
F . High energy particles
* >1 GeV.
* For cosmic rays, see BND C.
G . Very high energy particles
H . Excited particles
* With more energy than in ground state.

Electrons

Physics B
Matter BLY
Particle physics BM
Elementary particles BNB
By energy characteristics
. Excited particles BNL H

BNL K . Linear energy transfer particles
* See also Transfer reactions (nucleon-nucleon) BOQ UNR
L . . High linear energy transfer particles
M . Tachyons
* Postulated to have velocity exceeding that of electromagnetic waves.
* See also cosmic rays BND C
N . . Cerenkov radiation, Cherenkhov radiation

By mass, & strength of interaction shown
Q . Light particles (general)
R . Medium heavy particles (general)
S . Heavy particles (general)
* Heavier than pi-mesons.
* See also specific types; e.g. muons BNN; baryons BNT.
U . Generations
* Families of particles.
W . . Lepton & quark systems (generations)
BNM . Leptons
* Fermions which do not participate in strong interactions.
. . Exchange particles
O . . . W-bosons
PJ . . Electroweak interactions
QM . . Lepton-lepton interactions
RLR . . Heavy leptons (general)
* For muons, see BNN; for heavier-than-muon leptons, see BNN V.
BNN . . Muons, mu-mesons
. . . By source
RDC . . . . Cosmic ray muons
. . . *By charge*
RHU . . . . Positive muons
RHV . . . . Negative muons
U . . . Muonium
* See also Positronium BNP RFT
V . . Heavier than muon leptons
X . . . Tauons, tau particles
BNO . . Neutrinos
* Thought to have zero mass.
. . . Antiparticles
RF . . . . Antineutrinos
. . . *By associated particle*
RN . . . . Muon neutrinos
RNR F . . . . . Muon anti-neutrinos
RNX . . . . Tauon neutrinos

Physics B
Particle physics BM
Elementary particles BNB
Leptons BNM
Neutrinos BNO
. . Tauon neutrinos BNO RNX

BNP Electrons
* See also Beta radiation BNP RDO; Beta decay BOF KR
36 . Practical & experimental
. . Separation
73P . . . Millikan separation (electrons)
. Theory
8T . . Dirac electron theory
BD . Energy levels, energy states
* For electron energy states in particular media, see medium; eg in condensed matter BTX BD.
* See also Photons BNG O
BEK . . Excited state
. Emission
* For photoelectric effect, see BIV (general) and BVI V (solids).
FG . . Electron field emission, autoemission, cold emission
FGT . . . Secondary emission
FRU . Electron attachment, electron interaction
* See also radioactivity, BOF K
. Collision
FS . . Electron impact, electron beam interaction, electron ionization
* See also Atomic electron impact excitation BPF IXP; Molecular electron impact excitation BQF IXP
. Scattering
FT . . Compton scattering, Compton effect
. Annihilation
FV . . Electron pair annihilation, positron annihilation
GB . Electron beams
. . Instruments
GB4 V . . . Electron lenses, magnetic lenses
MK . Spin
MKF O . . Electron spin resonance
MKF P . . Electron spin polarization
. . Magnetic relaxation
MKJ CP . . . Electron spin-lattice relaxation
. *Types of electrons*
* For orbital electrons, see Atomes BPD T.
. . *By source*
RDC . . . Cosmic ray electrons
RDK J . . . Delta radiation
* Secondary electrons (or protons) emitted as a result of ionizing radiation.
RDO . . . Beta particles, beta radiation
* For beta decay, see BOF KS.
RDQ . . . Normal electrons
. . *Aggregations, generations*
RDR D . . . Many-electron systems
RDR F . . . Electron pairs

Hadrons

Physics B
Particle physics BM
Elementary particles BNB
Leptons BNM
. . . Aggregations, generations
. . . . Electron pairs BNP RDR F

. . . Anti-particles
BNP RF . . . . Positrons, positons, positive electrons
RFQ P . . . . . Electron-positron interactions
* For Electron pair annihilation see BNP RDR FFV.
RFQ PFS . . . . . Elecron-positron collision
* Producing hadrons.
RFT . . . . . Positronium
* Short-lived association between positron and electron.
* See also Muonium BNN U
RFU . . . . . Orthopositronium
RFV . . . . . Parapositronium
. . . *By charge*
RHV . . . . Normal negatively charged electrons
. . . *By energy*
RLD . . . . Low energy electrons
RLF . . . . High energy electrons
RLJ . . . . Free electrons
* See also conduction electrons (semi-conductors) BVI FN
. . . *By associated particle*
RNO . . . . Electron neutrinos
RNO RF . . . . Electron anti-neutrinos
T . . . Inner shell electrons
V . . . Valency electrons
W . . . Hot electrons

BNQ Hadrons (general)
* All elementary particles except leptons and photons.
8B . Theories
8SC . . Composite hadron models
8SL . . Bootstrap models
8SN . . Duality models
8SP . . Peripheral models
8SP Q . . . Multiperipheral models
8W . . Hadron classification models
* For Parton model, see BNU RBW; for Quark model, see BNR.
. *Properties & processes*
. . Very high energy
BCI . . . Hadron-induced very high energy interactions
BD . . Energy levels
BEM . . . Bound state
FS . . Collision
FSH . . . Cross section
FT . . Scattering
. . . Matrix algebra
FT2 TB . . . . S-matrix
. . . Models
FT8 RP . . . . Regge poles, Reggeons

Physics B
Elementary particles BNB
Hadrons BNQ
Scattering BNQ FT
. Models
. . Regge poles BNQ FT8 RP

. Inelastic scattering
BNQ FTJ N . . Hadron induced inelastic scattering
FTJ O . . . Two-particle final states (hadron scattering)
FTJ P . . . Many particle final states (hadron scattering)
HK Charge
* See quantum properties BNQ MM
M *Quantum number properties*
MC . Symmetry
MDS . . Unitary symmetry, internal symmetry
* For the hypothetical groups characterized by this property, see multiplets BNQ T.
* See also Isospin BNQ MI
MH . Mass
MI . Isospin, isotopic spin, isobaric spin
MIR . . I (isospin)
MIS . . I3 (isospin)
MIT . . . SU2
MJ . Angular momentum
MM . Charge
MMR . . Charge conjugation parity, C-parity
MMT . . Hypercharge
MPT . . Baryon number
MRW . Strangeness, strange particles
* See also Hypercharge BMM MT
PJ Electroweak interactions
* For electromagnetic interactions, see BNG.
. Weak interactions
PL . . Weak hadron interactions
PN Strong interactions (general)
* Extremely short range force, particularly that holding protons and nueutrons together in the atomic nucleus. Primarily the result of the exchange of gluons between quarks, the constituents of hadrons; see BNR O.
PNO . Exchange particles
* For gluons, see under quarks BNR O.
Q *Interactions with other particles*
QGO . Photon-hadron interactions
QGO FT . . Scattering
QH . Charged hadron interactions
QM . Lepton-hadron interactions
QMP L . . Weak lepton-hadron interactions
QMQ H . . Charged lepton-hadron interactions
QN . . Muon-hadron interactions
QP . Electron-hadron interactions
QPF T . . Scattering
QPF TJL . . . Elastic scattering
QPF TT . . . Compton scattering
QQ . Hadron-hadron interactions
. Nucleus-hadron interactions
* See Nucleus BOQ Q

Mesons

Physics B
Particle physics BM
Elementary particles BNB
Hadrons BNQ
Properties & processes
. . Nucleus-hadron interactions

Types of hadrons
. *By part*
BNQ RBW . . Composite models
. *By special & quantum property*
RCB . . Symmetrical
* For multiplets, see BNQ T.
. *By lifetime*
RDT . . Resonances
T . Multiplets, isospin multiplets
* Hypothetical groups of particles in which all the particles are regarded as different states of the same particle. All have the same spin (J), parity (P) & baryon number (B).
* See also Hadron symmetry BNQ MC
U . . SU3
* Special unitary group of 3x3 matrices, predictive of hadronic multiplet structure.
. . . Theory
U8U . . . . Eightfold way (hadron theory), octet theory
BNR . . . Quarks
* Hypothetical particles corresponding to the basic building blocks of the SU3 group. Their charge is not the usual electron charge (e) but integral multiples of 1/3e.
. . . . Theory
8M . . . . . Quantum chromodynamics, QCD
8MG . . . . . Quark confinement
. . . . *Properties*
MCP . . . . . Supersymmetry
* See also Axions BNK T
MCQ . . . . . Squarks
MRR . . . . . Colour
* See also the types of quarks below characterized by different manifestations of this property.
MRU . . . . . Charm
. . . . Exchange particles
O . . . . . Gluons
. . . . *Types of quarks*
RF . . . . . Antiquarks
SF . . . . . Flavours
. . . . . *With 2/3 the proton charge*
SP . . . . . Up (quark flavours)
SU . . . . . Charm (quark flavours)
T . . . . . Top (quark flavours)
. . . . . *With 1/3 the proton charge*
TX . . . . . Down (quark flavours)
U . . . . . Strange (quark flavours)
UX . . . . . Bottom (quark flavours)
VF . . SU4
VH . . SU6

Physics B
Particle physics BM
Elementary particles BNB
Hadrons BNQ
Multiplets BNQ T
. SU6 BNR VH

BNS Mesons
* Bosons, with mass usually intermediate between electrons and nucleons.
* For mu-mesons, see under Leptons BNN.
. Interactions
FJ . . Decay
FJM . . . Leptonic decay (mesons), semi-leptonic decay
FJM P . . . . Pi leptonic decay
FJM T . . . . K leptonic decay
FJQ . . . Hadronic decay (mesons)
. *Properties*
ME . . G-parity (mesons)
Q . . *Interactions with other particles*
* For Meson-nucleon interactions, see Nucleons BNU QS; for Meson-hyperon interactions, see Hyperons BNX QS.
QS . . . Meson-meson interaction
. *Types*
. . *By property*
RCR U . . . Charmed mesons
. . *By source*
RDC . . . Cosmic ray mesons
. . *By time*
. . . Resonances
RDT . . . . Meson resonances, vector resonances (mesons)
RDU . . . . . A-resonances (mesons)
RDV . . . . . B-resonances (mesons)
. . *By mass*
RLQ . . . Light mesons
RLR . . . Heavy mesons
T . . Pi-mesons, pions
TFK . . . Decay
TQ . . . *Interactions with other particles*
* For pion-baryon interactions, see Baryons BNT QST.
TRH . . . Charged pi-mesons
TRH U . . . . Positive
TRH V . . . . Negative
U . . K-mesons, kappa mesons, kaons
UFJ . . . Decay
UFJ Q . . . . Hadronic decay (kaons)
URH . . . Charged kaons
URH W . . . Zero charged kaons
V . . Eta-mesons
VFJ . . . Decay
VPL . . . Weak interactions
VPN . . . Strong interactions

Nucleons

Physics B
Elementary particles BNB
Hadrons BNQ
Mesons BNS
. . Eta-mesons BNS V
. . . Strong interactions BNS VPN

BNS W . . . Psi particles, J particles, psi mesons, psi resonances
WMB . . . . Symmetry
WMR R . . . . Colour (quantum number)
WMR U . . . . Charm (quantum number)
WQQ T . . . . Multiplets
WQQ U SU3
WQR . . . . . Quarks
WQR MM . . . . . Charge
Y . . Other mesons
* Arrange A/Z by equivalent of Greek initial letters; eg Upsilon meson BNS YU; Rho meson BBS YP

BNT Baryons
* Fermions which decay into nucleons by emisssion of mesons.
FC . Propagation
FCS . . Baryon photoproduction
FJ . Decay
FJM . . Leptonic decay (baryons)
FJQ . . Hadronic decay (baryons)
. *Interactions with other particles*
* For baryon-hadron interaction, see Hadronic decay BNT FJQ Q
QM . . Baryon-lepton interaction
QST . . Pion-baryon interaction
QSU . . Kaon-baryon interaction
. *Types*
RDT . . Baryon resonances
RF . . Anti-baryons
RH . . Charged baryons
T . . Dibaryons

BNU . Nucleons
. . Motions
DKT . . . Collective motions
. . . . Transitions
DKT BDN . . . . Collective transitions
MK . . Spin
. . . Exchange of spin direction
MKN X . . . . Bartlett force
MW . . Composite models
* For parton model, see BNU RBP.
. . *Interactions with other particles*
QU . . . Nucleon-nucleon interactions
* See also Nuclear forces BOB G
QUF L . . . . Absorption
QUF S . . . . Collisions
QUF T . . . . Scatter
QUM NX . . . . Exchange forces
QUM NYH . . . . . Heisenberg force

Physics B
Hadrons BNQ
Baryons BNT
Nucleons BNU
Interactions with other particles
. . . Heisenberg force BNU QUM NYH

BNU QUM NYM . . . Majorana force
Types
RBW . Partons
* See also Quarks BNR
. . Interactions with other particles
RBW QST . . . Parton-pion interactions
. *By aggregation*
RDR F . . Few-nucleon systems
RF . Antinucleons

BNV Protons, protonium
7TC . Accelerators
7VC . . Proton synchrotons
7VD . . . Zero gradient synchrotons
7VG . . . Alternating gradient synchrotons
7VH . . . . Fixed field alternating gradient synchrotons, ring accelerators
. *Interactions with other particles*
QU . . Proton-nucleon interactions
QUR BW . . Parton-proton interactions
QUR BWF T . . . Scatter
QV . . Proton-proton interaction
QVW . . . Proton-proton inclusive interaction
. *Types*
* For delta radiation, see BNP RDK J.
RDC . . Cosmic ray protons
RF . . Anti-protons
T . . Delayed protons

BNW Neutrons
AT . Transport
. Interactions
. . Flux
CW . . . Neutron flux, neutron economy
CWC L . . . . Neutron flux density
FJ . . Decay
FKS . . . Beta decay
FQ . . Diffraction
FUF . . Diffusion
FUH . . . Multigroup diffusion
. . *Interactions with other particles*
QW . . . Neutron-neutron interactions
. *Types of neutrons*
. . *By non-quantum properties*
. . . Beta decay
RBF KS . . . . Delayed neutrons
. . *By source*
RDA . . . Particle accelerators (neutron source)
RDA R . . . Nuclear reactors (neutron source)
RDC . . . Cosmic ray neutrons
RDL Y . . . Gamma radiation neutrons
RDN V . . . Protons (neutron source)
RDO XHD . . . Deuterons (neutron source)

Atomic & nuclear physics

Physics B
Hadrons BNQ
Baryons BNT
Nucleons BNU
. . . By source
. . . . Deuterons BNW RDO XHD

BNW RDT . . . Resonances
RDU D . . . . Dineutrons
RDU F . . . . Tetraneutrons
RF . . . Anti-neutrons
. . . *By energy*
RLC . . . . Monoenergetic
RLD . . . . Thermal neutrons, slow neutrons
RLD N . . . . Cold neutrons
* Very low energy neutrons, from reactor.
RLE . . . . Intermediate neutrons
RLF . . . . Fast neutrons
* >1MeV.

BNX Hyperons
* All long-lived baryons other than nucleons.
. Interactions with other particles
* For hyperon-nucleus interactions, see BOQ X.
PS . . Meson-hyperon interactions
. *Types*
RF . . Anti-hyperons
T . . Lambda particles
. . . Interactions with other particles
TPW . . . . Lambda-neutron interactions
* For hypernuclei, see BOX FT.
. . . Anti-particles
TRF . . . . Antimatter state (hyperons)
U . . Sigma particles
URF . . . Antiparticles
URF RH . . . . Charged
URF RHN . . . . Zero charged
URH . . . Charged
URH W . . . Zero charged
V . . Xi particles, cascade particles
VRF . . . Antiparticles
VRH . . . Charged
VRH W . . . Zero charged
W . . Omega particles, omega-minus particles
* See also Unitary symmetry BMM CS
X . . Other hyperons
* Arrange A/Z.

Physics B
Matter BLY
Particle physics BM
Types of particles
. . . . . Other hyperons BNX X

BNY Atomic & nuclear physics (together)

BO . Nuclei, nucleus
* Works on nuclear physics using the term in its very broad sense (to include elementary particles) should go at BM.
* Note that the instructions at BNB for qualifying and specifying any given particle, using letters A/S, are adjusted for nuclei (from BOQ YC onwards) in order to accommodate the special extension of the reactions facet. So Types of nuclei begin at BOR, not BOX D.
BO3 6 . . Practical & experimental physics
BO7 H . . . Track visualization
IJ . . . . Particle beam handling
T . . . Acceleration
TN . . . . *Types of accelerator*
. . *General properties*
BO8 B . . Theory & models
M . . . Quantum theory
M2M 8G . . . . Perturbation theory
M2M 8GE . . . . . Born approximation
P . . . . Wave mechanics
P2M 9NS . . . . . Schrodinger's equation
VC . . . Unified model (nucleus)
VE . . . Nuclear scattering model
VF . . . . Optical model (nucleus)
VH . . . Nuclear clustering model, alpha-particle model (nucleus)
VJ . . . Nuclear collective model
VK . . . . Nuclear cranking model
VL . . . . Liquid drop model (nuclear), drop model (nuclear)
VN . . . Nuclear shell model, independent particle model (nucleus)
VP . . . Hartree-Fock model
VR . . . Other models
* Arrange A/Z; e.g. Resonating group structure model BO8 VRR.
. . *Processes & properties*
BO9 D . . . Spatial dimensions
* For size of nucleus as a quantum number property, see BOM G.
G . . . Systems characteristics
GV . . . . Conservation
J . . . . Structure
* See also nuclear models BO8 B
JS . . . Symmetry
* Use BOM B
. . . Configuration
JV . . . . Shape of nucleus
JVH . . . . . Nuclear deformation
JVS . . . . . Surfaces (nucleus)

Nuclei

Physics B
Particle physics BM
Atomic & nuclear physics BNY
Nuclei BO
Processes & properties
. . . Surfaces BO9 JVS

BOA F Energy interactions & forms
* For nuclear reactions in the narrow sense, see BOR.

BOB . Mechanics
B . . Nuclear energy (general)
* For Nuclear reaction energy, see BOR BB
D . . . Nuclear energy levels For binding energy, see Nuclear forces BOB_GH.
D9D . . . . Energy level width
DN . . . . Transitions (nuclear energy levels), nuclear electromagnetic transition
* Change from one quantum energy level to another.
DNF . . . . . Internal conversion (nuclear transitions)
DNG . . . . . Mossbauer effect
DNJ . . . . . Branching & mixing ratios (nuclear transitions)
DNL . . . . . Nuclear energy levels lifetime
DQ . . . . Nuclear isomerism
* Existence of different energy states in otherwise identical nuclides and resulting in different radioactivity characteristics.
DQD N . . . . . Transitions
DQD O . . . . . Isomeric transitions
DQD P . . . . . Independent decay
DQD R . . . . . Stable isomers
DR . . . . Isobaric analogue state
DS . . . . Nuclear collective state
. . Force
G . . . Nuclear forces
* For nuclear exchange forces, see BON X.
GH . . . . Binding energy
GJ . . . . . Mass defect
GK . . . . . Coulomb energy (nuclear forces)
GN . . . . Nucleon-nucleon forces
* For charges, see BOM M.
* See also nucleon-nucleon interaction BNU QU
GN8 S . . . . . Meson field theory
GS . . . . . Central force
GT . . . . . Tensor force
GU . . . . . Repulsive force
GV . . . . . Spin-orbital coupling
IM . . . Moments
BOC H . . Statics
J . . . Nuclear mass
* For mass as a quantum number property, see BOM H.
JP . . . . Packing fraction
L . . . Nuclear density
P . . . Nuclear stability

Physics B
Particle physics BM
Atomic & nuclear physics BNY
Nuclei BO
Statics BOC H
. Nuclear stability BOC P

BOC X Dynamics
BOD E . Kinetics
EN . . Coupled channels
N . Rotation
* For angular momentum, see quantum properties BOM J; for spin, see BOM K.
BOF . Wave motion
G . . Emission nuclear reactions
GR . . . Prompt emission processes
GS . . . Delayed emission processes
IN . . . Excitation
IV . . . . Cascade reactions
J . . Decays, disintegrative processes (nuclear reactions), nuclear spontaneous reactions
* For nuclear reactions resulting from the bombardment of nuclei by particles, see BOR. Use the latter also for works dealing with nuclear reactions in general.
J8B . . . Nuclear decay theory
JFC N . . . Damping
JN . . . *By radiation/particle emitted*
* Add to BOF JN letters A/Y following BN; eg
JNW . . . . Neutron product reaction
JP . . . Spallation
* Very vigorous decay, usually following bombardment.
JT . . . Transmutation
K . . . Radioactivity
* Spontaneous decay of heavy elements.
KQF . . . . Half-life, lifetime
KQW . . . . Atmospheric radioactivity
* Note preceding BND A applies here also.
* See also DS Atmosphere
KQX . . . . . Fallout
KR . . . . Alpha radioactivity, alpha decay
KS . . . . Beta radioactivity, beta decay
KT . . . . . Nuclear electron capture (radioactivity), electron attachment (radioactivity)
* Transformation of the nuclide in which a bound electron merges with the nucleus.
KU . . . . . Radiative capture, orbital electron capture
KV . . . . . K-capture, K-coupling
KW . . . . . L capture
KX . . . . Gamma radioactivity
O . . Resonance
* See also magnetic effects BOJ FO
OQ . . . Giant resonances
OR . . . Isobaric analogue resonance
OS . . . Yield (nuclear reactions)
. . Polarization
P . . . Nuclear polarization, nuclear orientation, nuclear alignment

Nuclei

Physics B
Particle physics BM
Atomic & nuclear physics BNY
Nuclei BO
Polarization
. Nuclear polarization BOF P

BOF S Collisions, bombardment (nuclear reactions)
* See also Compound nuclear processes BOF SR.
S8B . Theory
S8W K . . Many-body theory
S8W L . . Lane-Robson theory
S8W N . . Yang theory
SBB . Energy
SBF N . . Excitation functions
SBF T . . Threshold energy
SCU . Momentum
* For angular momentum, see quantum number properties, BOM J.
SCU R . . Transverse momentum
SCU U . . Longitudinal momentum
SH . Cross sections
SH9 DJ . . Mean free path
. *Particular forms of collisions*
SI . . Impact
* With high rate of change of momentum, generating large contact forces.
SL . . Elastic collision
SM . . Inelastic collision
SN . . . Collisions of the first kind
SO . . . Collisions of the second kind
SP . . One dimensional collision
SQ . . Binary collision
SR . . Compound nuclear processes
T Scattering (nuclear reactions)
* In narrow sense: energy is transferred, but without removal or addition of nucleons.
. *Special quantum properties*
TB3 V . . Form factor (nuclear scattering)
TJL . Elastic scattering
* For Coulomb scattering, see BNG FTS.
TJM . Quasi-elastic scattering
TJN . Inelastic scattering
. *Special to nuclei*
TT . . Shadow scattering
TU . . Few neutron scattering
UR Capture
* For the capture of specific particles, see nuclear reactions; eg nuclear muon capture BOQ NFU R.
* See also Direct nuclear reactions BOR W; Electron attachment (radioactivity) BOF KT
US . Stripping
* A part of the incident nucleus merges with target nucleus, the remainder proceeding largely unchanged.
USP . . Oppenheimer-Phillips process, OP process
UT . Pick-up reaction

Physics B
Particle physics BM
Atomic & nuclear physics BNY
Nuclei BO
Mechanics BOB
. . . . Pick-up reaction BOF UT

BOH Electro-magnetic phenomena
BIM . Electromagnetic moment
I . Electricity
IBI M . . Electric moment
* See Charge BOM MP
K . Charge
* See quantum number properties, BOM M
BOJ . Magnetism
* For nuclear magnetic moment, see BOM NJ
FO . . Resonance
* For nuclear magnetic resonance, see BOM NO.
BOL Y Nuclear matter
* For nuclear energy in general, see BOB B.
BOM Quantum number properties
B . Symmetry
E . Nuclear parity
FM . Mean life
* For lifetime in radioactivity, see BOF KQF.
G . Size of nucleus
GJ . . Width
GK . . Radius
H . Mass
HP . . Packing fraction
I . Isospin (nuclei), isotopic spin (nuclei)
* A quantum mechanical variable.
* See also Hadrons BN
J . Angular momentum (nuclei)
. Spin
K . . Nuclear spin
KR . . . Helicity
KS . . . Orbital spin
KT . . . . Spin orbital coupling (nucleus)
KV . . . Intrinsic spin
M . Charge (nucleus)
MJ . . Charge distribution
MK . . Charge symmetry
ML . . Charge independence
MP . . Nuclear electric moment, nuclear quadupole moments
MT . . Hypercharge (nuclei)
. *Magnetic properties*
NJ . . Nuclear magnetic moment
NK . . . Nuclear magnetic dipole moment
NL . . . Nuclear magnetic quadrupole moment
NM . . . Nuclear magnetic octopole moment
O . . . Nuclear magnetic resonance (general), NMR (general)
* Most of the literature relates to its application in spectroscopy, etc (see B7M OO).
OP . . . . Double nuclear magnetic resonance
OQ . . . . . Internuclear nuclear magnetic resonance, INDOR

Nuclear reactions

Physics B
Nuclei BO
Quantum number properties BOM
. Magnetic properties
. . . . Double nuclear magnetic resonance BOM OP
. . . . . Internuclear nuclear magnetic resonance BOM OQ

BOM OQV . . . . . Nuclear Overhausen effect
OR . . . . Nuclear quadruple resonance
PM . Lepton number (nuclei)
PT . Baryon number (nuclei)
RU . Charm (nuclei)
RW . Strangeness (nuclei)
Interactions by energy expenditure
BON J . Superhigh energy reactions
L . Inclusive interactions
V Basic interactions
X . Nuclear exchange forces
BOQ *Interactions with other particles*
* This class (BOQ) takes general studies of the interactions betweeen a particle and a nucleus, without specification of the role(s) played by each.
* Reactions in which roles are specified are dealt with in classes BOR/BOX
* Add (retroactively) to BOQ letters B/X following BN; eg Hyperon-nucleus reactions BOQ X.
* Add (retroactively) to BOQ Y letters O/Q following B; eg Nucleus-nucleus reactions BOQ YO.
DC . Cosmic rays-nucleus reactions
DCF T . . Scattering
DLY . Gamma radiation-nucleus reactions
GO . Photon-nucleus reactions
. . High energy photon reactions
GOR LF . . . Photodisintegration
M . Lepton-nucleus reactions
N . . Muon-nucleus reactions
NFU R . . . Capture
P . . Electron-nucleus reactions
* For nuclear-electron capture, see Beta decay BOF KT.
Q . Hadron-nucleus reactions
QFT . . Scattering
S . . Meson-nucleus reactions
U . . Nucleon-nuclear reactions
. . . *Special reactions*
UNR . . . . Transfer reaction
* Nucleons are exchanged between target nucleus and the projectile nucleus.
* See also Linear energy transfer, BNL K
URD RF . . . Few nucleons-nuclear reactions
W . . . Neutron-nucleus reactions
. . . . Capture
WFU R . . . . . Neutron radiative capture
X . . Hyperon-nucleus reactions
XFU R . . . Hyperon capture
YO . *Nucleus-nucleus reactions*

Physics B
Particle physics BM
Atomic & nuclear physics BNY
Nuclei BO
Interactions with other particles BOQ
. Nucleus-nucleus reactions BOQ YO

BOR Nuclear reactions (general)
* Reactions between nucleus & bombarding particles.
* The instructions at BNB for the subdivision of any given particle are amended here; see second note at BO above.
* Class here (BOR) general works on all nuclear reactions, including spontaneous ones. For spontaneous reactions alone, see BOF J.
* Reactions in which roles are specified are dealt with in classes BOS/BOX (see the instructions preceding BOS).
* See also radiation and wave phenomena (BOF/BOG) for constituents of reactions
2M . Mathematics
2SA . . Group theory (nuclear reactions)
2SA G . . . G-matrix
2SA K . . . K-matric
2SA R . . . R matrix
. Theory & models
8VL . . Optical model
. Energy
BB . . Nuclear reaction energy, Q (nuclear reactions), Q-factor (nuclear reactions), Q-value
BB9 2D . . . Energy distribution (nuclear reactions)
* Between target amd interacting particles.
BCJ . . . Mass-energy relation
. *By general characteristics*
* For entoergic and exoergic nuclear reactions, see Collisions BOF SM.
PN . . Natural nuclear reactions
* For spontaneous decay, see BOF K.
PR . . Artificial nuclear reactions
Q . . Chain reactions
* For cascade reactions, see Excitation BOF IV.
QT . . Knock-on nuclear reactions
R . . Cyclic nuclear reactions
S . . Rearrangement processes (nuclear reactions)
T . . Transfer reactions
V . . Exchange reactions
W . . Direct nuclear interactions
* See also capture reactions BOF UR
X . . Compound nuclear processes
* Forming highly excited and short-lived nuclei immediately after collisions.
X8V . . . Jackson model

Nuclear reactions by roles played
* Reactions in which roles are specified observe the following citation order (which can also be seen in the inverted filing order of the arrays concerned):

Nuclei

Physics B
Matter BLY
Particle physics BM
Atomic & nuclear physics BNY
Nuclei BO
Nuclear reactions by roles played

* (1) By target nuclide (2) By incident & emitted particle or radiation combined (3) By projectile, incident particle (4) By particle emitted (5) By product nucleus. For example: Lithium as target, proton as projectile, with He4 as product BOV HLT VSH H.

BOS . *By product nucleus*
* Add to BOS letters D/R following BOX; eg
HD . . Deuteron (product nucleus)
HJ . . Helium 4 (product nucleus), alpha particle (product)
. . . Scattering
HJF T . . . . Alpha particle-nucleus scattering
HL . . Lithium (product nucleus)
JC . . Magnesium (product nucleus)
. *By emitted radiation or particle*
* Add to BOS letters T/Y following BOT; eg
T . . Gamma radiation
V . . Proton (emitted particle)
W . . Neutron (emitted particle)
YR . . Nuclear fragments (emissions)
BOT . *By projectile, incident radiation or particle*
. . *Nuclides as projectiles*
* Add to BOT letters D/R following BOX; eg
HD . . . Deuteron (projectile)
HE . . . Triton (projectile)
HH . . . Alpha particle (projectile in nuclear reactions)
. . *Incident particles/radiation*
T . . . Gamma rays (incident radiation)
U . . . Meson (projectile)
V . . . Proton (projectile)
W . . . Neutron (projectile)
X . . . *Other particles*
* Add to BOT X letters B/Y following BN;
* Add to BOT Y letters O/Q following B; eg
XGO . . . Photon projectile, photonuclear reaction, photodisintegration
YQU S . . . Heavy ion projectile
BOU . *By incident & emitted radiation/particle combined*
* Add to BOU letters B/Y following BOT; eg
V . . Proton (incident & emitted particle combined)
* For an example, see under chlorine as target, bombarded by protons with the emission of 6 protons & 4 neutrons, and production of magnesium 28: BOV KLU VSW SJC.

Physics B
Particle physics BM
Atomic & nuclear physics BNY
Nuclei BO
By incident & emitted radiation/particle combined BOU
. Proton BOU V

By target nucleus
BOU Y . Nuclear bombardment targets
* Add to BOV letters D/H following BOX; eg
BOV FN . . Radioactive nuclei
. . *By mass number*
GA . . . Nuclei with mass numbers 1-5
. . *By element*
HD . . . Deuteron (target nucleus)
HE . . . Triton (target nucleus)
HH . . . Helium (target nucleus), He4 (target nucleus), alpha particles(target nuclei)
HI . . . He-3 (target nucleus)
HL . . . Lithium (target nucleus)
HLT V . . . . Bombarded by protons
HLT VSH H . . . . . He4 product
HLT VSH HBH L . . . . . Mass defect
. . . *Other nuclides*
* Add to BOV letters I/N following C in Chemistry, except for thorium, uranium & plutonium (which are separately notated); eg
IU . . . . Beryllium (target nucleus)
JK . . . . Carbon (target nucleus)
KL . . . . Chlorine (target nucleus)
KLU V . . . . . *Bombarded by & emitting protons*
KLU VSW . . . . . *Emitting neutrons also*
KLU VSW SJC . . . . . *With production of magnesium*
NCF . . . Neptunium (target nucleus)
P . . . Thorium (target nucleus)
Q . . . Uranium (target nucleus)
R . . . Plutonium (target nucleus)
S . . . Trans-uranium nuclides (target nuclei)

Nuclear fusion

Physics B
Particle physics BM
Atomic & nuclear physics BNY
Nuclei BO
By target nucleus
. . . Trans-uranium nuclides BOV S

By mode of energy release

BOW . Fission
* Disintegration of heavy nuclei into two or more lighter ones, with a loss of mass. Usually the result of the impact of a neutron.
* Add to BOW letters A/V following BO; eg

3W . . Fission reactors
. . Theory & models
8VL . . . Liquid drop model (fission)
BB . . Energy
FK . . Spontaneous fission
. . *By product particle*
S . . . Fission output
SV . . . . Protons (fission products)
SW . . . . Neutrons (fission products)
SW9 BG . . . . . Number of neutrons
SWT . . . . . Prompt neutrons
SWV . . . . . Delayed neutrons
SY . . . . Fission fragments
. . *By projectile*
TW . . . Neutrons
. . . Photon
TXG O . . . . Photofission, nuclear photoeffect
. . . . *By particle emitted*
TXG OST . . . . . Gamma fission reaction
TXG OSV . . . . . Proton fission reaction, photoproton reaction
TXG OSW . . . . . Neutron fission reaction, photoneutron reaction
TYQ US . . . Heavy ion
UY . . *By target*
VP . . . Thorium
VQ . . . Uranium
VR . . . Plutonium

BOX B . Nuclear fusion, thermonuclear reactions
* Nuclear reaction between two light atomic nuclei to form a single heavier nucleus of greater binding energy (usually helium) with the loss of mass producing nuclear energy.
* Add to BOX B letters A/V following BO; eg

B3W . . Fusion reactors
B7T 3U . . Accelerators
BV . . Thermonuclear systems
BVT . . . Plasmas (thernonuclear systems)

Physics B
Atomic & nuclear physics BNY
Nuclei BO
Nuclear fusion BOX B
Thermonuclear systems BOX BV
. Plasmas BOX BVT

BOX BWB . Plasma confinement, containment (plasmas)
. . *Properties, parameters*
BWC E . . . Lawson criterion
* Product of particle density and containment time.
BWC F . . . Containment time
BWC H . . . Confinement temperature
BWC J . . . Plasma density
BWC K . . Inertial confinement
BWC L . . Radiofrequency confinement
BWC M . . Magnetic lines
BWC N . . . Internally generated magnetic lines
BWC P . . . Externally generated magnetic lines
BWC Q . . . Open magnetic lines
BWC R . . . Closed magnetic lines
BWE . . Magnetic wells
* Configuration of magnetic field for containment.
BWF . . . Pinch effect (general)
BWG . . . Toroidal field confinement
BWH . . . . Zeta pinch
BWI . . . . Theta pinch
BWK . . . . Tokamak, stellarator
BWL . . . Linear field confinement, axial field confinement
BWM . . . . Magnetic bottle
BWN . . . . . Magnetic mirrors
BWP . . . Cusp systems
BWQ . . . Baseball coils
BWS . Rotating plasma systems
BWT . Plasma injection systems
BWV . Thermal systems (nuclear fusion)
BWX . Fusion energy extraction

Types of fusion

BX . *By product nucleus*
* Add to BOX BX letters D/R following BOS; eg
BXH H . . Helium (fusion product)
BXH L . . Lithium (fusion product)
BY . *By projectile*
* Add to BOX BY letters D/R following BOX; eg
BYH B . . Hydrogen 1 (fusion projectile)
BYH D . . Deuteron, hydrogen 2 (fusion projectile)
BYH E . . Triton, hydrogen 3 (fusion projectile)

Nuclei

Physics B
Particle physics BM
Atomic & nuclear physics BNY
Nuclei BO
Energy interactions & forms BOA F
. . . . . Triton BOX BYH E

Types of nuclei
* See second note under BO.
* For Nuclides, see BPV

BOX D . *By other particles*
* Add (retroactively) to BOX D letters A/X following BN if applicable.
* Add (retroactively) to BOX E letters O/Q following B if applicable.

. *By various characteristics*

FC . . Isotopes (nuclei)
FE . . Active nuclei
FH . . Low energy nuclei
FL . . Stable nuclei
FN . . Unstable, radioactive nuclei
* See also compound nuclear processes BOR X

FP . . . Daughter products
FQ . . . Fissile nuclei
FR . . . Fissionable nuclei
FS . . . Radioactive series, nuclear series, nuclear decay series, radioactive decay series
FT . . . Hypernuclei
* Extremely unstable particles produced when a lambda particle replaces a neutron in a nucleus.

. *By mass number*

GA . . Nuclei with mass numbers 1-5
GB . . . Few-nucleon systems
GD . . Nuclei with mass numbers 6-19
GG . . Nuclei with mass numbers 20-38
GJ . . Nuclei with mass numbers 39-58
GL . . Nuclei with mass numbers 59-89
GN . . Nuclei with mass numbers 90-149
GQ . . Nuclei with mass numbers 150-189
GS . . Nuclei with mass numbers 190-219
GV . . Nuclei with mass numbers 220 or more
GW . . . Superheavy nuclei

. *By element*

HB . . Hydrogen nucleus
HD . . . Deuterons, deutons
* For deuterons as product nuclei, see BOS HD; as targets, see BOV HD.

. . . . *Interactions with other particles*

HDQ YO . . . . . Deuteron-nucleus interactions
HDR DC . . . . Cosmic ray deuterons
HE . . . Tritons
. . . . *Interactions with other particles*
HEQ YO . . . . . Triton-nucleus interactions
HEX B . . . . Hypernuclei
* A lambda particle can replace the neutron in a nucleus to form a very unstable hypernucleus.

HEX D . . . . . Hypertriton

Physics B
Matter BLY
Particle physics BM
Atomic & nuclear physics BNY
. . . . Hydrogen nucleus BOX HB
. . . . . Hypertriton BOX HEX D

BOX HH . . . . Helium nucleus, alpha-particles
HHR DC . . . . . Cosmic ray alpha particles
HI . . . . . Helium 3 nucleus
. . . . . *Interactions with other particles*
HIQ YO . . . . . Helium 3-nucleus intractions
HJ . . . . . Helium 4 nucleus
HL . . . . Lithium nucleus
. . . . *Other nuclei, by element*
* Add to BOX letters I/Q following C Chemistry, except for thorium, uranium & plutonium, which are notated separately; eg

IU . . . . . Beryllium nucleus
JC . . . . . Magnesium nucleus
JK . . . . . Carbon nucleus
KL . . . . . Chlorine nucleus
P . . . . . Thorium nucleus
Q . . . . . Uranium nucleus
R . . . . . Plutonium nucleus

BOY Atomic & molecular & ion physics (together)
* Add to BOY letters A/Y following BP so far as applicable; eg

BD . Energy levels
NV . Basic interactions
PL . . Weak interactions
PLB H . . . Van der Waals forces

BP Atoms (physics), atomic physics, physics of single atoms
* Structure, processes and properties of the atom regarded as a whole. For the atom as a constituent of molecular reactions, see Chemistry (Class C).
* Add to BP as instructed in the notes under BNB.

BP8 MF . Quantum field theory
BP9 D . Size
DK . . Atomic radii
BPB B . Energy
* For atomic energy, see Nuclear energy BOB B.

D . . Energy levels (atoms), electron energy states (atoms)
* Narrowly, the energy state of a particular electron in orbit around the central nucleus of an atom. More broadly, the possible energy value of an electron or nuclear particle.
* Strictly, the state can be considered separately from the level, although they are usually treated as synonymous. If state is distinguished from level, use BPB E Quantum states.
* For energy levels of particular particles, see the particle; eg Molecules - Charge transfer state BQB EW; for energy bands, see condensed matter BTX BF.

Atoms

Physics B
Matter BLY
Particle physics BM
Atoms BP
Energy BPB B
Energy levels BPB D

Processes & properties
* For degeneracy, see degenerate level BPB EQ.
* Add to BPB D numbers & letters 2/G following B; eg

BPB D9D J . Energy level width
DDN . Rotation
DFP . Polarization
DJ . Electron density of state
DK . Fermi level
* Probability of locating electrons in a level.
DL . Electron correlations
DM . Population inversion
* When higher energy state has more electrons than a lower state.
* For pumping, see Lasers (techniques) B6K SFI O.
DN . Transitions
* See also radioactivity BOF K
DN2 M . . Sum rules
DNM . . Quantized electron transition
DQ . Isomerism
Structure
DT . Orbitals, electron configuration (atoms)
DU . . Electron shells (atoms)
DU8 W . . Principal quantum number
DUL . . Larmor orbit, Larmor precession
Types of energy states
E . Stationary state
EG . Ground state
* See also atomic orbitals, BPB DT
EK . Excited state
EKL . . Doubly excited states (atoms)
EKM . . . Auger effect, Auger ionization
* Loss of energy on ionization.
EKN . . Atomic metastable state
EKR . . Atomic resonant state
EKS . . . Flashback resonance
EKT . . Metastable state
EM . Bound state
. . Mathematics
EM2 M9N . . . Bethe-Salpeter equations
EP . Unbound state
EQ . Degenerate level
EQP . . Degeneracy
ER . Fine state, atomic fine structure
ES . Hyperfine state
ET . . Isotope shift
Types of energy levels special to a particle, etc.
EU . Multiplets
EW . . Atomic triplet state
* Two unpaired electrons.

Physics B
Atoms BP
Energy BPB B
. Energy levels BPB D
. . Types of energy levels special to a particle, etc.
. . . . Atomic triplet state BPB EW

BPB F . . Energy bands
* See condensed matter BTX BF
. Force
G . . Atomic force, interatomic potential
BPC H Statics
J . Atomic mass, atomic weight
* For mass as quantum number, see BPM H; for isotopes, see BPW.
JM . . Relative abundance
BPE Y Radiation
. Spectra
BPF E . . Atomic spectra
* For atomic energy level transitions, see BPB DN; for hyperfine structure, see BPB ES.
E9D J . . . Atomic spectral line breadth
EML . . . Atomic fluorescence
IN . Excitation
IXP . . Electron impact excitation (atoms)
P . Polarization
S . Collision
* For collisions between two specified particles, see particle interractions BPQ.
SM . . Atomic inelastic collisions
BPG B . Atomic beams
BPH IBH Electric field
IBH FP . Polarizability
Charge
K . Atomic charge
KO . . Electric moment
* See BPM MP
BPJ BH Magnetic field
JC Magnetic moment
BPK J Ionizing radiation
JFC . Ionization
Quantum properties
BPM MP . Electric moment
BPN V Basic interactions
BPP L . Weak interactions
LBG . . Van der Waals forces (atomic)
Interactions with other particles
* For molecule-atom interactions, see BQQ YP; for ion-atom interaction, see BQU QYP.
* Add to BPQ letters B/Y following BN;
* Add to BPQ Y letters O/Q following B; eg
BPQ P . Electron-atom interaction
PFI N . . Excitation
PFS . . Collision
PFT . . Scattering
PRF . Positron-atom interactions
PRF FT . . Positron-atom scattering
YP . Atom-atom interaction

Particle physics

Physics B
Matter BLY
Particle physics BM
Atoms BP
Interactions with other particles
. Atom-atom interaction BPQ YP

BPQ YV *Parts of atoms*
* For electrons, see BNP; for nucleons, see BNU; for nucleus, see BO.

Types of atoms

BPR B . *By properties other than quantum properties*

BR . . Exotic atoms
* Unstable atoms in which electrons are replaced by another negative particle.
* See also Positronium BNP RFT

. *By quantum property*

CB . . Symmetry groups (atoms)

. *By aggregation*

DRC . . Atomic clusters

. *By charge*

H . . Charged atoms
* See Ions BQU

HW . . Neutral atoms, uncharged atoms

. *By mass*

LR . . Medium-heavy atoms

LS . . Heavy atoms

. *By other particles*

N . . Muonic atoms

Q . . Hadronic atoms

S . . . Mesic atoms

. *By individual element*
* Add to BPU letters I/Q following C Chemistry (but notation is provisional); eg

BPU HB . . Hydrogen atom

HBR HW . . . Hydrogen neutral atom

HH . . Helium atom

BPV . Nuclides, nuclear species
* Atoms characterized by their atomic number, mass number and the constitution of their nucleus.

. . Graphs

2HU . . . Segre charts

. . *Types*

R . . . Mirror nuclides

S . . . Wigner nuclides

BPW . . . Isotopes, isotopic nuclides
* Two or more nuclides which have identical nuclear charge (atomic number) but differ in nuclear mass.

. . . . *Operations*

73P . . . . . Isotope separation

73Q . . . . . Electrolytic separation (isotope)

73R . . . . . Gas diffusion separation (isotopes)

73S . . . . . Centrifugation (isotopes)

BPX . . . . Radioisotopes, radiactive isotopes, radioactive nuclides, radionuclides
* For nuclear decay series, see BOX FS.

R . . . . . Stable isotopes

Physics B
Particle physics BM
Atoms BP
. . . Types
. . . . Isotopes BPW
. . . . . Stable isotopes BPX R

BPX S . . . . Fissionable nuclides

T . . . . Fissile nuclides

BPY . . . Individual nuclides
* Specified by mass number as follows:
* Add to BPY letters A/W following BOX G; eg BPY A Nuclides with mass numbers 1-5.

BQ Molecules, molecular physics, physics of single molecules
* See also Stereochemistry C
* Add to BQ as instructed in the notes under BNB.

BQ9 D . Size

DS . . Molecular volume

JV . Configuration
* Use BQB DV

. Energy levels, energy states

BQB D . . Molecular electronic structure
* For valency, see Chemistry C

DQ . . . Isomerism
* Having the same atomic and mass numbers but with different energy states.
* For stereoisomerism, see Stereochemistry C

DQM . . . . Molecular rotational isomerism, molecular internal rotation

DT . . . Molecular orbitals, wave function (molecules)

. . . . Calculation

DT7 5 . . . . . Molecular orbital calculation

DT7 5A . . . . . Specific calculations
* Arrange A/Z; eg NDO calculation BQB DT7 5N.

DV . . . . Molecular configurations

DW . . . Molecular orientation, molecular alignment

ER . . . Molecular fine structure

ES . . . Molecular hyperfine structure

. . . *Special types of energy level*

EW . . . . Charge transfer state

IM . . Molecular moment

. . Internal forces

BQC D . . . Bond energy

F . . Energy loss
* See also Spin BQM K

FH . . . Molecular stopping power
* Energy loss per molecule normal to the motion of the particle travelling a distance.

H . Statics

. . Mass

J . . . Molecular weight

BQD N . Rotation
* For internal rotation, see BQB DQM.

NX . . Libration

V . Vibration

. . Energy states

VAB D . . . Molecular vibronic states

Ions

Physics B
Matter BLY
Particle physics BM
Molecules BQ
Vibration BQD V
. . Molecular vibronic states BQD VAB D

BQF E Spectra
. Breadth
E9D J . . Molecular spectral line breadth
IN Excitation
. Dexcitation
IQ . . Molecular internal conversion
IR . . . Non-radiative transition
IU . Molecular metastable state
IXP . Molecular electron impact excitation
Decay
J . Molecular dissociation
* Breakdown of molecules into smaller molecules or atoms.
M Refraction
O Resonance
Polarization
P . Molecular polarizability
S Collision
SM . Molecular inelastic collision
SR . Molecular energy transfer collision
T Scattering
TL . Molecular elastic scattering
Beams
BQG B . Molecular beams
BQH K Charge
KL . Charge transfer state
Magnetism
BQJ KS . Molecular magnetic susceptibility
BQM Quantum number properties
K . Spin
BQN V Basic interactions
BQP L . Weak interactions
LBG . . Van der Waals forces (molecular)
Interactions with other particles
* For chemical reactions see Chemistry (Class C)
* Add to BQQ letters B/X following BN;
* Add to BQQY letters O/Q following B; eg
BQQ W . Neutron-molecule interaction
WFR U . . Coupling
WFT . . Scattering
YP . Atom-molecule interaction
YQ . Molecule-molecule interaction
. Ion-molecule interactions
* See Ion physics BQU QYQ
Types of molecules
BQT D . Diatomic molecules
E . Polyatomic molecules
G . Conjugated molecules
M . Macromolecules
. . Energy states
MBD . . . Macromolecular energy state

Physics B
Matter BLY
Particle physics BM
Molecules BQ
. . . . Macromolecular energy state BQT MBD

BQU Ions, ion physics
* Electrically charged atoms, molecules or groups of atoms or molecules.
* Add to BQU as instructed in the notes under BNB.
AG . Thermodynamics
* See also Ion temperature BQU GV
BD . Energy levels
* For ionized state, see BKJ FC.
CH . Statics
CJ . . Mass
CJ9 2H . . . Change of mass (ions)
. . Density
CLM . . . Ion concentration
. Velocity
DC . . Ion mobility
DU . Oscillation
* See also ion optics BQU F
. Radiation, wave motion
* For ionization, see BKJ
F . . Ion optics
FG . . . Emission
FGT . . . . Secondary ionic emission
FGU . . . . Thermionic ionic emission
FIN . . . Excitation
* See also Metastable ions BQU TIU
. . . Decay
FJ . . . . Ionic dissociation
FS . . . Collision
* See also Recoil ions BQU TS
FT . . . Scattering
FUF . . . . Diffusion
. . . . Beams
GB . . . . . Ion beams
GV . Temperature
HIB H . Electric fields
HK . Charge
HL . Potential
. Current
HP . . Ionization current
L . Ion optics
* Use BQU F.
Q . Interactions with other particles
* Add to BQU Q letters B/Y following BN;
* Add to BQU QY letters O/Q following B: eg
QYP . . Atom-ion interactions
QYQ . . Molecule-ion interactions
QYQ FS . . . Molecule-ion collisions

Bulk matter physics

Physics B
Matter BLY
. . . Interactions with other particles BQU Q
. . . . . Molecule-ion collisions BQU QYQ FS

. . . *Types of ions*
. . . . *By charge*
BQU RHU . . . . . Cations, positive ions
RHV . . . . . Anions, negative ions
RHW . . . . . Ion pairs, paired ions
RHY . . . . . Stripped atoms
* Ionized atoms from which at least one electron has been removed.
RI . . . . Magnetic ions
RJ . . . . Complex ions
S . . . . Heavy ions
. . . . . *Interactions with other particles*
SQY O . . . . . Heavy ion and nucleus interactions
T . . . . *By origin*
* Add to BQU T letters A/Y following BF
* Add to BUQ U letters A/F following BG; eg
. . . . . Excitation
TIU . . . . . Metastable ions
. . . . . Collision
TS . . . . . Recoil ions
UH . . . . . Electrolytic ions
BQV F . . . . Free ions
BQW . . . . *By element*
* Add to BQW letters I/Q following C Chemistry; eg
HA . . . . . Metal ions
HB . . . . . Hydrogen ion
BQX Vacuum physics
* See also Vacuum techniques B6Q X

Physics B
Vacuum physics BQX

BR Bulk matter physics, macrophysics
* Physics of aggregates of molecules (including plasmas).
BR3 6 . Practical physics
B . . Equipment & materials
BR4 . . . Instrumentation
BR6 2 . . Investigative techniques
9 . . Physical methods
BR7 6 . . Measurement
BR8 B . Theoretical physics
. *General properties*
BR9 D . . Spatial dimensions
EK . . Isotropy (bulk matter)
EL . . Anisotropy (bulk matter)
G . . Systems characteristics
J . . . Structure
JV . . . . Shape, configuration
Q . . . Control systems
QG . . . . Open loop systems
QJ . . . . Closed loop systems, feedback control systems

BRA F . Energy interactions & forms
* Add to BR letters A/L following B amplified as indicated below.
G . . Thermodynamics
* In the sense, somewhat narrower than that at BAG, of the transfer of energy to, from and between macroscopic bodies.
* For thermal properties of bulk matter, see BRG P.
T . . . Transport processes & properties
* Most of the literature refers to these properties in particular energy forms or states of matter, q.v. This class takes only general works on transport properties in bulk matter.
* For mass transfer, see BAX.
T2M 9L . . . . Equations
T2N 9N . . . . . Bolzmann equation, transport equation
V . . . . Diffusion (general)
X . . . . Mass transfer
* See also Heat transfer BRG Q

Mechanical vibrations & oscillations

Physics B
Bulk matter physics BR
Energy interactions & forms BRA F
Thermodynamics BRA G
. . Mass transfer BRA X

BRB Mechanics
G . Forces
IM . . Moments
J . . Pressure
JBH . . . Pressure field
JP . . . Low pressure physics
JQ . . . High pressure physics
JW . . External forces
K . . . Deformation
* For works on deformation in bulk matter in general; most of the literature concerns the solid state and the detailed schedule is given at BVB K.
* Add to BR letters BK/CB following BV; eg
KL . . . . Stress/strain relations
L . . . . . Stress
P . . . . . Shear
T . . . . Strain
BRC B . . . . Elasticity
H . Statics
L . . Density
N . . Equilibrium
P . . Stability
S . Motion

X . Dynamics
BRD A . . Kinematics
C . . . Velocity
D . . . Acceleration
E . . Kinetics
* For special elements & attributes of flow, see Fluids BSG E.
. . . Theory
E8B . . . . Kinetic theory (bulk matter)

S . . Periodic motion
TB . . . Harmonics
BRE . . . Mechanical vibrations & oscillations, sonics
* The term Sonics is sometimes used for sound waves narrowly, in which case use BRG H.
* Add to BRE A letters A/DS following B;
* Add to BRE letters B/Y following BE; eg
. . . . *Operations*
72 . . . . . Control
72B . . . . . Hysteresis
72D . . . . . Damping
72E . . . . . Isolation damping
73D . . . . . Generation, reproduction
* As an operation in investigation.
* For synthesis of sound, see BRG H73 N
. . . . *Properties & processes*
B . . . . . Harmonics
BH . . . . . Nodes

Physics B
Bulk matter physics BR
Mechanical vibrations & oscillations BRE
. Properties & processes
. . Harmonics BRE B
. . . Nodes BRE BH

BRE BQ . . . Anharmonics
D . . Frequency
DD . . . Mode
. *Types of vibrations*
* For vibration in a particular state of matter, see latter; eg BTE Vibration & oscillation in gases.
VV . . *By property*
. . *By direction/transience & waveform*
WJ . . . Linear vibration, non-sinusoidal vibration
WL . . . Non-linear vibration, sinusoidal vibration, angular vibration, circular vibration
WM . . . . Random vibration
WN . . . . . Chatter
WP . . . Rotational vibration
WPQ . . . . Critical speed
WPR . . . . Hunting
WR . . . Transverse vibration
WS . . . . Shear vibration
* See also S waves (seismology) DG
WU . . . Longitudinal vibration
WV . . . . Axial vibration
XC . . *By degree of freedom*
. . *By internal/external origin*
XG . . . Free vibration, natural frequency
XH . . . Forced vibration
XL . . *By origin as to action*
* Arrange A/Z (eg blowing, plucking).
. . *By origin as to body vibrating*
XM . . . Vibrating bodies
* For acoustic phenomena in particular types of materials, see BRG J.
. . . . *By solid medium*
XN . . . . . Linear bodies (vibration)
XNG . . . . . Strings
XNH . . . . . Rods
XNJ . . . . . Straight rods
XNK . . . . . Curved rods
XNN . . . . . Tuning forks
XP . . . . . Two-dimensional bodies (vibration)
XPM . . . . . Membranes (vibration)
XPN . . . . . Diaphragms (vibration)
XPP . . . . . Plates (vibration)
XS . . . . . Three-dimensional bodies (vibration)
XSP . . . . . Pendulums
XT . . . . *By specific medium*
* Arrange A/Z (eg bells, foghorns)

BRF Waves
* Division of waves is parallel with that of vibrations and oscillations (see notes at BE and BF). For bulk matter, some amplification may be made here by adding letters following BRE.

Acoustics

Physics B
Bulk matter physics BR
Mechanics BRB
Dynamics BRC X
Periodic motion BRD S
Waves BRF

* Add to BRF letters A/Y following BRE so far as is necessary; eg

. *Properties*

BRF D . . Frequency

. *Types*

YG . . Standing waves

YR . . Transverse waves

YS . . . Shear waves

* See also S waves (seismology) DG

YU . . Longitudinal wave

BRG H Acoustics, sound waves, sonics (sound)

* For acoustic phenomena in a particular medium (gas, liquid, solid, etc.) see medium.

H36 . *Practical & experimental*

H72 N . . Analysis of sound

H72 P . . . Qualitative analysis of sound

H72 Q . . . Quantitative analysis of sound

H73 . . Generation of sound

* See also Types of sound by source BRG I

H73 D . . Reproduction of sound

* Purely acoustic studies; most of the literature will go under sound recording & reproduction in Technology Class U.

H73 L . . . *By causative action*

* Arrange A/Z; eg

H73 LB . . . . Blowing

H73 M . . . . *By specific body*

* Arrange A/Z (eg bells, foghorns).

H73 N . . . Synthesis of sound

H74 J . . Sensing & detection

H7M . . Acoustic spectroscopy

H8B . Theory

. *Properties & processes*

H9D G . . Directionality

HBJ . . Pressure

HDT . . Velocity

HFB . . Harmonics

HFB K . . . Quality of sound, timbre

HFC . . Propagation, transmission

HFD . . Frequency

. . *Special acoustic attributes*

HFE N . . . Pitch

HFE O . . . . Octaves

HFE P . . . Tone

HFE Q . . . . Beats (acoustics)

* Subjective difference in tone associated with two closely similar frequencies being heard together.

* See also Interference BRG HFR

. . Amplitude

HFE S . . . Loudness, volume (sound), subjective intensity (sound)

Physics B
Bulk matter physics BR
Acoustics BRG H
Properties & processes
. Amplitude
. . Loudness BRG HFE S

BRG HFN . Reflection

HFN R . . Reverberation (acoustics)

HFN S . . . Albedo (acoustics)

HFO . Resonance

* For magnetic resonance, see BRG HJF O.

HFO S . . Dissonance, consonance

* See also Noise BRG HN

HFR . Interference

HFX X . Pulses

HFY G . Standing waves

. *Interactions with other energy forms*

HGP . . Thermal acoustics

HH . . Electroacoustics

HJ . . Magnetism

HJF O . . . Magnetic resonance (acoustics)

HL . . Acoustooptics, acoustic optics

HM . *Relations with particle physics*

* Add to BRG HM letters M/Q if applicable.

Types of sound

HN . Noise

* Subjective category of sounds which are undesired by the (human) recipient.

HP . . Reduction of noise

HQ . . . Insulation of sound

* Most of the literature goes in technology.

HR . . Ambient noise

HS . . Cavitation noise

* For sonic boom, see BTM GHT.

HW . . White noise

* Aperiodic sound.

I . *By source*

* Alternative (not recommended) for libraries wishing to keep together all acoustic studies.

* Add to BRG I numbers & letters 3/9,A/Z from the whole classification; eg physics of music BRG IWV.

J . *By medium*

* Alternative (not recommended) for libraries wishing to keep together acoustic studies in all media (see note at head of this class).

* Add to BRG J letters R/W following B; eg acoustic properties of solids BRG JV.

. *By frequency*

K . . Acoustic spectrum

K9L R . . . Linear

K9M . . . Non-linear

L . . Infrasound

M . . Audible sound

* Usually assumed; see note at BRG HN.

N . . High-frequency sound, ultrasonics

O . . . Extremely high frequency sound

* For phonons, see solid state BVG O8N.

Heat transfer

Physics B
Bulk matter physics BR
Energy interactions & forms BRA F
Mechanics BRB
. . . . . Extremely high frequency sound BRG O

BRG P Thermal properties of bulk matter
P93 . *Environmental conditions*
P94 F . . Constant volume, isochoric, isometric
P94 K . . Constant pressure, isobaric
P94 Q . . Constant temperature, isothermal
PAG . Thermodynamics
. . *Processes & properties*
PAP D . . . Reversible
PAP E . . . Irreversible
PAP Q . . . Adiabatic
PAP T . . . Isothermal
PAP V . . . Isentropic
PAP Y . . . Cycles
PAQ . . . . Named cycles
* Arrange A/Z; eg
PAQ C . . . . . Carnot cycle
PAQ R . . . . . Rankine cycle
PAT . . . Transport processes
* For heat transfer, see BRG Q.
PBB . Energy
PCN . Equilibrium
PCN P . . Balancing
PDE . Kinetic energy
* For temperature, see BRG V; for combustion, see Chemistry C.
PM . *Relations with particle physics*
* Add to BRG PM letters M/Q following B if applicable.

. *Special thermal properties & processes*
PQ . . Heat, quantity of heat
* For latent heat, see Phase transormation BRN S.
. . . Measurement
PQ7 6 . . . . Calorimetry
PQ7 64 . . . . . Calorimeters
PQ7 64V . . . . . Bomb calorimeters
PQ7 64W . . . . . Continuous flow calorimeters
PQ7 64X . . . . . Others
* Arrange A/Z; eg mixing calorimeters.
PQ7 64Y . . . . . Microcalorimetry
PQ7 7 . . . . . Calorimetric units
PR . . . Heat capacity, thermal capacity
PS . . . . Specific heat capacity

Physics B
Bulk matter physics BR
Energy interactions & forms BRA F
Thermal properties of bulk matter BRG P
Heat BRG PQ
. . Specific heat capacity BRG PS

BRG Q Heat transfer, heat exchange
* Includes heat & mass transfer together; for mass transfer alone, see transport processes BRA X;
* See also Chemical engineering V
* Add to BRG QA letters A/J following B.
QK . Radiation
* See BRG R
QL . Heat flux, transmission, heat flow
QL7 6 . . Measurement
QL7 64 . . . Heat flow meters
QLK . . Heat transfer coefficient
QLM . . Direct flow (heat)
QLP . . Counter flow (heat)
QM . Thermal cycling
. *By process*
QN . . Conduction of heat
QNK . . . Coefficient of thermal conduction, thermal conductance
QNT . . . Thermal conductivity
QP . . . Diffusion of heat
QR . . Heat resistance, resistivity
QT . . Thermal transpiration, thermal effusion
* See Gases BTM GQT
QV . . Convection
* Heat transfer in a fluid by the movement of the fluid itself; see Fluids BSM GQV.
R . . Thermal radiation, heat radiation
* Add to BRG R letters K/L following B so far as applicable.
RS . . . Black body radiation
RT . Thermal emission
RTS . . Emmisivity
RU . Thermal absorption
* For black body radiation, see BRG RS.
. *By resulting temperature*
T . . Heat loss, cooling
* For supercooling, see change of state BRN P94 T.
. . . Radiation
TEX . . . . Radiation cooling
TSH . . . Thermoelectric cooling
TSJ . . . Magnetic cooling
TT . . . Phase change cooling
TTS . . . . Linde cooling
TTV . . . Film cooling
TTX . . . Expansion cooling
TTY . . . Sweat cooling
TU . . . Evaporative cooling
TV . . . . Tranpiration cooling
TVS . . . . Boiling heat transfer
TW . . . Ablation cooling
TX . . . Sublimation cooling

Thermal properties of bulk matter

Physics B
Bulk matter physics BR
Thermal properties of bulk matter BRG P
Heat transfer BRG Q
. . Heat loss BRG T
. . . Sublimation cooling BRG TX

BRG TY . . . Other forms of cooling
* Arrange A/Z.

U . . Heat gain, heating
* For superheating, see change of state BRN P94W.

UEY . . . Radiation

UQN . . . Conduction

V Temperature
* Property of an object which determines the direction of heat flow when in thermal contact with another body.
* Add to BRG VA letters A/Q folowing B if applicable.

V72 . Control

V72 4 . . Thermostats

V72 4AC . . . Electrical thermostats

V72 4GA . . . Thermistors

V72 4V . . . Gas thermostats

V72 4W . . . Cryostats

V72 4X . . Pneumatic temperature control

V72 4Y . . Other control methods

. Measurement

V76 . . Thermometry

V76 4 . . . Thermometers

V76 47A . . . . Testing & correcting

V76 47A H . . . . . Hypsometers

V76 5C . . . . Electric thermometers

V76 5D . . . . . Resistance electric thermometers

V76 5E . . . . . Special types
* Arrange A/Z; eg thermistor.

V76 5G . . . . . Thermocouples (thermometers)

V76 5H . . . . . Thermopiles

V76 5J . . . . Gas thermometers

V76 5K . . . . Vapour pressure thermometers

V76 5M . . . . Mercury thermometers

V76 5N . . . . . Beckmann thermometer

V76 5P . . . . Other liquid expansion thermometers

V76 5R . . . . Solid expansion thermometers

V76 5S . . . . . Bimetallic thermometers

V76 5T . . . . . Other solid expansion thermometers
* Arrange A/Z; eg quartz thermometers BRG U76 5TQ

V78 L . . Temperature scales

V78 LT . . . Thermodynamic temperature, absolute temperature scales

V78 M . . . . Kelvin scale

V78 MR . . . Relative temperature scales, practical temperature scales

V78 N . . . . Celsius scale, Centigrade scale

V78 O . . . . Fahrenheit scale

V78 P . . . . Reaumur scale

Physics B
Thermal properties of bulk matter BRG P
. Special thermal properties & processes
. . . Measurement
. . . . . Relative temperature scales BRG V78 MR
. . . . . Reaumur scale BRG V78 P

BRG V7M . . . . . Spectral methods (thermometry)

V7N SL . . . . . Colour thermometry, thermocolour methods

V7T . . . . . Acoustic methods (thermometry)

V7V . . . . . Calorimetric thermometry

. . . *Properties*

VJ . . . . Temperature variations

VJ9 2J . . . . . Temperature gradients

VK . . . . . Adiabatic change

. . . *Types of temperature*

VN . . . . Inversion temperature

VR . . . . Normal temperature, room temperature, ambient temperature

VS . . . . Critical temperature

VSR . . . . . Minimum temperature

VSX . . . . . Maximum temperature

VW . . . . Low temperatures (general)
* For cryogenics, see

VX . . . . High temperatures (general)
* For high temperature physics, see BRG X.

. *Thermal regimes*

W . . Low temperature physics, cryogenics

. . . Measurement

W76 . . . . Cryometry

X . . High temperature physics (general)

. . . Measurement

X76 . . . . Pyrometry

X76 T . . . . . Resistance pyrometry

X76 U . . . . . Radiation pyrometry, total radiation pyrometry

X76 V . . . . . Optical pyrometry

X76 W . . . . . Heat radiation pyrometry

X76 X . . . . . Light radiation pyrometry

Y Electrical & magnetic properties of bulk matter
* The detailed schedule for this class is given under solid state BVG Y.
* Add to BR letters H/K following BV; eg

BRH U . Electrically conducting systems

BRJ . Magnetic properties

FO . . Magnetic resonance

BRK . Electromagnetic radiation

Optics

Physics B
Bulk matter physics BR
Energy interactions & forms BRA F
Electrical & magnetic properties of bulk matter BRG Y
Electromagnetic radiation BRK

E-m waves by frequency & wavelength

BRK M . Radiofrequency waves
U . Microwaves

BRL . Optics, optical properties of bulk matter
* Originally confined to the study of visible light, the term Optics is usually used to cover infrared, visible light and unltraviolet. But it is sometimes used to embrace most of the electromagnetic spectrum in one way or another (e.g.including the behaviour of electrons and neutrons in an optical context). Here, it is restricted to the frequencies from infrared to ultraviolet.
* Most of the literature refers to visible light (BRL V), details for which are taken from the general class (BRL 2/BRL Q)
* An alternative (not recommended) is to confound visible light with optics in general and use BRL 2/BRL Q for optics in general and visible light.

2M . . Mathematics
2M9 4 . . . Fourier transform optics

36 . . Practical & experimental optics

3B . . . Materials & equipment
. . . . Undesired effects
3B3 7I . . . . . Aberration
. . . . *Operations on materials & equipment*
3BK . . . . . Testing & monitoring
. . . . *Properties*
. . . . . *Special to optical materials*
3ML . . . . . Reflectivity
3R . . . . Materials
3RQ V . . . . . Optical film
3RQ X . . . . . Coatings (optical materials)
3TF . . . . . Optical fibres
* For fibre optics, see B6L FCT.
3TT . . . . . Optical glass
3TV . . . . . Light sensitive materials
3U . . . . Equipment & plant
* Equipment serving particular processes, etc. goes with the process. But although some of the devices below primarily perform a particular operation in optics, (eg mirrors reflect) they may appear in many different contexts and are therefore treated as general accesories.
* When used in a particular process, wave-length, etc. see latter; eg Absorption - Filters BRL FL4 UF. Filters BK
* When treated as a component in a containing instrument, see latter; eg microscope mirrors BRL 7J4 WM.

Physics B
Bulk matter physics BR
Electrical & magnetic properties of bulk matter BRG Y
Optics BRL
Materials & equipment BRL 3B
Equipment & plant BRL 3U

* For light sources, see Production BRL 73; see also Physical optics BRL F

BRL 4 . Optical instruments
45 . . *Components*
. . . *Special to optics*
4UF . . . . Optical filters, light filters
* For filters controlling particular processes, etc, see latter - eg Absorption - Filters BRL FL4 UF.
4UF P . . . . . Spatial filters
4UF S . . . . . Spectral filters
4UH . . . . Luminescence devices
* See also Phosphors BRL FH3 TP
4UH L . . . . . Fluorescent screens
4UJ . . . . Diffraction gratings
4UR . . . . Rangefinders (optical instruments)
4UY . . . . Lenses & prisms (together)
4V . . . . . Lenses
4V3 8Q . . . . . Aberrations
4V3 8R . . . . . Image errors
4V3 8S . . . . . Aperture error
4V3 8T . . . . . Sperical aberration
4V3 8U . . . . . Coma
4V3 8V . . . . . Curvature of field
4V3 8W . . . . . Astigmatism (lenses)
4V3 8X . . . . . Distortion
4V3 8YC . . . . . Chromatic aberration, chromatism
. . . . . *Properties*
4V3 JM . . . . . Principal focus
4V3 JN . . . . . Principal focal plane
4V3 JP . . . . . Focal length, refractivity of system
4V3 JR . . . . . Field of view, visual field, image field
. . . . . *Parts*
4V3 NB . . . . . Surfaces (lenses)
4V3 NC . . . . . Bloomed surfaces, coated surfaces (lenses), blooming
4V3 NE . . . . . Apertures
4V3 NH . . . . . Stops (optical equipment), diaphragms
4V3 NI . . . . . Iris diaphragms
. . . . . *Types of lenses*
4VC . . . . . Eyepieces, oculars
4VD . . . . . Thin lenses (general), astigmatic lenses
* Hypothetical, infinitely thin lens.
4VD L . . . . . Cylindrical lenses
4VE . . . . . Thick lenses (general)
* Real lens, as distinct from infinitely thin lens.
4VF . . . . . Achromatic lenses
4VG . . . . . Apochromatic lenses

Physics B
Electrical & magnetic properties of bulk matter BRG Y
Optics BRL
Components BRL 45
. . . Lenses BRL 4V
. . . . . Apochromatic lenses BRL 4VG

BRL 4VH . . . . . Contact lenses
4VI . . . . . Helical lenses
4VJ . . . . . Quadruple lenses
4VK . . . . . Spherical lenses
4VL . . . . . Aspherical lenses
4VM . . . . . Gas lenses
4VN . . . . . Zoom lenses
4VO . . . . . Refracting prisms
4VP . . . . . Focusing
4VQ . . . . . Converging lenses
4VR . . . . . Diverging lenses
4VS . . . . . Complex lens systems
4VT . . . . . Geodesic lenses, integrated optics
4VU . . . . . Other forms of lens
* Arrange A/Z; eg zone plates BL5 VXZ.
4WB . . . Prisms
* See also Lenses & prisms (together) BRL 4UY
4WC . . . . Beam splitters
* Arrangement of 3 prisms.
4WD . . . . Nicol prisms
* See also Polarizers BRL 4WS
4WF . . . Reflectors
4WG . . . Gratings
4WM . . . Mirrors
4WN . . . . Schmidt corrector, Schmidt plates
4WP . . . . Plane mirrors
4WQ . . . . Spherical mirrors, curved mirrors
4WS . . . Polarizers
* See also Nicol prisms BRL 4WD
4WT . . . . Piles (optics)
4WU . . . . Kerr cells
4WY C . . . Collimators, finders
4WY D . . . . Autocollimators
4WY F . . . Focussing instruments
4WY H . . . Optical scanners
4WY I . . . . Flying spot scanners
4WY K . . . Isolators (light)
4X *Components special to a type of optics*
* See particle optics imaging (BM7 I) for example.
5 *Types of optical instruments*
* For instruments serving a particular purpose, see latter; eg Magnification - Microscopy BL7 J.

Physics B
Electrical & magnetic properties of bulk matter BRG Y
Optics BRL
Practical & experimental optics BRL 36
. Materials & equipment BRL 3B
. . . . Types of optical instruments BRL 5

BRL 62 . Investigative techniques in optics
69 . . Physical methods
. . *By operations on the phenomena*
. . . Control
72 . . . . Optical control
* For control of specific properties, etc. see the latter; eg Luminance - Control BRL LR7 2..
73 . . . Production
73L . . . . Light sources
74G . . . Detecting & indicating
74T . . . Recording
74V . . . . Scanning
74V 4 . . . . Optical scanners
74V 4V . . . . . Flying spot scanners
76 . . . Measurement
* Measurement of particular phenomena goes with the phenomenon; eg Diffractometers BRL FQ7 64.
* For Photometry, see BRL L76.
7A . . . Testing & evaluation
7I . . . Imaging
7IC . . . . Optical transfer function
7IC P . . . . . Phase transfer function
7IE . . . . Focusing, beam focusing
7IE E . . . . . Beam trapping, optical self-focussing
* See also Thermal blooming BRL FCL R
7IE F . . . . . Self-trapping
7IF E . . . . Resolution
7IF N . . . . Scanning
7IF P . . . . Projection (optics)
7IF Q . . . . . Collimation
7IX . . . . Magnification (optics)
7J . . . . . Microscopy
7M . . . Spectroscopy
Theory
8D . Emission theory of light (Newton)
8DS . Wave theory of light (Huyghen, etc.)
8FD M . Electomagnetic theory of light (Maxwell)
8M . Quantum optics (general)
* For Non-linear optics, see BRL 9M; for Coherent optics see BRL PF; for Lasers & Masers, see B6K QM.
Non-linear systems
9M . Non-linear optics (general)
* Studies electro-optical effects of very intense light beams and how the light interacts with and is propagated through matter.
* See also specific properties, processes, etc. treated as non-linear systems; e.g. Optical phase conjugation BRL FEY; Stimulated scattering BRL FTM.
* See also Quantum optics BRL 8M

Optics

Physics B
Bulk matter physics BR
Electrical & magnetic properties of bulk matter BRG Y
Optics BRL
Non-linear systems
. Non-linear optics BRL 9M

BRL 9NP . Adaptive optics

AF Energy interactions & forms
BB . Energy
BB9 2D . . Distribution of energy
BB9 2DM . . . Spectral distribution of energy (optics)
BB9 2DN . . . . Equal energy spectrum
BB9 2DP . . . . . Relative spectral distribution, spectral density
DA . Kinematics
. . Velocity
DC . . . Speed of light

. *Special radiation properties & processes*
EXJ . . Transients
EYB BF . . Radiant flux
* For luminous flux, see Luminosity BRL LBB F.
. . Radiant intensity
EYB BI . . . Radiance

. . Wave motion
F . . . Physical optics (general), electromagnetic optics (general), light waves
* Light as electromagnetic waves; for geometrical optics, see Rays BRL GC.
FC . . . Propagation, transmission
* For optical fibres, see Optical techniques BRL 3TF.
. . . . Coefficients
FC2 QK . . . . . Transmittance (optics), transmission coefficient
* See also Opacity BRL FIL
FC4 . . . . Instruments
FC4 UF . . . . . Light filters
FCD C . . . . Velocity of propagations
FCI . . . . Transmissivity
FCL . . . . Amplification
* For laser techniques, see B6K S
FCL R . . . . . Thermal blooming (nonlinear optics)
FCL S . . . . . Parametric oscillation amplification
FCM . . . Attenuation
FD . . . Frequency
FD7 T . . . . Optical frequency conversion
FD7 U . . . . . Optical harmonic generation
FDM . . . . Frequency mixing (non-linear optics)
FE . . . Spectra
FE7 3 . . . . Production
* For diffraction gratings, see BRL FQ4 PW.

Physics B
Bulk matter physics BR
Electrical & magnetic properties of bulk matter BRG Y
Optics BRL
Spectra BRL FE
. Production BRL FE7 3

BRL FEX Phase
FEY . Optical phase conjugation, wavefront reversal, time reversal reflection
FF Coherence
* For coherent light, see BRL PF.
. Transients
FFC F . . Optical coherent transients
FG Emission
FGK . Exitance, emittance
FGO . . Luminous exitance
FGP . . Radiant excitance, radiant emittance
FGQ . Incandescence
FGQ S . . Candoluminescence
FH . Luminescence
* Emission resulting from non-thermal processes.
* For luminosity, see BRL L.
. . Materials
FH3 TP . . . Phosphors
. . *By duration of luminescence*
FHL . . . Fluorescence
* Luminescences ceases on removal of energy source.
. . . . Instrumentation
FHL 4 . . . . . Fluorescent screens
FHN . . . Phosphorescence
. . *By method of excitation*
FHP B . . . Triboluminescence
* By friction.
FHP H . . . Sonoluminescence
FHQ . . . Thermoluminescence, incandescence
FHQ R . . . . Radiothermoluminescence
FHR . . . Electroluminescence
FHR T . . . . Galvanoluminescence
FHR U . . . . Cathodoluminescence
FHS . . . Photoluminescence
FHS W . . . . Radiophotoluminescence
FHT C . . . Chemiluminescence
FHT E . . . Bioluminescence
* Optical aspects only.
FHV Wavetrain
FI Transparence
FIJ E . Behaviour of transparent bodies
FIJ G . Self-induced transparence
FIJ H . Non-transparence
FIJ K . . Shadows
FIK Translucence
FIL Opacity
* Reciprocal of transmittance BRL FC2 QK.
FIM Visibility

Optics

Physics B
Bulk matter physics BR
Electrical & magnetic properties of bulk matter BRG Y
Optics BRL
Energy interactions & forms BRL AF
Visibility BRL FIM

BRL FL Absorption
. Filters
FL4 UF . . Absorption filters
FLQ . Dichroism
* Selective absorption by crystals in one plane and not another.
FLR . . Pleochroism
* Colour effects of dichroism.
FLT . Trichroism
FLX Refraction & reflection (together)
FM . Refraction
FM4 . . Instrumentation
FM4 UR . . Rangefinders
FM9 BIN . . Refractive index
* See also Schlieren device B6L FQ
FM9 BIP . . . Becke line
FMJ . . Double refraction, birefringence, extraordinary rays, photoelastic effect
* See also Double refraction techniques B6L KMJ
. . . *By medium*
FMJ M . . . . Circular birefringence
FMJ N . . . . Elliptical birefringence
FMJ P . . . . Stress birefringence, mechanical birefringence, photoelasticity
FN . Reflection
FN4 . . Instrumentation
FN4 UF . . . Reflection filters
FNL . . Total internal reflection
FNL 3R . . . Materials
FNL 3TF . . . . Optical fibres
FNM . . Surface reflection
FNM R . . . Fresnel reflection
FNQ Images (optics)
* See also imaging as a technique, B7I
FNQ 37J . Aberrations
FNQ 4 . Instrumentation
FNQ 4L . . Image converters
FNQ 4SS . . Image detectors
FNQ 4TU . . Image intensifiers
FNQ 62 . Investigative techniques
FNQ 73P . . Image processing & restoration
FNQ 73R . . Image reduction
FNR . Real images
FNS . Virtual images
FNS T . Stereoscopic images
* For holography, see B7K.

Physics B
Bulk matter physics BR
Electrical & magnetic properties of bulk matter BRG Y
Optics BRL
Images BRL FNQ
. Stereoscopic images BRL FNS T

BRL FP Polarization
FP7 3 . Production
FP7 3D . . Rotation of plane of polarization
FP7 3DR . . . Rotatory power (polarization)
FP7 3DV . . . Optical activity
FP7 3E . . . Kerr effect, magneto-optical effect
. . *By source*
FP7 3LE . . . Irregular crystals
FP7 3LG . . . Quartz
FP7 3LJ . . . Other crystals
FP7 3LK . . . Amorphous substances
FP7 3M . . . Wave surfaces of refraction
FP7 3MN . . . . Single-sheet surfaces
FP7 3MP . . . . Double-sheet surface
. . *Effects of particular media, structures*
FP7 3MR . . . Ray axes, optic axes (polarization)
. Measurement
FP7 6 . . Polarimetry
FP7 64 . . . Polarimeters, Polariscopes
. . . . Instrumental outputs
FP7 64T . . . . . Polaroids
. *Properties*
FPQ B . . Plane of polarity
FPQ D . . Degree of polarization
FPQ E . . . Depolarization
. *Types of polarization*
* For birefringence, see Double refraction BRL FMJ.
FPS . . Plane polarization
FPT . . Circular polarization
FPU . . Elliptical polarization
FPV . . Chromatic polarization
FQ Diffraction
FQ4 . Instrumentation
FQ4 UJ . . Diffraction gratings
FQ4 UK . . . Echelon gratings, echelles
FR Interference
* For holography, see B7K.
. Instrumentation
FR4 . . Interferometers
FR4 V . . Interference filters
FRM . Interference fringes
. Interference patterns
FRN . . Inclusion pattern interference
FRO . . . Labradorescence
FT Scattering
. *Types of scattering by particle*
* See note under Types of scattering at BFT.
* Add to BRL FT letters J/M following BMF T if required.
FTM . Stimulated scattering (general)
* For laser techniques, see B6K S.

Optics

Physics B
Electrical & magnetic properties of bulk matter BRG Y
Optics BRL
Special radiation properties & processes
. . Scattering BRL FT
. . . Stimulated scattering BRL FTM

BRL FTN . . . Brillouin scattering
FTO . . . Mie scattering
FTP . . . Raman scattering
FTP W . . . . Coherent antiStokes Raman scattering
FTQ . . . Rayleigh scattering
FTR . . . Tyndall effect
FTS . . . *Types of scattering special to a particle*
* For example, Coulomb scattering BNG FTS.
FUF . . Diffusion
FUP . . Dispersion
* For optical rotation, see BRL FP7 3D.
FUP 4 . . . Instrumentation
FUP 4V . . . . Dispersion prisms
. . *Types of light motion*
FWR . . . Spherical waves
FWS . . . Cylindrical waves
. . . Rays
GC . . . . Geometrical optics (general), rectilinear propagation (optics)
* Assumes rectilinear propagation of light, as rays, without reference to waves or the physical nature of light. The behaviour of light in optical instruments.
* See also Optical instruments BRL 4
Interactions with other energy forms
GH . Acoustooptics
* See also Brillouin scattering BRL FTN
GN . . Sonoluminescence
* Produced by high-frequency sound waves.
GP . Thermooptics
H . Electrooptics, electric double refraction, optoelectronics
IU . . Stark effect
J . . Magneto-optical effects
. . . *Named effects*
JM . . . . Couton-Mouton effect (magneto-optics)
JN . . . . Faraday effect
JP . . . . Kerr effect (magneto-optics)
JQ . . . . . Pockels effect
JS . . . . Voigt effect (magneto-optics)
JT . . . . Zeeman effect (magneto-optics)
. *Relations with particles*
* Add to BRL M letters LX/Q following B if applicable.

Physics B
Bulk matter physics BR
Electrical & magnetic properties of bulk matter BRG Y
Optics BRL
Interactions with other energy forms
. Relations with particles

Special optical properties & processes
BRL KY . Optical illusions
L . Luminosity
* Attribute of light sources which give visual sensation of brightness.
* See also Luminescence BRL FH
. . Measurement
L76 . . . Photometry (light)
L76 4 . . . . Photometers
L78 Q . . . . Physical photometry
* Measurement by physical receptors, radiometers, etc.
L78 R . . . . Visual photometry, subjective photometry
* Evaluation by visual effect in the eye of the observer.
. . Radiant flux
LBB F . . . Luminous flux, light flux
LBB G . . . . Illuminance, light flux density, illumination density
LBB I . . . . Luminous intensity, light intensity, candlepower
. . . . . Units
LBB I77 . . . . . Candela
LM . . Radiant quantities
LN . . Luminous quantities
LR . . Luminance, brightness
LT . . Shade
M . Colour
. . Measurement
M76 . . . Colorimetry
M78 Q . . . . Spectral methods (colour)
M78 R . . . . Comparison method (colour), empirical method (colour)
M8B . . Theory
M8V . . . *By specific theorists*
* A/Z by name; eg Goethe.
. . Frequency
MFD . . . Physical colour
* For physiological colour, see BRL MV.
MFN . . Reflection
MFN N . . . Surface colour
MH . . Electrochromism
. . Luminosity
ML . . . Brightness
. . *Special chromatic properties*
MM . . . Chromaticity
* Objective description of the colour quality of a visual stimulus irrespective of its luminance. Chromaticity & luminance together completely specify a colour stimulus.
MM7 6 . . . . Measurement
MM7 6T . . . . Chromaticity coordinates

Optics

Physics B
Optics BRL
Colour BRL M
Special chromatic properties
. Chromaticity BRL MM
. . Chromaticity coordinates BRL MM7 6T

BRL MM7 6V . . Tristimulus values
MN . Colour diagrams
MNP . . Two-dimensional colour representation
MNR . . Three-dimensional colour representation
MP . Chrominance
MQ . Saturation (colour), chroma
MR Composition of colours
* For shade, see luminosity BRL LT.
Types of colours
MU . Colourlessness
MV . Physiological colour
* For physical colour, see wavelength BRL MFD.
MW . . Hue_
NB . Primary colours
NB2 M . . Colour equations
. . *Operations*
NC . . . Mixing colours (operation)
NE . . . . Additive mixing (colours)
* Eg mixing coloured lights as in TV.
NF . . . . Subtractive mixing (colours)
NFN . . . . . Colour filter transmission
NFP . . . . . Pigment mixing
NH . Secondary colours
NJ . Complementary colour, compensatory colour
* Giving white when mixed.
NK . Equivalent colours
. *By wavelength*
NMB . . Physical colour
NMD . . White
NME . . Grey
NMF . . Black
NMG . . Red group
NMH . . . Specific colours
* Eg carmine, pink.
NMJ . . Orange group
NMK . . . Specific colours
* Eg reddish orange, brown.
NML . . . . Yellow group
NMM . . . Specific colours
* Eg reddish yellow, cream.
NMN . . Green group
NMP . . . Specific colours
* Eg yellowish green, pure green.
NMQ . . Blue group
NMR . . . Specific colours
* Eg ice blue, turquoise.
NMS . . Indigo
NMT . . Violet group
NMV . . . Specific colours
* Eg bluish violet, purple.

Physics B
Optics BRL
Energy interactions & forms BRL AF
. Special optical properties & processes
. . . Types of colours
. . . . . Specific colours BRL NMV

BRL NP . . . Colour systems, chromatic systems
* Representation of colours in terms of a specific set of coordinates (eg wavelength, luminosity).
NPQ . . . . Objective colour systems
NPS . . . . Subjective colour systems
NQ . . . . Monochromatic systems
NR . . . . Dichromatic systems
NS . . . . Trichromatic systems
NT . . . . . Physiological chromatic systems
* See also physiological colour BRL MV; equivalent colours BRL NK
NU . . . . . Named systems
* Arrange A/Z; eg Abney, OSA.
NV . . . . Tetrachromatic systems
NW . . . . Thermochromatic systems
NX . . . . Photochromatic systems
. *Other special optical properties*
OB . . Optical bistability
OC . . Optical multistability
OD . . Optical switching (non-linear optics)
OE . . Optical properties of substances (general)
. *Types of light by property*
* Add to BRL P letters C/Y following BF;
* Add to BRL PQ letters A/D following BG; eg
PF . . Coherent light, coherent optics
* For lasers, see B6K QM.
PFF CK . . . Light modulation
PM . . Refracted light
PN . . Reflected light
PP . . Polarized light
PPP . . . Partially polarized light
PPT . . . Circularly polarized light
PPU . . . Elliptically polarized light
PWC . . Isotropic light
PWD . . Anisotropic light
PWP . . Optical solitons, solitary waves (optics)
PX . . Light pulses
PYH . . Continuous light waves
QB . . Beams (light)
. *By source*
QN . . Natural light
QP . . Artificial light
. *By frequency & wavelength*
U . . Infrared radiation
UFE . . . Spectra
UV . . . Near infrared radiation
UW . . . Far infrared radiation
V . . Light, visible light
* See notes at BRL.
W Ultraviolet radiation
WW . Long wave ultraviolet radiation

States of matter

Physics B
Bulk matter physics BR
Electrical & magnetic properties of bulk matter BRG Y
. . Optics BRL
. . . Ultraviolet radiation BRL W
. . . . Long wave ultraviolet radiation BRL WW

BRL WX . . . . Vacuum ultraviolet radiation, far ultraviolet radiation
X . . . X-rays, Roentgen rays
* Penetrating electro-magnetic radiation, usually generated by accelerating electrons to bombard a solid body, or by inner shell transition of atoms.
XFC . . . . Production
XFE . . . . Spectra
XFL . . . . Absorption
XFN . . . . Reflection
XFQ . . . . Diffraction
XFT . . . . Scattering
XU . . . . Grenz rays, Infra-Roentgen rays
XV . . . . Continuous X-rays, Bremsstrahlung
XW . . . . . Cosmic ray X-rays
Y . . Gamma radiation
* High energy photons, especially as emitted by a nucleus in a transition between two energy levels.
YU . . . Non-solar gamma radiation
YV . . H-alpha radiation, alpha radiation
* See Nuclear reactions BOF KR

BRM Particle physics of bulk matter, high energy physics of bulk matter
* Add to BRM letters M/Q following B; eg
O . Nuclear physics of bulk matter

Physics B
Bulk matter physics BR
Energy interactions & forms BRA F
. . Nuclear physics of bulk matter BRM O

BRN States of matter, physical phases (states of matter), systems of bulk matter, forms of matter
* new file bu2.sch 27.6.97; 3.7.97; 22.7.97; 14.8.97 20.8.97; 12.11.97; 29.6.98; 31.7.98; 12.8.98; 27.8.98
* For the effects of these on chemical behaviour, see Chemistry C.
. *Processes*
9HH . . Change of state of system
* Use BRN P.
P . . Change of state, thermodynamic changes of state, phase changes
* Process by which a substance changes from one state to another without a change in temperature; accompanied by change in volume and in degree of randomness in the internal structure.
* Note that 'phase' is also used to represent a particular chemical substance in a mixture, or a particular crystal structure in a mixture of such structures. If these meanings arise in this class, the array (Systems by number of components) is provided, at BRR N. Here, 'phase' means a state of matter.
. . . Mathematics
P2M 9L . . . . Equations
. . . . . Named equations
P2M 9NB . . . . . Boyle-GayLussac equation
P2M 9NC . . . . . Clapeyron equation
P2M 9NV . . . . . Van der Waals equation
. . . *Conditions, parameters, influences*
P94 C . . . . Critical point
P94 E . . . . Volume
P94 F . . . . . Constant volume
P94 G . . . . . Decreasing volume
P94 H . . . . . Increasing volume
P94 J . . . . Pressure
P94 JC . . . . . Critical pressure
P94 K . . . . . Constant pressure
P94 L . . . . . Dcreasing pressure
P94 M . . . . . Increasing pressure
P94 N . . . . . Other pressure conditions
* Add to BRN P94 N letters P/S following BSB J if applicable.
P94 O . . . . Velocity
P94 P . . . . Thermal conditions
P94 PC . . . . . Critical temperature
P94 Q . . . . . Constant temperature
P94 R . . . . . Adiabatic change of state
. . . . . Decreasing temperature
P94 S . . . . . Cooling (change of state)
* For heat loss in general, see BRG T.
P94 T . . . . . Supercooling

Surfaces

Physics B
Processes
. . Conditions, parameters, influences
. . . Thermal conditions BRN P94 P
. . . . Decreasing temperature
. . . . . Supercooling BRN P94 T

. . . . Increasing temperature
BRN P94 V . . . . . Heating (change of state)
* For heat gain in general, see BRG U.
P94 W . . . . . Superheating
P94 Y . . . Electro-magnetic conditions
P95 . . . . Electrical conditions
P96 . . . . Magnetic conditions
P97 . . . . Radiation conditions
P98 . . . Other conditions
R . . Phase transformations, phase transitions
* For transitions in a particular state of matter, see the latter.
* For order-disorder transformations, see solid solutions BVU SNR.
. . . Critical points
R94 E . . . . Critical state, transition points
S . . . Latent heat, specific latent heat
* Quantity of heat absorbed or released in thermal phase transformation. Change of internal energy of a physical system without change of temperature.
* See also Thermochemistry C
T . . . Phase equilibrium
TP . . . . Phase diagrams, constitution diagrams
TR . . . . Phase rule
TT . . . . Triple point, three-phase equilibrium
TY . . . Commensurate-incommensurate transformation
U . . . Allotropic transformation
* For allotropes, see Chemistry C
V . . . Isothermal transformations
BRO . . *Types of change by states involved*
* This class is used only when qualifying a particular state of matter.
* See the states of matter involved. In the case of two different states, the denser one is cited first; eg both liquid into solid and solid into liquid go under solids (see BVO L). Note that the same citation order applies to mixed states of matter (dispersions); see note at BRT.
Subsystems, parts
* Each subsystem may be divided in the same way as a system. See Add instructions at BRR.
BRP W . Impurities (states of matter)

Physics B
Bulk matter physics BR
States of matter BRN
Impurities BRP W

BRQ Surfaces
36 . Practical & experimental
6FQ . . Diffraction techniques
6FQ R . . . Low energy electron diffraction
. . Interferometry
6FR . . . Surface interferometry
. *Properties & processes*
* For surface chemistry, see Physical chemistry C
9J . . Structure
. . . Profile, contours
9JV . . . . Microtopography of surfaces
. . Energy
BB . . . Surface activity, surface energy
* For surface tension, see BRQ BLX.
BBP . . . . Potential energy
BBQ . . . . . Potential barrier, potential hill
. . . . . Quantum effects
BBQ 8O . . . . . Tunnelling
BFN . . . . Adhesion
BFP . . . . Sorption physics
BFR . . . . . Absorption
BFT . . . . . Adsorption
. . Tension
BLX . . . Surface tension
BLX M . . . . Wetting
BLX P . . . . Angle of contact
EY . . Radiation properties
FGK . . . Exitance
FNH . . . Reflectance
FNI . . . . Specular reflectance
FNJ . . . . Diffuse reflectivity
FNK . . . . Total relectivity
H . . Electromagnetic properties
HWB . . . Resistance
HWJ . . . Resistivity
L . . Optical properties
LFG O . . . Luminous exitance
LFG P . . . Radiant exitance, radiant emittance
M . . Relations to particle physics
* Add to BRQ M letters M/Q following B.
O . Interfaces
* Surface separating two physical phases.
. . Energy
OBB . . . Interfacial energy
. . . Surface tension
OBL X . . . . Interfacial surface tension
* For skin friction, see aerodynamic drag BTB TKP.
OT . . Contact surfaces
OU . . Free surfaces
P . . *Types by materials interfacing*

States of matter

Physics B
Bulk matter physics BR
States of matter BRN
Subsystems, parts
. Surfaces BRQ
. . . Types by materials interfacing BRQ P

BRQ Q . Films (states of matter), surface films
* General studies only, covering solid & liquids films & fluid molecular layers.
R . . Thin films
. . . Formation
RR . . . . Unctuosity, oiliness
RT . . . Molecular films
RU . . . . Monomolecular layers (films)
RV . . . Plateau figures
RW . . . Minimum surfaces, soap bubbles
SC . . Thick films
SG . . Coatings
T . . Membranes, porous media
TBJ . . . Pressure
* For osmotic pressure, see Liquids BUB JSO
TO . . . . Electrosmosis, electroendosmosis

BRR *Systems by state of matter*
* Systems defined by particular physical properties (eg isotropic, low pressure, electrically conducting) are treated as indistinguishable from the state of matter qualified by the property; so dense liquids (say) are classified as Liquids - Density BUC L.
* Each system may be divided as follows (where hyphen represents the clasmark of the system):
* Add to - letters A/L following B;
* Add to -M letters M/Q following B;
* Add to - letters N/T following BR; eg Homogeneous systems - Mixtures BRS NRO.
* Add to -U letters RU/V following BR for states dispersed in the medium (see note and example at BRT).

D *Systems by simplifying assumptions*
* Use only when the system is distinguishable from the properties qualifying the state of matter.
* Add to BRR letters D/F following AYK; eg perfect gases BTR D.

Systems by number of components
* Phases other than those represented by states of matter. See note at BRN P.

N . Single component systems
O . Mixtures (general)
* See note at BRT for citation order between the states involved in a mixture, etc.
S . . Solutions
* See homogeneous systems BRS NRS
U . . Two component systems
V . . Three component systems
W . . Four component systems
X . . Five or more component systems

Physics B
Bulk matter physics BR
States of matter BRN
Systems by number of components
. . Five or more component systems BRR X

Systems by number of phases
* Phase here means a state of matter, not a chemical substance or crystal structure.
* For Allotropic systems, see Class C Chemistry.

BRS N . Homogeneous systems, single phase systems
NRO . . Mixtures
NRS . . . Solutions (general)
* Physical studies only; for solutions (critical mixtures) see physical chemistry, C
T . Heterogeneous systems, inhomogeneous systems, multiple phase systems
TRO . . Mixtures
TU . . Anomalous systems
TV . . Binary systems (bulk matters)
TW . . Ternary systems (bulk matter)
TX . . Quaternary systems (bulk matter)
TY . . Five phases or more

BRT . . Disperse systems, mixed states of matters, dispersions
* A system of particles dispersed and suspended in a solid, liquid or gas.
* Physical considerations only; most of the literature goes in physical chemistry. If in doubt, prefer physical chemistry.
* Mixtures, solutions, colloid dispersion, etc. of one state in another state go under the denser state; eg gases in liquids go under liquids.
* Use -U to introduce states dispersed in a system; eg BVU G Solids - Dispersions in - Gas in solid.
HBH . . . Electro-magnetic field
HDE . . . . Electrokinetic effect
HDF . . . . . Streaming potential
HDG . . . . . Sedimentation potential
HDH . . . . . Electrophoresis
* For electrosmosis, see Membranes BRQ TO.
U . . . Suspensions
* See fluids BST U
V . . . Colloids
* Consist of ultramicroscopic particles, intermediate between those of a true solute and those of a suspension. Most substances can be brought to the colloidal state by suitable technique.
Y . . . Composite materials
* Displaying the distribution throughout one material of another material in fine particle form.

Plasmas

Physics B
Bulk matter physics BR
States of matter BRN
Systems by number of phases
. . . Composite materials BRT Y

Systems by particular state of matter

BRU . Plasmas & fluids
* Add to BRU letters A/X following BS Fluids so far as applicable.
. . Mechanics
B . . . Flow of plasmas & fluids
B9B . . . . Dimensions of a physical quantity
* Expressing the quantity in terms of powers of fundamental quantities (e.g. mass, length, time).
B9B K . . . . . Similarity parameters, dimensionless numbers
* Usually considered in relation to aerodynamic and fluid flow. See BSB 9BL for enumeration of particular numbers (which may be added here as necessary).
GP . . Thermal properties
GW . . . Low temperature
. . Magnetism
J . . . Magnetohydrodynamics, MHD
* Behaviour of a conducting plasma or fluid in a magnetic flux. The motion of the plasma induces an electrical field which interacts with the applied magnetic field to cause a change in motion itself.

BRV . . Plasmas
* A gas at a temperature high enough for most of its atoms to be ionized.
* See also nuclear fusion BOX B
* Add to BRV letters A/X following BS Fluids so far as applicable.
36 . . . *Practical & experimental*
69 . . . . Physical methods
6H . . . . . Electromagnetic
6J . . . . . Toroidal systems (plasmas)
. . . . . Equipment
6J3 U . . . . . Stellarators (plasmas)
. . . . Production
73 . . . . . Plasma generation, plasma sources
73K . . . . . Formation of plasmas (natural)
73L . . . . . Laser beam production of plasmas
73L S . . . . . Shock wave production of plasmas
73M . . . . . Excitation (plasmas), ionization (plasmas), breakdown (plasmas)
73N . . . . . Heating (plasmas), plasma microwave resonance
73N K . . . . . Plasma focus

Physics B
Plasmas BRV
Practical & experimental BRV 36
. Production
. . . Heating BRV 73N
. . . . Plasma focus BRV 73N K

BRV 73P . . . Acceleration (plasmas)
73P 76 . . . . Measurement
73P 764 . . . . . Plasma probes
73P 764 V . . . . . Rogowski coil probes
73P 764 W . . . . . Langmuir probe
73P 7M . . . . Spectroscopy
73Q . Confinement (plasmas), containment (plasmas), control (plasmas)
73Q R . . Magnetic mirrors
73Q T . . Magnetic traps, magnetic bottles
73Q V . . Pinch
73Q W . . . Theta effect (plasmas)
73R . . Tokamak confinement
73S . . Non-magnetic confinement
73T . . . Inertial confinement of plasmas
73U . . . Electrostatic confinement of plasmas
73V . . Radiofrequency confinement (plasmas)
7F . Modelling
7FY T . . Heat-trap model
AF Plasma reactions
AF9 2J . Reaction rate
AG . Thermodynamics
AT . . Transport properties
AV . . . Diffusion in plasmas
AW . . . Viscosity
. Mechanics
B . . Flow of plasmas (general)
B8M . . . Quantum theory
BG . . . Forces
BJ . . . . Pressure
BJQ . . . . . High pressure plasmas
CB . . . . Elasticity
* See also Vibration BRV E
CH . . . Statics
CL . . . . Density
CLP . . . . . Low density plasmas
* See also Collisionless plasmas BRV VL
CLT . . . . . High density plasmas
* See also Collisional plasmas BRV VR
CN . . . . Equilibrium
CR . . . . Instability
CRR B . . . . . Velocity-space instabilities
DA . . . Kinematics
DC . . . . Velocity
DC9 2D . . . . . Distribution
DE . . . Kinetics

Plasmas

Physics B
States of matter BRN
Plasmas & fluids BRU
Plasmas BRV
Plasma reactions BRV AF
. . . Kinetics BRV DE

. . . *Forms of motion*
. . . . Rotation
BRV DN . . . . . Rotating plasmas
DS . . . . Periodic motion
E . . . . . Oscillation & vibration
F . . . . . Waves
FC . . . . . Propagation
FPY . . . . . Interactions
FPY W . . . . . Plasma-wall interaction
FS . . . . . Collisions
FSH . . . . . Atomic cross section (plasmas)
FYJ . . . . . Linear waves
FYL . . . . . Non-linear waves
FYN . . . . . Solitons
GA . . . . . Shock waves
. . . . *Special attributes & elements of flow*
* Normal retroactive synthesis from BRG F/BRL is interrupted here in order to accommodate the large vocabulary of fluid flow. It is resumed at BRV M.
GL . . . . . Jets
GLV . . . . . Arcs
GM . . . . . Drift waves, drift current
M *Other energy interactions & forms*
* Normal retroactive synthesis from BR is resumed here after its interruption beginning at BRV GER.
* Add to BRV M letters GF/L following BR; eg
. Acoustic properties
MGH . . Plasma sound waves, magnetosonic waves
MGP . Thermal properties
MGP Q . . Heat
MGQ . . Heat transfer
MGV . . Temperature
. . Thermal regimes
MGW . . . Low temperature plasmas
* 10,000 K - 100,000 K
* See also Collisional plasmas BRV VR
MGW W . . . . Thermal plasmas
MGW X . . . . Cold plasmas
MGX . . . High temperature plasmas
* Over 100,000 K.
* See also Collisionless plasmas BRV VL
MGY . Electrical & magnetic properties
MHL . . Electric potential
MHN . . Electrostatic waves
MHR . . Discharges
MHU . . Conductivity
MHW B . . Resistance
MIS . . Dielectric properties

Physics B
Plasmas & fluids BRU
Plasmas BRV
Other energy interactions & forms BRV M
. Electrical & magnetic properties BRV MGY
. . Dielectric properties BRV MIS

. . Magnetic properties
. . . Magnetohydrodynamics
BRV MJ . . . . Magnetoplasmadynamics
* Behaviour of a conducting fluid (ionized gas, plasma, etc.) under the influence of a magnetic flux.
. . . . . Waves
MJF . . . . . Alfven waves, hydromagnetic waves, plasma magnetohydrodynamic waves
MK . . Radiation
MKF H . . . Emission in plasmas
MKF L . . . Absorption in plasmas
MKF T . . . Scattering in plasmas
ML . . . Optical properties
MM . Particle physics of plasmas
MMD MW . . Particle orbits in plasmas
MMG B . . Particle beam interaction in plasmas
MNH . . Plasma interaction with charged particles
MNP . . Electron physics of plasmas
MNP BD . . . Electron state (plasmas)
MQU . . Ion physics of plasmas
. . . Dissociation
MQU FJ . . . . Plasma loss, plasma decay
MQU KQF . . . . . Plasma lifetime
. Change of state
NP . . Plasma formation (natural)
* See also plasma production techniques BRV 73
Subsystems, parts of plasmas
PW . Impurities in plasmas
Systems by number of components
RN . Single component systems
Systems by number of phases
SN . Homogeneous plasmas
ST . Inhomogeneous plasmas
U . *Systems by phase media*
* For plasmas in other states (gases, liquids, solids), see the other state; eg gaseous plasmas BTU B.
Special types of plasmas
. *By form, shape*
VB . . Plasmoids
VC . . . Clouds (plasmas)
VD . . . Rings (plasmas)
VE . . Columns (plasmas)
VF . . Layers (plasmas)
VG . . Sheaths (plasmas), plasma double layers
VH . . Slab plasmas
VJ . . Cylinders (plasmas)

Fluids

Physics B
States of matter BRN
Plasmas & fluids BRU
Plasmas BRV
. . By form, shape
. . . Cylinders BRV VJ

. . *By activity*
BRV VL . . . Collisionless plasmas
* See also Low density plasma BRV CLP
VM . . . . Non-equilibrium plasmas
VN . . . . Non-uniform plasmas
VP . . . . Relativistic plasmas
VR . . . Collisional plasmas
* See also High density plasma BRV CLT
. . *By composition*
* For impure plasmas, see BRV PW
. . . *By particle*
* See Particle physics of plasmas BRV MM; eg Electron plasmas BRV MNP.
BRX . . . *By chemical characteristics*
* Alternative (not recommended) to locating in Class C Chemuistry; if this option is taken:
* Add to BRX letters G/R following C; eg (notation is provisional)
IC . . . . Metallic plasmas
ICP . . . . . Alkali metal plasmas
V . . *By location*
* Alternative (not recommended) to locating these in their context. If this option is taken, proceed proceed as follows:
* Add to BRX V letters A/G following D; eg Cosmic plasmas, Geophysical plasmas.

BS Fluids
* Many concepts included in this class are applicable mainly (and sometimes perhaps exclusively) to a particular type of fluid or plasma. For economy in scheduling and ease of reference and assignment of notation, all generally applicable concepts are given here, under fluids in general. Concepts which are largely or exclusively applicable only to a particular form of fluid are given under that form; eg lift in aerodynamics (BTB SB). But any concept appearing in any part of this general fluids class may be used in any type of fluid or plasma, and vice versa, should it prove to be applicable.
* Normal retroactive notation is modified for fluids in order to insert a large expansion under flow (beginning at BSG E). The add instructions are summarized here for convenience although they are reinforced at necessary points of the schedule.
* Add to BS letters A/GD following B;
* Add to BSM letters GF/L following BR;
* Add to BSM letters M/Q following B;
* Add to BS letters N/T following BR.
. Quantum theory
BS8 M . . Quantum fluids

Physics B
States of matter BRN
Plasmas & fluids BRU
Fluids BS
Quantum theory
. Quantum fluids BS8 M

BSA G Thermodynamics
* For thermal properties narrowly, see BSM GP.
T . Transport properties
V . . Diffusion
W . . Viscosity, fluidity
WC . . . Dynamic viscosity
WD . . . Kinematic viscosity
WI . . . Intrinsic viscosity

Mechanics

BSB . Fluid mechanics, flow of fluids (general)
36 . . Practical & experimental study
3U . . . Equipment
3YE . . . . Tunnels & tubes, rigs
* Add to BSB 3Y letters E/U following BTB 3Y so far as applicable; eg BSB 3YS Expansion tubes.
76 . . . Measurement
764 . . . . Instruments
764 V . . . . . Venturi meters
764 W . . . . . Pitot tubes
8B . . Theory
8T . . . Molecular theory of flow
9B . . Dimensions of a physical quantity
9BK . . . Similarity parameters, dimensionless numbers
9BL E . . . . Euler number
9BL F . . . . Froude number
9BL H . . . . Hartmann number
9BL K . . . . Knudsen number
9BM . . . . Mach number
9BM P . . . . . Critical Mach number
9BM V . . . . . Mach number of divergence
9BN . . . . Nusselt number
9BN P . . . . Prandtl number
9BO . . . . Reynolds number
9BP . . . . Others
* Arrange A/Z.
G . . Forces
* Many of the concepts in this class are more usually found under gases; see BTB G/BTC D for more details (which may be used here if required).
IM . . . Moments
IQ . . . . Pitching moments
IR . . . . Rolling moments
IS . . . . Yawing moments
IT . . . . Hinge moments

Fluid mechanics

Physics B
Fluids BS
Fluid mechanics BSB
Forces BSB G
. Moments BSB IM
. . Hinge moments BSB IT

BSB J . Pressure
. . *Properties & processes*
J92 D . . . Distribution of pressure
J94 . . . Pressure conditions
J94 E . . . . Critical pressure
J94 K . . . . Constant pressure
JBH . . . Pressure fields
JMP . . . Pressure effects
* See also Cavitation BSG NV
JN . . . . Centre of pressure
JO . . . . Head of pressure
JO9 2J . . . . . Gradients (pressure)
JOS . . . . . Pressure drop, pressure loss
JOT . . . . . Pressure recovery
JOU . . . . . Pressure rise, pressure gain
. . *Types of pressure*
* See also Osmotic pressure BUB JSO
JP . . . Low pressure
JQ . . . High pressure
JSB . . . Partial pressure
JSC . . . Static pressure
JSD . . . Dynamic pressure
JSF . . . Induced pressure
JSI . . . Impact pressure
JSJ . . . Base pressure
JSK . . . Kink pressure
JSN . . . Stagnation pressure
JW . External forces
K . . Deformation
L . . . Stress
Q . . Loading, loads
* See also Dynamic stability BSC Q
* Add to BSB letters R/T following BTB so far as applicable. A selection of examples is given to show their scope.
QS . . . Compressibility (fluids)
QU . . . Buffeting loads
QV . . . Gust loads
QW . . . Impact loads (hydrodynamics)
SB . . . Lift, normal force (lift)
TB . . . Drag
TS . . . Side force, lateral force
TT . . . Drift
BSC B . Elasticity
* See also Vibration BSD V
D . Internal forces
H Statics
L . Density
N . Equilibrium
P . Stability
PS . . Static stability

Physics B
Fluids BS
Fluid mechanics BSB
Statics BSC H
. Stability BSC P
. . Static stability BSC PS

BSC Q . . Dynamic stability
* Add to BSC Q letters T/V following BTC Q; eg longitudinal stability BSC QU.
R . Instability
X Dynamics
BSD A Kinematics
B . Displacement
C . Velocity
* For types of flow defined by speed, see BSJ R.
C76 . . Measurement
C76 4 . . . Rate flowmeters
CF . . Velocity gradient
CQ . . Mass flowrate
CR . . Internal velocity
CS . . Surface velocity
D . Acceleration
E Kinetics
. Theory
E8B . . Kinetic theory of fluids
K Forms of motion
N . Rotational flow
P . . Vortices, vortex motion, vortex flow
* See also cavitation BSG NV
PR . . . Breakdown of vortices
. . . *Properties*
PT . . . . Vorticity
. . . *Elements*
QF . . . . Vortex filaments
QH . . . . Vortex streets
QJ . . . . Vortex sheets
. . . *Types*
QL . . . . Bound vortices
QN . . . . Trailing vortices
QP . . . . Free axis vortex motion
QR . . . . Three-dimensional vortex motion
S . Periodic motion
* See also Elasticity BSB C
BSE . . Vibration & oscillation
* See also special forms under aerodynamics BTE; eg Flutter BTE H.
BSF . . Waves (fluids)
YR . . . Transverse waves
YU . . . Longitudinal waves
BSG A . . . Shock waves, compression waves
* See also Supersonic flow (gases) BTJ W
AF . . . . *Properties & processes*
AFC M . . . . . Attenuation
. . . . *Types*
AG . . . . . Mach cones
* See also Sonic boom BTM GHT
AH . . . . . Attached shock waves
AJ . . . . . Detached shock waves

Fluid mechanics

Physics B
Fluids BS
Fluid mechanics BSB
Forms of motion BSD K
. . . Shock waves BSG A
. . . . . Detached shock waves BSG AJ

BSG AL . . . . . Normal shock waves
AN . . . . . Oblique shock waves
AP . . . . . Standoff waves
AR . . . Blast waves
AS . . . . Explosion waves
AT . . . . Denotation waves
AX . . . Expansion waves
D . . . Other types of waves
* Arrange A/Z; eg flexural waves

Special attributes & elements of flow
* Normal retroactive synthesis from BRG F /BRL is interrupted here in order to accommodate the large vocabulary of fluid flow. It is resumed at BSM.

ER . Flow regime
* Complete flow field.

EV . . Homogeneity (flow)
FC . Suction
FE . Aeronautical factors
* See BTG FE and the note there.

FT . Interference (fluid dynamics), interaction (fluid dynamics)
FV . Stagnation
FX . Choking
G . Aerodynamic heating
GH . Downwash
GJ . Upwash
GL . Sidewash
GP . Wake
GQ . Slipstream
GT . Turbulence
GV . Surging
GX . Ground effect, ground resonance
JB . Hydrodynamic characteristics
JD . . Spray
JF . Concurrent streams
JH . Mainstream
JJ . Downstream
JM . Streamtubes
JP . Streamlines
JQ . Sources
JS . Sinks
JT . Doublets
L . Jets
LM . . Jet streams
LN . . Mixing jets
LP . . Propulsive jets
LR . . Wall jets
LT . . Plumes
LU . . Couette flow
LV . Arcs (fluid flow)
NC . Leaks

Physics B
Plasmas & fluids BRU
Fluids BS
Fluid mechanics BSB
Special attributes & elements of flow
. Leaks BSG NC

BSG NE . Wakes
NG . Eddies
NJ . Surges
NL . Sloshing
NN . Circulation
NP . . Supercirculation
NR . Ripples
NS . Sprays
NT . Drops
NV . Cavities, cavitation
NX . . Bubbles
P . Boundary layer
* Add to BSG letters P/Q following BTG so far as applicable; eg

PH . . Transition

Types of flow
. *By shape*
RC . . Conical flow
. *By compressibility*
RE . . Compressible flow
RG . . Incompressible flow
. *By viscosity*
RJ . . Viscous flow
RJL . . . Slow viscous flow
RJP . . . Creeping viscous flow
RK . . Non-viscous flow, inviscid flow
RL . . Free stream flow
RM . . Newtonian flow
RN . . Non-Newtonian flow
* See also Multiphase flow BSG RP

RNL . . . Relativistic flow
RNS . . Slug flow
RNV . . Forced flow
. *By phase*
RO . . Single phase flow
RP . . Multiphase flow
* See also Non-Newtonian flow BSG RN

RQ . . . Two phase flow
RR . . . . Piston flow, plug flow, slug flow
RS . . . Three or more phases
. *By dimension*
RT . . One-dimensional flow
RU . . Two-dimensional flow
RV . . Threee-dimensional flow
. *By symmetry*
SE . . Symmetrical flow
SF . . Axisyymetrical flow
. *By equilibrium*
SH . . Equilibrium flow
SJ . . Non-equilibrium flow, reactive flow, radiative flow

Fluid mechanics

Physics B
Plasmas & fluids BRU
Fluids BS
Fluid mechanics BSB
By equilibrium
. Non-equilibrium flow BSG SJ

By degree of attachment

BSG SM . Separated flow
SN . Unseparated flow
SR . Reattached flow
SS . Mixed flow
ST . . Re-energized flow

By stress

SV . Cavity flow
T . . Shear flow

By development

TQ . Secondary flow
TR . Fully developed flow
TT . Accelerated flow
TV . Decelerating flow

By pressure

* For compressible & incompressible flow, see BSG RE; for molecular flow (Knudsen flow) see Gases BTG V.

U . Isobaric flow
UR . Rarefied flow

* Add to BSG letters UR/X following BTG so far as applicable; eg Molecular flow BSG V.

Y . Isothermal flow

By parameter changes

BSH B . Reversible flow
D . Irreversible flow
F . Adiabatic flow
H . Diabatic flow
I . Isentropic flow
J . Non-isentropic flow

By presence of velocity potential

L . Potential flow
P . Irrotational flow

* For rotational flow, see BSD N.

By continuity

S . Steady flow, continuous flow
U . Unsteady flow, transient flow

By degree of mixing

W . Free stream flow
BSI . Laminar flow, streamline flow, Poiseuille flow
S . Superlaminar flow
T . Transitional flow
BSJ . Turbulent flow
P . Pulsating flow

By speed

* Add to BSJ letters R/X following BTJ so far as applicable; eg

R . Low speed flow
S . Medium speed flow
T . High speed flow

Physics B
Plasmas & fluids BRU
Fluids BS
Fluid mechanics BSB
By speed
. High speed flow BSJ T

Flow defined by bodies in fluid

BSK B . Bodies in fluid flow
BBG . . Control forces

* On bodies in fluids.

BBG L . . . Longitudinal controls
BBG N . . . Lateral controls
BBG P . . . Directional controls

. . Parts of bodies in flow

D . . . Surfaces
DL . . . Corners, kinks
DN . . . Bends
DP . . . . Irregular bends
DR . . . Holes
E . . . . Orifices, apertures, openings
EL . . . Constrictions
EN . . . Widenings
EP . . . Entries
EQ . . . Exits
ER . . . Forebodies
ET . . . Centrebodies
EV . . . Afterbodies

. . Types of bodies in flow

F . . . Streamlined bodies
G . . . One-dimensional bodies (fluid flow)
H . . . Two-dimensional bodies (fluid flow)
I . . . . Porous media (bodies in flow), membrane flow
J . . . . Manifolds
K . . . . Nozzle
L . . . . Conduits, ducts
LL . . . . . Low gradient conduits
LP . . . . . High gradient conduits
M . . . . . Open conduits
N . . . . . Channels, passages, channel flow
NP . . . . . Semi-infinite channels
O . . . . . Sluices

* Channels allowing sudden rushes of fluid.

P . . . . . Closed conduits
PP . . . . . Pipes
PR . . . . . Networks (fluid flow)
PT . . . . . Tubes
PV . . . . . Pitot tube
PX . . . . . Diffusers

Fluids

Physics B
Plasmas & fluids BRU
Fluids BS
Mechanics
. . . . . Two-dimensional bodies BSK H
. . . . . Diffusers BSK PX

BSK Q . . . . . Three-dimensional bodies (fluid flow)
QL . . . . . Cubes
QP . . . . . Prisms
QR . . . . . Pyramids
R . . . . . Wedges
S . . . . . Bodies of revolution
T . . . . . Cylinders
V . . . . . Hollow cylinders, tubular cylinders
W . . . . . Discs
BSL C . . . . . Cones
D . . . . . Truncated cones
H . . . . . Spheres, balls
I . . . . . Cocentric spheres, concentric flow
* See also Couette flow BSG LT
J . . . . . Hemispheres
L . . . . . Ellipsoids
N . . . . . Ogives
O . . . . . Toruses
P . . . . . Paraboloids
R . . . . . Rings
S . . . . . Boat-tail bodies
T . . . . . Blunt bodies
U . . . . . Bluff bodies
V . . . . . Other bodies in flow

BSM *Other energy interactions & forms*
* Normal retroactive synthesis from BR is resumed here after its interruption beginning at BSG ER.
* Add to BSM letters GF/L following BR: eg
GH . Acoustic properties
GP . Thermal properties
GQV . . Convection
GQV S . . . Natural convection, free convection
GQV T . . . Forced convection
. . Zero temperature
* For superfluids, see BSM PBF.
H . Electro-magnetic properties
. . Conduction
HU . . . Electrically conducting fluids
* For magnetohydrodynamics, see BRU J.
M . *Relations with particle & atomic physics*
* Add to BSM letters M/Q following B; eg
P . . Atomic aspects
PBE G . . . Lowest energy state
* For superfluidity, see BSM PBF.
PBF . . . Superfluidity, superfluids
* State exhibiting apparently frictionless flow.
PBF B . . . . Superfluid flow

BSN States of matter
P . Change of state
R . . Transitions

Physics B
States of matter BRN
Plasmas & fluids BRU
Fluids BS
States of matter BSN
. . Transitions BSN R

BSO . . *Types of changes of state*
* See note at BRO.
BSP R . . . *Properties special to a type*
Subsystems, parts of fluids
W . Impurities
BSQ . Surfaces
U . . Free surfaces
W . . Mainstream (fluids)

Types of fluids
* See also properties defining quasi-types; eg Electrically conducting fluids BSM HU
. *By simplifying assumptions*
BSR D . . Perfect fluids, ideal fluids
F . . Real fluids
FR . . . Rarefied fluids
. *By number of components*
O . . Mixtures
. *By number of phases*
BSS N . . Homogeneous
T . . Heterogeneous systems
U . . . Anomalous fluids, Non-Newtonian fluids, anomalous viscosity
* Fluids with two or more phases present at the same time.
. . . Mixed systems, dispersions
BST . . . . Fluid dispersions
* For dispersions involving two states, cite first the denser state; eg fluids in solids go under solids.
U . . . . . Suspensions
* Systems in which the denser particles are distributed through the less dense fluid.
BSU . . . . *By state dispersed*
* See note at BRT re citation order.

BT . Gases
* Works relating to physics of air are treated as general works on gas physics unless their purpose is specifically to distinguish problems of air from those of other gases, in which case prefer BTV.
* Many concepts associated primarily with gas physics (eg many types of flow) appear in the general class for fluids (BS). All concepts in fluid physics which are applicable to gases may be added to the latter if necessary (eg BTG FH Balancing (aerodynamics)). Similarly, if any concept enumerated under gases but not under fluids or liquids proves to be applicable to the latter, it may be added to them.
* Add to BT letters A/U following BS; eg
. . Spatial properties
. . . Anisotropy
BT9 E2 . . . . Anisotropic gases

Gas mechanics

Physics B
Plasmas & fluids BRU
Fluids BS
Gases BT
Spatial properties
. . Anisotropic gases BT9 E2

BTA G Thermodynamics
T . Transport properties
V . . Diffusion
VT . . . Penetration of gases, inflow (gases)
W . . Viscosity
WS . . . Internal friction (gases)
WT . . . . Outflow

Mechanics

BTB . Gas mechanics, pneumatics, flow of gases (general), aerodynamics
36 . . Practical & experimental study
3U . . . Equipment
3XT . . . . Physical models
3YB . . . . . Simulators (gas flow)
3YE . . . . Tunnels & tubes, rigs
. . . . . *Parts*
3YF . . . . . Special components
* Arrange A/Z; eg nozzles BTB 3YF N.
3YG . . . . . Walls
. . . . . *Types*
3YJ . . . . . Rotating equipment (gas physics)
* For spinning towers, see BTB 3YO V
3YL . . . . . Wind tunnels
3YL 3BD . . . . . Design & construction
. . . . . *Types*
3YM . . . . . *By flow properties*
* Add to BTB 3YM letters D/M following BT (except for JR/JX).
3YN . . . . . *By speed*
* Add to BTB 3YN letters R/X following BTJ; eg transonic wind tunnels BTB 3YN V.
3YO V . . . . . Vertical wind tunnels, spinning towers
3YP . . . . . Shock tubes
3YQ . . . . . Shock tunnels
3YS . . . . . Expansion tubes
3YU . . . . *Special to a situation*
* E.g. electrolytic tanks (potential flow) BTH L3Y U
76 . . . Measurement
9B . . Dimensions of a physical quantitity
9B2 X . . . Dimensional analysis
9BK . . . Similarity parameters
9BL K . . . . Knudsen number
9BM . . . . Mach number
9BO . . . . Reynolds number

Physics B
Fluids BS
Gases BT
Gas mechanics BTB
Dimensions of a physical quantitity BTB 9B
. . Reynolds number BTB 9BO

BTB G Forces
IM . Moments
IQ . . Pitching moments
IR . . Rolling moments
IS . . Yawing moments
IT . . Hinge moments
IX . Attitude
* Angle of airfoil to flow [level]
J . Pressure
. . *Properties & processes*
J94 . . . Pressure conditions
J94 E . . . . Critical pressure
J94 K . . . . Constant pressure, isobaric
JBH . . . Pressure fields
JMP . . . Pressure effects
JN . . . Centre of pressure
. . *Types of pressure*
JP . . . Low pressure
JQ . . . High pressure
JSB . . . Partial pressure
JSC . . . Static pressure
JSD . . . Dynamic pressure
JW . External forces
Q . . Loading, loads
QS . . . Compressibility
QU . . . Buffeting loads
QV . . . Gust loads
QW . . . Impact loads
SB . . . Lift
SB2 QK . . . . Lift coefficient
SB9 2D . . . . Lift distribution
SCK . . . . Kussmer function
SF . . . . Lift vector
SH . . . . Lift slope
SJ . . . . Lift interference
SL . . . . Lift effects
SN . . . . Non-linear lift
SP . . . . Maximum lift
TB . . . Drag (aerodynamics), air resistance (aerodynamics)
TC . . . . Drag coefficient
TF . . . . Drag rise
TG . . . . Drag divergence
TH . . . . Foredrag
TJ . . . . Profile drag, zero lift drag
TK . . . . . Form drag
TKP . . . . . Surface friction drag, skin friction drag
TKR . . . . Wave drag
TL . . . . Induced drag, lift-induced drag
TN . . . . Parasitic drag, interference drag
TP . . . . Coulomb drag

Gas mechanics

Physics B
Forces BTB G
. External forces BTB JW
. . Loading, loads BTB Q
. . . Drag BTB TB
. . . . Coulomb drag BTB TP

BTB TQ . . . . Zero lift drag
TS . . . Lateral force
TT . . . Drift
TU . . . Wind loading
TV . . . . Gust loading
TW . . . . Thrust
TX . . . . . Vertical thrust
UN . . . Torsion
VE . . . Elastic deformation
BTC B . . Aeroelasticity (general)
* Interaction of aerodynamic forces & the elastic reactions of bodies.
* See also Vibration BTE
. . . Viscoelasticity
C . . . . Viscoelastic gases
D . Internal forces
H Statics
K . Weight
KN . . Buoyancy
* See also vertical thrust BTB TX
L . Density
N . Equilibrium
P . Stability
PS . . Static stability
Q . . Dynamic stability
* See also Oscillation BTE
QTR . . . Stability derivatives
QU . . . Longitudinal stability
QUH . . . . Short-period longitudinal stability
QUP . . . . Phugoid stability
QV . . . Lateral stability, directional stability
QVK . . . . Snaking
* Uncontrolled oscillation in yaw.
QVR . . . . Dutch rolling
R . Instability
Dynamics
* For aerodynamics, see gas mechanics in general (BTB).
XN . Non-stationary gas dynamics
BTD A . Kinematics
B . Displacement
C . . Velocity
* For types of flow defined by speed, see BTJ R.
. . . Measurement
C76 . . . . Anemometry
D . . Acceleration
E . Kinetics
E8B . . Kinetic theory of gases
E8G . . . Brownian movement
EG . . Mean energy of molecules, mean velocity of molecules

Physics B
Gases BT
Gas mechanics BTB
Dynamics
. Kinetics BTD E
. . Mean energy of molecules BTD EG

. *Forms of motion*
BTD N . . Rotational flow
P . . . Vortices, vortex mmotion, vortex flow
S . . Periodic motion
V . . . Vibration (aeroelasticity)
* Use BTE.
BTE . . . Vibration & oscillation
* See also aerolasticity BTC B
* Add to BTE letters A/E following BE.
* Add to BTE F letters F/U following BE so far as applicable.
. . . . *Special forms*
H . . . . . Flutter
* Sustained oscillation of body.
J . . . . . Flexure-torsion flutter
L . . . . . Buzz
* Severe vibration, especially of control surfaces.
N . . . . . Buffeting
* Irregular oscillation of body.
BTF . . . Waves (gas dynamics)
YU . . . . Longitudinal waves
BTG A . . . . Shock waves, compression waves
* See also Sonic boom BTM GHT; Supersonic flow BTJ W
. . . . . *Properties & processes*
AFC M . . . . . Attenuation
. . . . . *Types*
AG . . . . . Mach cones
AH . . . . . Attached shock waves
AP . . . . . Standoff waves
AR . . . . Blast waves
AX . . . . Expansion waves
D . . . . Other types of waves
Special attributes & elements of flow
* Normal retroactive synthesis from BRG H/BRM is interrupted here in order to accommodate the large vocabulary of gas flow. It is resumed at BTM
* The main enumeration of the special properties and types of flow is given under fluids in general, at BSG. A number of the concepts prominent in gas dynamics are repeated below for convenience and to demonstrate the scope of the synthesis. But all the classes under fluids may be used under gases if required.
* Add to BT letters GE/L following BS; eg
ER . Flow regime
FC . Suction

Gas mechanics

Physics B
Plasmas & fluids BRU
Fluids BS
Gases BT
Gas mechanics BTB
Suction BTG FC

BTG FE Aeronautical factors (airflow)
* Alternative (not recommended) to locating in Technology U.
FG . Blowing
FH . . Balancing (aerodynamics)
* Minimizing control forces needed to balance air loads.
FK . Rotational field (aerodynamics), curl (aerodynamics)
FL . Autorotation, windmilling
FM . . Spin (aerodynamics)
FN . Feathering
FP . Manoeuvrability forces
FPH . . Performance (aerodynamics)
FPJ . . Speed
FPL . . . Rate of ascent
FPN . . . Rate of descent
FPP . . Take-off
FPR . . Landing (aerodynamics)
FT Interference (aerodynamics), interaction (aerodynamics)
* Aerodynamic influence of one body on another.
GH Downwash
GQ Slipstream
GT Turbulence
GX Ground effect, ground resonance
JQ Sources
JS Sinks
JT Doublets
L Jets
LT . Couette flow
NC Leaks
NE Wakes
NG Eddies
NN Circulation
* Lift-producing airflow round an aerofoil.
NP . Supercirculation
P Boundary layer
. *Processes*
PH . . Transition (boundary layer)
PK . . Separation (boundary layer)
PL . . Reattachment
PM . . Thickening (boundary layer)
PN . . Growth (boundary layer)
PP . . Interference (boundary layer)
. *Types*
PS . . Wall boundary layer
PT . . Oscillating boundary layer
Q . . Other
* Add to BTG Q letters DF/L following BT; eg Vortex boundary layer BTG QDP : Laminar boundary layer BTG QI.

Physics B
Fluids BS
Gases BT
Gas mechanics BTB
Special attributes & elements of flow
. . . Other BTG Q

Types of gas flow
. *By shape*
BTG RC . . Conical flow
. *By compressibility*
* See also Rarefied gas flow BTG UR
RE . . Compressible flow
RG . . Incompressible flow
. *By viscosity*
RJ . . Viscous flow
RJL . . . Slow viscous flow
RK . . Non-viscous flow
RL . . Free stream flow
RM . . Newtonian flow
. *By symmetry*
SE . . Symmetrical flow
SF . . Axisyymetrical flow
. *By equilibrium*
SH . . Equilibrium flow
SJ . . Non-equilibrium flow
. *By degree of attachment*
SM . . Separated flow
SN . . Unseparated flow
SR . . Reattached flow
SS . . Mixed flow
. *By stress*
SV . . Cavity flow
T . . . Shear flow
. *By pressure*
* For compressible & incompressible flow, see BTG RE.
U . . Isobaric flow
UR . . Rarefied gas flow
V . . . Molecular flow, Knudsen flow
* Mean free path of the gas molecules is large compared with dimensions of containing vessel; so flow rate is determined more by molecule/wall collisions than intermolecular collisions (ie viscosity).
VRL . . . . Free molecular flow
W . . . Superaerodynamics
* Flow at very low densities.
X . . . Slip flow
XP . . . . Expansion flow, Prandtl-Meyer flow
Y . . Isothermal flow
. *By parameter changes*
BTH B . . Reversible flow
D . . Irreversible flow
. *By presence of velocity potential*
L . . Potential flow
. . . Equipment
L3Y U . . . . Electrolytic tanks (potential flow)

Physics B
Fluids BS
Gases BT
Gas mechanics BTB
By presence of velocity potential
. . . Electrolytic tanks BTH L3Y U

By continuity

BTH S . Steady flow, continuous flow
* For Couette flow, see Jets BTG LT.
U . Unsteady flow, transient flow

By degree of mixing

W . Free stream flow
BTI . Laminar flow, streamline flow, Poiseuille flow
S . . Superlaminar flow
T . Transitional flow
BTJ . Turbulent flow

By speed

R . Low speed flow
* Mach 0.3 or less.
S . Subsonic flow
* M 0.8 - M 1.0.
ST . . With compressibility effects
SV . . Without compressibility effects
T . High speed flow
U . Subcritical flow
V . Transonic flow
* Partly subsonic, partly supersonic.
W . Supersonic flow
* M 1.0 - M 4.99.
X . Hypersonic flow
* Mach 5 or more.
Y . . Hypervelocity flow

Flow defined by bodies in gases

BTK B . Bodies in gas flow
BBG . . Control forces

. *Parts*

D . . Surfaces
DR . . Holes

. *Types of bodies in flow*

F . . Streamlined bodies
G . . One-dimensional bodies (gas flow)
H . . Two-dimensional bodies (gas flow)
J . . . Manifolds
K . . . Nozzles
L . . . Conduits, ducts
N . . . . Channels, passages
P . . . . Closed conduits
PP . . . . . Pipes
PT . . . . . Tubes
Q . . Three-dimensional bodies (gas flow)
R . . . Wedges
S . . . Bodies of revolution
T . . . . Cylinders
BTL S . . . . Boat-tail bodies
T . . . . Blunt bodies
U . . . . Bluff bodies

Physics B
Fluids BS
Gases BT
Mechanics
. . . . . Bodies of revolution BTK S
. . . . . Bluff bodies BTL U

BTL W . . . . . Immersed bodies
* See Liquids BUL W
X . . . . . *Aeronautical structures*
* See Aeronautical engineering U

BTM *Other energy interactions & forms*
* Normal retroactive synthesis with classes from BR is resumed here after its interruption beginning at BTG FC.
* Add to BTM letters GH/Q following BR; eg
GH . Acoustic properties of gases
GHN . . Noise
GHS . . . LCavitation noise
GHT . . . Sonic boom
* See also Shock waves BTG A
GP . Thermal properties of gases
. . Thermodynamics
GPA G . . . Aerothermodynamics
GQ . . . Heat transfer
GQT . . . . Thermal transpiration
GU . . . . Aerodynamic heating
GY . Electrical & magnetic properties
HR . . Electrical discharge, field discharge (electricity)
HR3 6 . . . Practical & experimental
HR5 V . . . . Thermionic tubes
HR5 W . . . . Cold cathode tubes
HRJ . . . Partial discharge
HRK . . . High-frequency discharge
HRL . . . Electrical breakdown (general)
HRL V . . . . Electron avalanches
HRM . . . Surface discharge
* See also Luminous discharge (gases) BTM LFH R
HRN . . . . Corona
HRP . . . . Brush discharge
HRQ . . . Disruptive discharge
HRR . . . . Arc discharge
HRR S . . . . . Flashover
HRS . . . . . Spark discharge
HRT . . . . . Glow discharge
HRV . . . Space charges
KJ . . Ionization
KJF C . . . Ionized gases
. . Electroluminescence
LFH R . . . Luminous discharge (gases)
M *Relations with particle & atomic physics*
* Add to BTM letters M/Q following B; eg
NP . Atomic aspects

Condensed matter

Physics B
Plasmas & fluids BRU
Fluids BS
Gases BT
. Relations with particle & atomic physics BTM M
. . Atomic aspects BTM NP

. *Processes & properties special to bulk matter*
BTN P . . Change of state
BTO . . . *Types of change by states involved*
* See note at BRO re citation order.
. . . . *Change of gas to & from liquid*
* See Liquids - Types of change BUO E
. . . . *Change of gas to & from solid*
* See Solids - Types of change BVO E
. *Subsystems, parts*
BTP W . . Impurities
BTQ . . Surfaces
Q . . Films
. *Types of systems*
* For types defined by physical properties, see the property; eg anisotropic gas BT9 EL.
. . *By simplifying assumptions*
BTR D . . . Perfect gases
F . . . Real gases
* See also Rarefied gas flow BTG UR
K . . *By number of components*
O . . . Mixtures
. . *By number of phases*
BTS N . . . Homogeneous, single phase
T . . . Heterogeneous, multiphase
U . . . . Anomalous
V . . . . Binary systems
BTT . . . Dispersions, mixed systems
V . . . . Colloids
BTU . . *By state dispersed*
B . . . Plasmas in gases, gaseous plasmas
G . . . Gases in gases
. . . Gases in liquids & liquids in gases
* See Liquids - States of matter BUU G
. . . Gases in solids & solids in gases
* See Solids - States of matter BVU G
. *Types of gases*
* For gases by chemical composition, see Class C Chemistry; for air, see DSQ (in Class DG Earth sciences).
Liquids
* See BU (under condensed matter)

Physics B
Bulk matter physics BR
States of matter BRN
Plasmas & fluids BRU
. . . Liquids

BTX Condensed matter
* See note at BR. Although sometimes used to cover all bulk matter, its usual meaning now is of liquids and solids taken together.
* Add to BTX letters A/U following BR as instructed; eg at BRR, with the addition of BTX BF; eg
BB . Energy
BF . . Energy bands, band structure
* See also Semi-conductors BVI; Dielectrics BVI S
BF7 5 . . . Calculation
BF7 5W . . . . Calculations (energy bands)
* Arrange A/Z; eg OPW calculation BTX BE7 5WO.
BF8 B . . . Theory, models
BF8 H . . . . Relativistic models
BF8 T . . . . Free electron approximation (energy bands)
BF8 U . . . . Nearly-free electron approximation (energy bands)
BF8 V . . . . Cellular method (energy band theory)
BF8 W . . . . Supercell cellular method
. . . *Properties*
BFF . . . . Band edge energy
. . . *Particular bands, states*
* Some of these are special to semi-conductors (BVI) but are given here for convenience.
BFG . . . . Fermi level, Fermi energy
BFH . . . . Brillouin zone
BFI . . . . Localized electron states
BFJ . . . . Deep levels (energy bands)
BFK . . . . Inner band
BFL . . . . Allowed band
BFM . . . . Forbidden zone
BFN . . . . Occupied state
* Usually implies a metal.
BFO . . . . Valence band
BFP . . . . . Empty state (energy bands)
BFQ . . . . . Energy gaps, band gaps
BFQ R . . . . . Energy band tails
BFR . . . . . Barrier layer
BFR S . . . . . Barrier penetration
BFS . . . . . Depletion layer
BFT . . . . Conduction bands
BFW . . . . *Special states*
* Arrange A/Z; eg
BFW T . . . . . Two level bands
BG . Forces
BJ . . Pressure
BJQ . . . High pressure physics
BJW . . External forces
. . . Deformation
BK . . . . Rheology
* Deformation and flow of condensed matter.

Liquids

Physics B
States of matter BRN
Condensed matter BTX
Forces BTX BG
. . Deformation
. . . Rheology BTX BK

BTX BQS . . Compressibility
CX Dynamics
DN . Rotation
. . Quanta
DN8 N . . . Rotons
* Quantum of rotational energy (analogous to photon).
GE . *Special attributes & elements of flow*
* This class has a special expansion in Fluids BU, for use also in gases and liquids. This special provision applies only to a minor degree to condensed matter in general and probably not at all to solids. But in case any of the concepts concerned are required under BTX or BV (Solids) provision is made here for them:
* Add to BTX GE letters GE/LW following BU if applicable.
H Electrical & magnetic properties
HU . Conductivity
IP . . Superconductivity (general)
* Most of the literature on this refers to the solid state; all details are therefore given there (at BVI P) but may be used here to qualify truly general works.
* See also Superfluids BSV
NP Change of state
O . *Types of change, by states involved*
* See note at BRO re citation order.
Subsystems
Q . Surfaces
QBD . . Surface energy levels
QBF . . Fermi surface
QO . Interfaces
QOB D . . Interface energy levels

BU Liquids, liquid physics
* Add to BU letters A/U following BS (Fluids).
BU3 6 . Practical
U . . Equipment
YL . . . Water tunnels, water tanks
BUA G . Thermodynamics
T . . Transport properties

Physics B
States of matter BRN
Condensed matter BTX
Liquids BU
Thermodynamics BUA G
. Transport properties BUA T

Mechanics
BUB . Hydromechanics, flow of liquids
J . . Pressure
JSO . . . Osmotic pressure
* For osmosis, see Chemistry C.
JST . . . Flotation, floating
. External forces
BUC B . . Hydroelasticity
* See also Vibration BUE
. Statics
H . . Hydrostatics
N . . . Equilibrium
OW . . . . Relative equilibrium (liquids)
. Dynamics
X . . Hydrodynamics
X2M . . . Mathematics
X2M 9L . . . . Equations of continuity
X2M 9N . . . . . *By name*
* Arrange A/Z; eg
X2M 9NE . . . . . Euler's equation (hydrodynamics)
BUD K . . Forms of motions
N . . . Rotational motion
P . . . . Vortices
S . . . Periodic motion
BUE . . . Vibrations & oscillations
* For acoustics in liquids, see BUM GH.
BUF . . . *Waves*
YU . . . . Longitudinal
BUG A . . . . Shock waves
. . *Special attributes & elements of flow*
* Normal retroactive synthesis from BRG H/BRM is interrupted here in order to accommodate the large vocabulary of liquid flow. It is resumed at BUM.
* Add to BU letters GE/L following BS; eg
ER . . . Flow regime
GT . . . Turbulences
P . . . Boundary layers
. . *Types of flow*
BUI . . . Laminar flow
BUJ . . . Turbulent flow
BUK B . . . Flow determined by bodies
KN . . . . Channel flow
KO . . . . . Sluices
BUL V . . . . Hydrofoils
W . . . . Immersed bodies, submerged bodies, floating bodies
. . . . . Density effects
WCL . . . . . Buoyancy

Liquids

Physics B
States of matter BRN
Condensed matter BTX
Liquids BU
Mechanics
. . . . . Buoyancy BUL WCL

BUM *Other energy interactions & forms*
* Normal retroactive synthesis is resumed here after its interruption at BUG ER.
* Add to BUM letters GF/Q following BR; eg

GH . Acoustics
GP . Thermal properties
H . Electro-magnetic properties
M . *Relations with particle & nuclear physics*
BUN P . Change of state
R . . Transitions, transformations
BUO . . *Types of change by states involved*
* See note at BRO re citation order.
. . . Change of liquids to gases & gases to liquids
E . . . . Liquid-vapour transformations
* For works considering both directions of change.
G . . . . . Evaporation, vaporization, volatilization, change of liquids to gases
* For vaporization in the narrower sense of transformation of solid to gas, see BVO G.
. . . . . Entropy
GAM . . . . . Entropy of fusion (liquid to gas)
. . . . . Pressure
GBJ . . . . . Vapour pressure
. . . . . Latent heat
GNS . . . . . Latent heat of vaporization
GP . . . . . Volatility
GQ . . . . . Boiling
. . . . . Critical point
GQ9 4C . . . . . Boiling point
GQN . . . . . Nucleate boiling
GQP . . . . . Film boiling
GQR . . . . . Pool boiling
GR . . . . . Formation of vapour below boiling point
GS . . . . . Superheating
* Heating of liquid above its normal boiling point,
GV . . . . . Field evaporation
H . . . . . Liquefaction of gas, change of gases to liquids
I . . . . . Condensation
I94 C . . . . . Condensation point, dewpoint
IR . . . . . Filmwise condensation
IS . . . . . Dropwise condensation
L . . . Change of liquids to & from solids
* See Solids - Change of state BVO L
. *Subsystems of liquids*
BUP W . . Impurities
BUQ . . Liquid surfaces
BLX . . . Surface tension
OU . . . Free surfaces

Physics B
Condensed matter BTX
Liquids BU
. . Subsystems of liquids
. . . Liquid surfaces BUQ
. . . . Free surfaces BUQ OU

BUQ Q . . . Films
. . *Systems*
* For systems defined by physical properties, see property; eg electrically conducting liquids BUM HU.
. . . *By simplifying assumptions*
BUR D . . . . Ideal liquids
N . . . *By number of components*
O . . . . Mixtures
. . . *Systems by number of phases*
BUT . . . . Liquid dispersions
BUU . . . . . *By state dispersed*
* See note at BRT re citation order.
B . . . . . Plasmas in liquids, liquid plasmas
G . . . . . Gases in liquids & liquids in gases
H . . . . . Liquids in gases
J . . . . . Gases in liquids
L . . . . . Liquids in solids & solids in liquids
* See Solids BVU L
S . . . . . Liquids in liquids
. . *Types of liquids*
* For liquids defined by chemical composition, see Class C Chemistry; for liquid crystals, see BWU L
BUW D . . . Pure liquids

BV Solids, rigid bodies
* For solid state physics in the narrow sense of the electrical and electronic properties of solids, see BVH.
* Add to BV letters A/U following BR; eg
. Spatial properties
BV9 EK . . Isotropic solids
EL . . Anisotropic solids

BVB . Mechanics
F . . Energy bands

G . . Forces

Strain

Physics B
Bulk matter physics BR
States of matter BRN
Condensed matter BTX
Solids BV
Forces BVB G

BVB K Deformation
. *Parameters*
KL . . Stress-strain relationships
. . . Techniques
. . . . Birefringence techniques
KL6 LFM J . . . . . Photoelastic stress analysis
* For photoelelastic effect, see BVL FMJ.
KM . . . Elastic limit
KN . . . Limit of proportionality
KP . . . Strength (stress-strain)
KQ . . . . Yield point, yield strength
KR . . . . . Rupture point
KV . High velocity deformation
L . Stress
* Deforming force per metre.
. . *Processes & properties*
LM . . . Stress distribution
LN . . . . Concentration (stresses)
LP . . . Stress raisers
* For example, holes, edges.
LQ . . . Intensity (stress)
LR . . . Relaxation
LS . . . Stress waves
LV . . Stress components
LX . . . Tension
. . *Types of stresses*
MD . . . Internal stress, residual stress
MF . . . Combined stress
MH . . . Static stress
ML . . . . Hydrostatic pressure (stresses)
MM . . . Dynamic stress
MN . . . . Cyclic stress
MP . . . Flow stress
MQ . . . Vibrational stress
MR . . . Thermal stress, thermoelastic stress
MT . . . Bending stress
N . . . Torsional stress, twisting stress
NS . . . . Impact stress
O . . . Normal stress, direct stress
OT . . . . Tensile stress, tensional stress
OU . . . . . Ultimate tensile stress, direct stress
OV . . . . Compressive stress
P . . . Shear stress
Q . . Loads, loading
* Add to BVB letters Q/V following BTB (aerodynamic loads) so far as applicable.
QS . . . Compressibility
* See also Bulk modulus BVC BG

Physics B
States of matter BRN
Condensed matter BTX
Solids BV
Stress BVB L
. . Compressibility BVB QS

BVB T Strain
* Deformation resulting from stress.
TL . Bauschinger effect
TM . Hooke's law
. *By stress*
* Add to BVB U letters L/R following BVB; eg
UN . . Torsion
* Result of applying twisting force or torque.
UO . . Normal strain
UP . . Shear strain
UW . Warpage
UX . Aging
VE . Elastic deformation
* See also elasticity BVC B
VL . . Electrostriction, electrostricture strain
* See also piezoelectric effect BVI UC
VM . . Dimension changes (strains)
VN . . . Longitudinal strain, linear strain
VO . . . . Elongation, stretching, lengthening (strain)
VP . . . . Contraction, shrinkage, shortening (strain)
VQ . . . Area changes (strain)
VR . . . Volume changes (strain)
VS . . . . Swelling (strain)
VT . . . . Flattening
VX . . . . Expansion (strain)
WP . Plastic deformation
WQ . . Superplasticity
WR . . Hardness
WT . . Deflection
XD . . Dislocation
XDB KQ . . . Yield strength
XF . . . Slip
XG . . . . Direction of slip
XH . . . . Slip planes
XJ . . . Deformation twinning (dislocation)
* Rotation of crystal axes to achieve symmetry.
XL . . . Edge dislocation
XN . . . Screw dislocation
YD . Failure (strain)
YF . . Fatigue
YG . . . Limit (fatigue strain)
YH . . . *By environmental effect*
* Arrange A/Z; eg
YHA . . . . Acoustic fatigue
YHV . . . . Vacuum fatigue
YJ . . . *By load*
* Arrange A/Z; eg
YJC . . . . Compression load
YJR . . . . Random load

Solids

Physics B
Condensed matter BTX
Solids BV
Deformation BVB K
. . . Fatigue BVB YF
. . . . . Random load BVB YJR

BVB YK . . . Creep
YLB . . . . Recovery (creep)
. . . . *By stage*
YLD . . . . . Transient creep
YLF . . . . . Steady state creep
YLH . . . . . Tertiary creep
YM . . . Shearing
* Angular deformation.
YN . . . Tearing
YP . . . Fracture, rupture (fracture)
YQ . . . . Post-yield fracture
YR . . . . Brittle fracture, brittleness
YS . . . . Spalling
YT . . . . Cleavage, splitting
YU . . . . Cracks (fracture)
YV . . . Buckling
BVC A Friction, tribology
* See Surfaces BVQ CA
B Elasticity
* Property of a physical system allowing it to return to the original physical state after removal of a stress.
BE . Modulus of elasticity, elastic constants
* Ratio of stress to strain.
* For elastic limit, see BVB KM.
BF . . Young's modulus, coefficient of elasticity
BG . . Bulk modulus, volume elasticity
* For compressibility (the reciprocal of bulk modulus) see BVB QS.
BH . . Rigidity modulus, shear modulus
BI . . Poisson's ratio (elasticity)
BJ . . Rupture modulus
BK . . Bending moment
BL . *Elastic properties*
BM . . Ductility
BN . . Toughness
BO . . Hysteresis (properties of solids)
BP . . Instability (elasticity)
BQ . . Brittleness
BR . . Resilience
BS . . Flexibility (elasticity)
BT . . Extensibility
BU . . Relaxation
BV . . Stiffness
BW . . Rigidity
. *Forms of elasticity*
* For photoelastic effect, see BVL FMJ.
CC . . Viscoelasticity, viscoelastic solids
* Show a combination of liquid-like and solid-like behaviour, due in particular to energy storage and dissipation during deformation.
CE . . Anelasticity
* See also Creep BVB YK; Damping BVC CJ

Physics B
Condensed matter BTX
Solids BV
Forces BVB G
. Elasticity BVC B
. . . Anelasticity BVC CE

BVC CG . . . Thermoelasticity
CJ . Damping
CK . . Internal friction
CP . Plasticity
CQ . . Photoplasticity
CS . . Superplasticity
CT . Hardness
D . Internal forces
H Statics
S Motion
X Dynamics
. Periodic motion
BVE . . Vibration, oscillation & wave motion
. . . Coupling
RU . . . . Polaritons
BVG E . . . *Special attributes & elements of flow*
* This class has a special expansion for fluids, gases and liquids, achieved by an interruption of normal synthesis. The concepts involved apply only to a minor degree to condensed matter and hardly at all to solids. But in case any of the concepts concerned are required here, provision is made for them as follows:
* Add to BVG E letters GE/LW following BU.
H . . . Acoustic properties (solids)
H7H . . . . Visualization & imaging
H7H L . . . . . Chladni figures
. . . . *Interactions with other energy forms*
HJ . . . . . Magnetoacoustics, acoustomagnetics
HK . . . . . Acoustomagnetoelectric effects
O . . . . Extremely high frequencies
. . . . . Quantum state
O8N . . . . . Phonons
P Thermal properties
. *Interactions with other energy forms*
PJ . . Magnetocaloric effects, thermomagnetic effects, magnetothermal effects
* For pyromagnetism, see BVJ UGX.
W . Low temperature (solids)
X . High temperature (solids)

Solids

Physics B
States of matter BRN
Condensed matter BTX
Solids BV
Thermal properties BVG P
. High temperature BVG X

BVG Y Electrical & magnetic properties
* This is the main schedule for these in Class B, for the reasons given at BGY (that many of the concepts are dependent on bulk matter). An additional factor is that many of them (eg circuits) also reflect the existence of human artefacts which, strictly speaking, should go in Class U/V Technology.
* The term Solid state physics is sometimes used for this class. For works using it thus, use BVH.
* Locate works here only when they are treated as contributions to physics proper, rather than technology. In cases of doubt, prefer technology.

BVH . Electromagnetic properties of solids
* Electric and magnetic fields in solids and their interaction with electric charges and currents.
* For electric fields, see BVH IBH; for magnetic fields, see BVJ BH.

BH . . Electromagnetic field
* See also Electrostatics BVH N

. . . *Properties*
BHJ . . . . Gradient (electromagnetic field)
BHK . . . . Field strength (electromagnetism)
BHL . . . . Field interaction (electromagnetism)
BHM . . . . Excitation of field (electromagnetism)
BHN . . . . Deexcitation of field (electromagnetism)

I . *Electricity, electrical properties of solids*
IBH . . Electric field
* Usually implies electrostatic field (BVH NBH); in cases of doubt, prefer latter.

IBH K . . . Electric intensity, electric field strength
JC . . Electrical quantities, electrical variables
. . . *Input-output relations*
JG . . . . Gain
JL . . . . Loss
K . . . Charge, electric charge
* For free electrons, see BNP RLJ; for charge carriers, see BVI E.

KL . . . . Electrification
* See also Electrostatics BVH NKL

KNT . . . . Attraction
KNV . . . . Repulsion
KO . . . . Electric moments
KP . . . . Polarity
KQ . . . . Electric dipoles
KR . . . . Positive charge
KS . . . . Negative charge
KV . . . . Hypercharge

Physics B
Condensed matter BTX
Solids BV
Electrical quantities BVH JC
. Charge BVH K
. . Hypercharge BVH KV

BVH L . Voltage, potential difference, electromotive force, EMF, potential (electricity)
. . Gain
LJG . . . Voltage gain
LN . . Distribution of voltage
LP . . Voltage drop
LQ . . Overvoltage
LR . . Contact potential
LS . . Surface potential
LT . . Low voltage
LU . . Medium voltage
LV . . High voltage
LW . . Very high voltage
LX . Capacitance
MC . Power (electricity)
* Rate at which energy is spent.

. . Gain
MCJ G . . . Power gain
MCP . . Power factor, dielectric power factor
MCR . . Dissipation factor
MCT . . Power level
MD . . Input power
ME . . Output power
MG . . Reactive power
MH . . Apparent power
ML . . Load (electricity)
MM . . . Load distribution (electricity)
MN . . . Load fluctuation (electricity)
MP . . . Load instability (electricity)
MQ . . . Load sharing
MR . . . Load energy (electricity)
MS . . . No load

N Electrostatics, static electricity
* Phenomena associated with electric charge at rest, as compared with current electricity.
* For electrodynamics, see BVH O.

. Electrostatic forces
NBG . . Electric flux lines, electric lines of force
NBH . Electrostatic field
* See note at BVH IBH.

NBH K . . Electric field strength, electric intensity
NBH Q . . . Electric flux lines, electric lines of force
. . *Types of electrostatic fields*
NBH R . . . Radial electric field
NBH S . . . Uniform electric field
NBH T . . . Crossed fields (electricity)
. Charge
NK . . Electrostatic charge
NKL . Electrification
NKM . . Inductive electrification, electrostatic induction
NKN . . Frictional electrification, triboelectrification

Current

Physics B
Condensed matter BTX
Solids BV
Electrostatics BVH N
. Electrification BVH NKL
. . Frictional electrification BVH NKN

. *Special properties*

BVH NN . . Edge effect
NQ . . . Electric potential
* Energy needed to move a charge; for potential difference, see BVH L.

O Electrodynamics
* Relationship between electric and magnetic forces and their mechanical causes and effects, especially changes in motion due to electric and magnetic fields.
* For quantum electrodynamics, see BNG 8M.

OP . Electromagnetic induction
* For alternating currents, see BVH Y

OR . . Inductance
OS . . . Self inductance
OU . . . Mutual inductance
P . Current (electricity)
* Rate of flow of charge.

PCM . . Density
. . Kinetics
PDE . . . Electrokinetics
PEA . . Oscillation
PQ . . Distribution of current, conduction of electricity, transmission of electricity
PR . . Amplification of current
PS . . Fluctuations of current
PT . . Rectification
PV . . Skin effect
R . . Electrical discharge (general), field discharge (electricity) (general)
* Removal or reduction of an electrical charge from a body. Most of the literature concerns discharge in gases; see Bulk matter - Gases BTM HR

S . . Circuits (general)
* Arrangement of conductors, etc. to form a path for an electric current.
* For types of circuits, networks, etc., see electrotechnology U

S76 . . . Measurement
S76 T . . . . Q factor
. . . *Conditions, influencing factors*
S94 P . . . . Temperature
S97 . . . . Radiation
. . . *Properties*
* For capacitance, see BVH LX.

. . . . Inductance
* See Electromagnetic induction BVH OP

Physics B
Solids BV
Electrodynamics BVH O
Current BVH P
Circuits BVH S
. . Inductance

BVH SV . . Immittance
* Admittance and impedance together.

SX . . . Admittance
* Property which permits flow of current; reciprocal of impedance.

SY . . . . Intensity (admittance)
T . . . . Electric displacement
TU . . . . Susceptance
TX . . . . Conductance
* Reciprocal of resistance; real part of admittance.

U . . . . Conductivity, conduction, electrically conducting solids
V . . . Impedance
* The total opposition to a current flow (by its capacitance and inductance as well as its resistance). In particular, the quantity determining the amplitude of the current for a given voltage in an a-c circuit (see BVH Y).
* For capacitance, see BVH LX.

VFO . . . . Resonance (impedance)
VV . . . . Reactance
VW . . . . . Capacitive reactance
VX . . . . . Inductive reactance
WB . . . . Resistance
WC . . . . . Constant resistance
WD . . . . . Negative resistance
WE . . . . . Contact resistance
WG . . . . . Insulating resistance
. . . . . *In special materials*
* For dielectrics, see BVI S

WJ . . . . Resistivity (impedance)
. . . . *Types of impedance*
WL . . . . . Low impedance
WM . . . . . High impedance
WN . . . . . Characteristic impedance
WP . . . . . Constant impedance
WS . . Saturation (electricity)
WT . . Drift (electricity)
Types of current
XB . Normal current, conduction current
* Usually assumed.

XD . Displacement current
* Not accompanied by motion of current carriers in the dielectric; formulates electric dipoles.

XF . Forward current
XH . Reverse current
XJ . Critical current
XK . Eddy current, Foucault current
* For electromagnetic induction, see BVH OP.
* See also Skin effect BVH PV

XL . Light current

Semicounductors

Physics B
Condensed matter BTX
Solids BV
Electrodynamics BVH O
Current BVH P
. . Light current BVH XL

BVH XN . . Heavy current
XV . . Direct current
Y . . Alternating current
YSX . . . Admittance
YTU . . . Susceptance
YWB . . . Resistance

Electrodynamics of special media
* For vacuum tubes, see B6I BM; for gas discharge tubes, see B6I BS.

BVI . Semicounductors
BCX . . Electron states, crystal electron state
BCX 8B . . . Theory
BCX 8R . . . . Localized electron theory
BCX 8S . . . . Collective electron theory
BCX HN . . . Coulomb effect
BCX J . . . Magnetoelectric effect
BCX K . . . Radiation effect
BCX KFU F . . . . Diffusion
BCX KIH . . . . Recombination radiation
BCX L . . . Photovoltaic effect
BCX M . . . Photoconductivity
BD . . Energy levels
BF . . . Energy bands (semiconductors), band structure (semiconductors)
* Add to BVI BF letters A/Y following BTX BF; eg
BFL . . . . Allowed bands
BFM . . . . Forbidden zone
BFO . . . . Valence bands
BFT . . . . Conduction bands
BFW . . . . Other bands
* Arrange A/Z.
D . . *Other energy interactions & forms*
* Add to BVI D letters D/Q following B if applicable.
E . . Charge carriers
. . . *Processes*
EH . . . . Generation
EJ . . . . Concentration
EK . . . . Injection
EL . . . . Recombination
EM . . . . Doping
EN . . . . . Ion implementation
EP . . . . Breakdown
ER . . . . . Reverse bias charge
ES . . . . . Avalanche
ET . . . . . Tunnelling, tunnel effect
EU . . . . . Josephson junction, Josephson effect
EV . . . . . Zener effect

Physics B
Semicounductors BVI
. Charge carriers BVI E
. . Processes
. . . . Reverse bias charge BVI ER
. . . . . Zener effect BVI EV

BVI EX . . . . Electron-bound hole pairs
. . *Properties*
F9C I . . . Lifetime, bulk lifetime
FAT . . . Transport properties
FAY C . . . . Mobility, scattering
FAY D . . . . . Drift mobility
FCL . . . Density
. . *Constituents*
FJ . . . Traps
. . *Types of carriers*
FN . . . Conduction electrons
FP . . . Ionic conduction
FQ . . . Holes (charge carriers)
FR . . . Majority carriers
FS . . . Minority carriers
GB . Semi-conductor materials
* More details are available in the Technology schedule U
GC . . Binary materials (semiconductors)
GD . . Ternary materials (semiconductors)
GE . . Intrinsic semiconductor materials
GF . . Extrinsic semiconductor materials
GG . . Dopants, impurities (semiconductors)
GH . . . Acceptor impurities
GJ . . . Donor impurities
. . *By substance*
GL . . . Amorphous substances (semiconductors)
GM . . . Elemental substances (semiconductors)
GN . . . Ionic substances (semiconductors)
GP . . . Liquids (semiconductors)
GQ . . . Oxides (semiconductors)
GR . . . Silicon (semiconductors)
GS . . . Germanium (semiconductors)
GT . . . Group 3-5 semiconductors
GU . . . Gallium arsenide (semiconductors)
GV . . . Group 2-6 semiconductors
GW . . . . Cadmium sulphide
GX . . . . Other substances
HB . Semiconductor devices
* See Techniques B6I HB
P Superconductors
* More details are available from the Technology Class U
* Add to BVI P letters A/G following BVI so far as applicable; eg
P94 PC . Critical temperature
PET . Tunnelling
PEU . . Josephson effect
PS . Superconducting junction devices
PU . . Superconducting quantum interference devices, SQUID

Solids

Physics B
Condensed matter BTX
Solids BV
Electrodynamics BVH O
Superconductors BVI P
. . Superconducting quantum interference devices BVI PU

BVI PV . . Meissner effect devices
PW . . Superconducting thin film circuit
S Dielectrics, dielectric materials
* Substances which can sustain an electric field and act as insulators.
* See also Piezoelectricity BVI UC
SBV E . Elastic deformation
SBV L . . Electrostriction
SFA . *Wave properties*
SFC . . Propagation
SFC G . . . Loss (dielectrics), dissipation (dielectrics)
SFC M . . . Attenuation
SFL . . Absorption
. . Polarization
SFP . . . Dielectric polarization
SFP R . . . . Relaxation time (dielectrics)
SFU P . . Dispersion
SH . Electromagnetic properties
. . Loss
SHJ L . . . Breakdown (dielectrics)
. Strength
SHJ N . . Dielectric strength, disruptive strength (dielectrics)
. *Electrical properties of dielectrics*
SHP . . Current
. . . Displacement
SHT . . . . Dielectric strain, dielectric displacement
SHT S . . . . . Permittivity
* Ratio of electric displacement in a dielectric to the applied electric field strength.
SHT T . . . . . Absolute permittivity
SHU . . . . . Relative permittivity, dielectric constant (permittivity)
SHU V . . . . . Electric susceptibility
SHV . . . . . Dielectric hysteresis
SHW . . . . . Electric flux (dielectrics)
* Quantity of electric displacement across a given area of a dielectric.
SL . Optical properties
SLF MJP . . Photoelasticity
SLH . . Electrooptics
. *Types of dielectrics*
SM . . Ferroelectric materials

Physics B
States of matter BRN
Condensed matter BTX
Solids BV
Electrodynamics BVH O
. . . . Ferroelectric materials BVI SM

Interactions of electrical with other energy forms
* Electric phenomena affected by other energy forms. For interactions in which electricity is the agent & not the recipient of the action, see the latter; eg electrooptics BRL H.
BVI UB . Mechanical electric effects, electromechanical effects
UC . . Piezoelectricity
* Production of electrical polarization by mechanical stress. May also refer to the reverse (production of mechanical stress by electrical polarization); in this case, use BVB LH.
* For electrostriction, see BVB VL.
. . . Resistance
UCH WB . . . . Piezoresistance
UCH WH . . . . . Elastoresistance
UCR . . . Ferroelectricity
UGH . Acoustoelectric effects, electroacoustics
* See also acoustoelectronics (technology) U
UGP . Thermoelectricity, thermoelectric effect
. . *Special effects*
UGQ . . . Peltier effect
UGR . . . Seebeck effect
UGS . . . Thomson effect, Kelvin effect (thermoelectricity)
UGT . . . Pyroelectricity
UGU . . . Electrocaloric effect
UJ . Magnetoelectric effects, galvanomagnetic effects
UJQ . . Hall effect
UJR . . Nernst effect
UJS . . Photoelectromagnetic effects
UJT . . Magnetoresistance, magnetoresistivity
UJU . . . Corbino effect
V . Photoelectric effects (solids)
* For electron emission in general, see BNP FG
* For photoconductivity, see semiconductors BVI BCX M.
* For electroluminescence, see BRL FHR.

Magnetism

Physics B
States of matter BRN
Condensed matter BTX
Solids BV
Electricity, electrical properties of solids BVH I
. . Photoelectric effects BVI V

BVJ Magnetism, magnetic properties magnetically ordered systems, magnetic materials
4 . Instrumentation
5V . . Magnetometers
5W . . Magnetic balances
8M . . Quantum properties
8MO . . . Magnons, quantized spin waves
. Potential energy
BBP . . Magnetomotive force, MMF, magnetic potential
BH . Magnetic fields (general)
BHK . . Field strength (magnetism), magnetic intensity
. *Properties & processes*
. . Moments
BIM . . . Magnetic moment, dipole moment (magnetism)
. . Stability
CP . . . Relaxation (magnetism)
* Returning to equilibrium after disturbance.
FO . . Resonance (magnetism)
* See also Magnetic resonance imaging B7I O
FOH . . . Double resonance
FP . . Polarization (magnetism), polarity (magnetism)
JE . . Magnetic loss, magnetic leakage
JF . . Attraction (magnetism)
JG . . Repulsion (magnetism)
JM . . Transition temperature (magnetism)
JN . . Curie temperature, Curie law
K . . Magnetic flux, magnetic lines of force
KL . . . Magnetic circuit
KN . . . Magnetic flux density, MFD, magnetic induction (mfd)
KP . . . Anisotropy (magnetism)
KQ . . . Permeability
* Ratio of mfd & magnetic field strength.
KR . . . . Magnetic constant
KS . . . Susceptibility
KT . . . Reluctance, magnetic resistance
L . . Magnetization
LM . . . Coercive force
LN . . . Magnetic aftereffect
LP . . . Hysteresis (magnetism)
LR . . . Reversal of magnetization, magnetic polarity reversal
LS . . . Demagnetization, demagnetized fields
LT . . . . Transition (demagnetization)
LU . . . Remanence, residual magnetization
LV . . . Spontaneous magnetization
LW . . . . Magnetic transitions
LX . . . . Induced magnetization, magnetic induction, magnetic displacement
LY . . . . Saturation

Physics B
Condensed matter BTX
Solids BV
Magnetism BVJ
Properties & processes
. . . Saturation BVJ LY

Field components
* For fields of force, see BVJ BH
BVJ N . Magnetic monopoles
* Hypothetical particles underlying magnetism.
NP . Poles
NQ . Dipoles
NR . . Dipole moments
NS . Domains
* For domain wall and wall energy, see ferromagnetism BVJ S
Types of magnetic fields
PC . Steady state magnetic fields
PE . . Magnetostatics
PF . High magnetic fields
PL . Multipole fields
PN . Crossed magnetic fields
PP . Geomagnetism
* See Earth sciences D
PQ . . Magnetic meridians
Forms of magnetism
* See also materials defined by these forms; eg paramagnetic materials BVR JR.
. *By source*
PX . . Electromagnetism (forms of magnetism)
* Produced by an electric current rather than by a permanent magnet.
. *By atomic and ionic structure*
* See also materials defined by these forms; eg paramagnetic materials BVR JR.
Q . . Diamagnetism
QS . . Soft magnetism, soft magnetic materials
* Unable to retain magnetism.
* See also high polymers BVS RB
R . . Paramagnetism, paramagnetic materials
R6 . . . Techniques
. . . . Cooling
R6G T . . . . . Magnetic cooling
RFO . . . Paramagnetic resonance
RS . . . Pauli paramagnetism, free electron paramagnetism
RU . . . Superparamagnetism
S . . Ferromagnetism
SLM . . . Coercive force
SNS . . . Domains
SNW . . . Walls
SV . . . Anti-ferromagnetism
T . . Ferrimagnetism
TV . . . Anti-ferrimagnetism

Solids

Physics B
Mechanics BVB
. Electrical & magnetic properties BVG Y
. . Magnetism BVJ
. . . Forms of magnetism
. . . . . Anti-ferrimagnetism BVJ TV

BVJ U . . . *Interactions of magnetism with other energy forms*
* Interactions in which magnetic properties are affected by other energy forms. For interactions in which the magnetism is the agent rather than the patient, see the material or phenomenon affected; e.g. magnetohydrodynamics BRU J; Kerr effect (optics) BRL JP.
* See also Magnetic cooling BVR JR6 GT

UB . . . . Magnetomechanical effects
. . . . . Stress
UBL . . . . . Magnetostriction, piezomagnetism
* Stress dependence of magnetic properties.
UBL R . . . . . Joule effect
UCB . . . . . Magnetoelasticty
. . . . Rotation
UDN . . . . . Gyromagnetic effect
UGX . . . . Pyromagnetism

BVK . . Radiation properties
73 . . . Production techniques
FC . . . Transmission
FC4 . . . . Instruments
FC5 V . . . . . Waveguides

BVL . . Optical properties
* The full schedule for these is at BRL, from which details may be drawn; eg
FE . . . Spectra
FIL . . . Opacity
FM . . . Refraction
. . . . Birefringence
FMJ . . . . . Photoelastic effect
FN . . . Reflection
FP . . . Polarization
FR . . . Interference
J . . . Magneto-optical effect
L . . . Luminosity
LFH R . . . . Electroluminescence
M . . . Colour
NP . . . . Colour systems

BVM . *Relations with particle physics*
* Add to BVM letters M/Q following B.

BVN P Change of state
* See also types of solids defined by number of phases BVS N/BVU.
R . Phase transformations

Physics B
States of matter BRN
Condensed matter BTX
Solids BV
Change of state BVN P
. Phase transformations BVN R

. *Types of changes in solids, by states involved*

BVO B . . *To & from plasmas*
E . . *To & from gases*
F . . . Sublimation
FQ . . . . Latent heat of sublimation
G . . . . Solids to gases (change of state), vaporization (solid to gas)
H . . . . Gases to solids (change of state)
L . . *To & from liquids*
M . . . Solids to liquids (change of state), liquefactions (of solids)
* For humidity, see Class D Meteorology
N . . . . Melting, fusion (melting)
. . . . . Critical point
N9B . . . . . Melting point
NAM . . . . . Entropy of fusion (liquid to solid)
P . . . . . Plastic-liquid phase
PR . . . . . Flow point, softening point
PS . . . . . Dropping point, droplets
Q . . . Liquids to solids (change of state), solidification
. . . . Critical point
Q94 C . . . . . Eutectic point, reaction point
R . . . . Freezing
R94 C . . . . . Freezing point
S . . . . Icing, congealing
T . . . . Supercooling
* Slow & continuous cooling of liquid whereby its temperature drops to below normal freezing point (ie, to a metastable state in which solidification is precipitated by very small additions of solid or by the smallest mechanical disturbance).
W . . . . Crystallization
* See BWO J

Subsystems of solids

BVP W . Impurities

BVQ . Surfaces
B . . Mechanics
BK . . . Deformation
CA . . . Tribology, friction (general)
* Friction, lubrication & wear of surfaces in relative motion.
. . . . *Operations*
CAB . . . . . Lubrication
CAC . . . . . Lubricants
CAD . . . . . *By composition*
* Arrange A/Z; eg
CAD G . . . . . Graphite lubricants
CAE . . . . . *By state of matter*
CAE T . . . . . Gaseous lubricants
CAE U . . . . . Liquid lubricants

Solids

Physics B
Subsystems of solids
. Surfaces BVQ
. . Mechanics BVQ B
. . . Tribology BVQ CA
. . . . Operations
. . . . By state of matter BVQ CAE
. . . . Liquid lubricants BVQ CAE U

BVQ CAE V . . . . . Solid lubricants
CAF . . . . . Self lubrication
CAG . . . . . Boundary lubrication
CAH . . . . . Thin film lubrication
. . . . *Processes*
* For friction, see general class BVQ CA.
CAJ C . . . . . Mechanical contact (surfaces)
CAJ D . . . . . Adhesion
CAK . . . . . Internal friction
CAL . . . . . Coulomb friction
CAM . . . . . Rolling & sliding friction (together)
CAN . . . . . Rolling friction
CAP . . . . . Sliding friction
CAQ . . . . . Skid resistance
CAR . . . . . Wear
CAR R . . . . . Resistance to wear
CAS . . . . . Abrasion
CAT . . . . . Erosion (tribology)
CAV . . . . . Ablation
* Removal of matter from surface of a moving body by friction with the atmosphere (eg by vaporization).
. . . *Elements & attributes of surfaces*
NB . . . . Roughness, smoothness
NC . . . . Corrugations
NP . . . . Protuberences
NR . . . . Notches
NS . . . . Perforations
NT . . . . Porosity
O . . Interfaces
Q . Films

Systems of solids
* For systems defined by physical properties, see the property; eg isotropic solids BV9 EK.
* Chemical aspects of the following classes are located in Class C Chemistry.
. *By number of components*
BVR N . . Single component systems
O . . Mixtures
OP . . . Eutectics
S . . . Solutions
* See Homogeneous solids BVS NRS

Physics B
States of matter BRN
Condensed matter BTX
Solids BV
By number of components
. . Solutions BVR S

By number of phases
BVS N . Homogeneous solids
* Physical and chemical properties are the same about every point; may be amorphous or crystalline.
NL . . Optically homogeneous solids
NRS . . Solid solutions
* Homogeneous mixture of two or more solids, forming a homogeneous crystalline phase of several different chemical species.
NRS NR . . . Transformation
NRS NRS . . . . Order-disorder transformations
O . . Amorphous solids (homogeneous solids)
. . . *Properties*
OP . . . . Crystallinity of amorphous solids
P . . . VitreouLs solids
PV . . . . Glasses
Q . . . Polymers (amorphous solids)
RB . . . . High polymers (amorphous solids), plastics (amorphous solids)
RE . . . . Elastomers (amorphous solids)
RG . . . . Thermoplastics (amorphous solids)
RH . . . . Thermosetting plastics (amorphous solids)
RJ . . . . Fibres (amorphous solids)
T . Heterogeneous solids
BVT . . Dispersions
Q . . . Surfaces
. . . *Systems*
V . . . Colloids
. . . *By states dispersed*
BVU B . . . . Plasmas in solid, solid state plasmas
G . . . . Gas-in-solid & solid-in-gas
H . . . . . Solid-in-gas dispersions
. . . . . Mixtures
HRP . . . . . Dusts
HTV . . . . . Colloids
HTW . . . . . Smokes
J . . . . . Gas-in-solid dispersions
L . . . . Liquid-in-solid & solid in liquid
M . . . . . Solid-in-liquid dispersions
MRO . . . . . Mixtures
MRP . . . . . Suspensions
MTV . . . . . Colloids
MTW . . . . . Semi-solids
MTX . . . . . Gels
MTY . . . . . Sols
N . . . . . Liquid-in-solid dispersions
S . . . . Solid-solid systems
* For solid solutions, see homogeneous mixtures BVS NRS.

Crystals

Physics B
States of matter BRN
Condensed matter BTX
Solids BV
By number of phases
. . . . Solid-solid systems BVU S

BW Crystals, crystallography
* Solids in which the physical properties may vary regularly with direction, being the same along all parallel directions.
* An alternative (not recommended) is to locate this class in C, with crystal chemistry.

BW2 M . Mathematical methods
BW3 6 . Practical & experimental crystallography
U . . Equipment
BW6 9 . . Physical methods in investigation
K . . . Radiation techniques
KFM . . . . Refraction techniques
KFM 9BI . . . . . Refractive index (crystallography)
KFM J . . . . . Double refraction, birefringence
KFM M . . . . . Ordinary rays (refraction)
KFM N . . . . . Extraordinary rays (refraction)
KFP . . . . Polarization
KFP 76 . . . . . Polarimetry
KFQ . . . . Diffraction techniques
KFQ H . . . . . Precession method (diffraction techniques)
KFQ J . . . . . Rotating crystal method (diffraction techniques)
KFQ L . . . . . Oscillating crystal (diffraction techniques)
KFQ P . . . . . Powder method (crystal diffraction)
KFQ R . . . . . De Jong-Boumann method
KFT . . . . Scatter techniques
. . . . *By radiation/particle*
LX . . . . . X-ray techniques
LXF Q . . . . . X-ray diffraction
LXF S . . . . . Laue method
LXF W . . . . . Weissenberg method
M . . . . . Particulate radiation techniques
NP . . . . . Electron techniques
NPF Q . . . . . Electron diffraction (crystallography)
NW . . . . . Neutron techniques
NWF Q . . . . . Neutron diffraction (crystallography)
. . *By action on phenomenon investigated*
BW7 M . . . Spectroscopy
MLX . . . . X-ray spectroscopy (crystallography)
* See also diffraction techniques BW6 KFQ
. *Processes & properties*
. . Spatial properties
* For isotropic and anisotropic crystals, see BWS Q.

Physics B
Condensed matter BTX
Solids BV
Crystals BW
Processes & properties
. Spatial properties

BWA . Physical crystallography
BWB . . Mechanics
H . . . Forces
K . . . . Deformation
* For crystal defects, see BWQ D
KV . . . . . High velocity deformation
L . . . . . Stress
T . . . . . Strain
WP . . . . . Plastic deformation
XD . . . . . Dislocation
YF . . . . . Fatigue
YK . . . . . Creep
YP . . . . . Fracture
YR . . . . . Brittleness
YT . . . . . Cleavage
BWC B . . . . Elasticity
BWG P . . Thermal properties
Y . . Electric & magnetic properties
BWL . . Optical properties
FL . . . Absorption
FM . . . Refraction
FP . . . Polarization
FQ . . . Diffraction
M . . . Colour
BWM . . Particle physics & crystallography
BWN P . Change of state
* For crystallization, see BWO J.
R . . Phase transformation
T . . . Phase equilibrium
Special processes/properties in crystallography
* Normal retroactive synthesis by BV (as instructed at BR) is modified here in order to accommodate the special processes and properties of crystals. Normal synthesis is resumed at BWR B.
* Add to BWN X letters A/W following BVO if applicable.
BWO G . Growth of crystals, formation of crystals
H . . Nucleation
* Initiation of the growth process.
. . . *Agents*
HR . . . . Nucleating agents
HS . . . Homogeneous nucleation
HT . . . Heterogeneous nucleation
J . . Crystallization
* Slow formation of a crystal from melt or solution.
. . . *Agents*
JS . . . . Seed crystals
JW . . . Water of crystallization, constitutional water, water of hydration
JY . . . Polymorphism (crystallization)

Lattices

Physics B
Solids BV
Crystals BW
Special processes/properties in crystallography
. . Crystallization BWO J
. . . Polymorphism BWO JY

BWO L . . Epitaxy
* Unified crystal growth, depositing one layer on another.
* See also Semiconductors BVI

LR . . . Liquid phase epitaxy
LS . . . Molecular beam epitaxy
M . . Recrystallization
MS . . . Solid state recrystallization
* See also Mineralogy DIQ

MT . . Crystal pulling
N . . Thick films (crystal growth)
P . . Whisker crystals
Q . . Dendritic growth, dendrites
R . . Crystalline overgrowth
T Structural crystallography, crystalline state
* For crystal texture, see BWR C.

T2P . Geometry
* Use BWO U.

T9J S . Symmetry
* Use BWP S.

U . Geometric crystallography
. *Components*

BWP . . Lattices, space lattices, arrangement (crystals)
. . . Energy

BB . . . . Lattice energy
BB2 M . . . . . Mathematics
BB2 M9N . . . . . Kapustinskii equation
. . . Dynamics
CX . . . . Lattice dynamics
* Oscillation of atoms in the lattice.
* See also phonons BWP E8N

E . . . Vibration
. . . . *Special quantum properties*
E8N . . . . . Phonon
* Quantum of lattice vibrational energy in crystal.

E8N FT . . . . . Phonon-phonon scattering
S . . . Symmetry (crystals)
* Symmetry is a major defining characteristic of types of crystals. For such types, see BWS Q/BWU.
* See also Cleavage BWB YT

. . . . *Elements*
* For space groups, see BWQ L.

T . . . . . Point groups, symmetry classes, crystal classes (point groups)
V . . . . . Axes of symmetry
* See also types of crystals defined by axes, BWS Q

VR . . . . . Crystal axis
VS . . . . . Crystallographic axis
VT . . . . . Screw axis
VW . . . . . Rotational axis of symmetry

Physics B
Structural crystallography BWO T
Lattices BWP
Symmetry BWP S
. . Axes of symmetry BWP V
. . . Rotational axis of symmetry BWP VW

BWP W . . Faces
WR . . . Crystal habit
X . . Interfacial angles
. . . Measurement
X76 . . . . Goniometry (crystals)

BWQ D Defects in lattice, defects (crystals), imperfections (crystals), impurities (crystals)
D36 . Practical physics
. *Processes/properties*
D92 D . . Distribution of imperfections
D92 E . . . Concentration of imperfections
DR . . Annealing
DS . . Doping, implantation of impurities
DT . . Interactions between imperfections
. *Types of defects*
. . *By cause*
EG . . . Thermal diffusion (crystal defects)
EK . . . Radiation effects (crystal defects)
. . . . *Processes*
EKG G . . . . . Channelling effect, blocking
. . . . *By type of radiation*
* Add to BWQ E letters KJ/Q following B; eg

ELX . . . . . X-rays (crystal defects)
. . *By origin*
ER . . . Intrinsic defects
ET . . . Extrinsic defects, inclusions (crystal defects)
EV . . . . Voids, bubbles
EW . . . . Colour centres
. . *By lattice structural characteristics*
* For line defects, see slip planes BWB XH.

F . . . Non-stoichiometric defects, defect structures
* Localized misalignments or gaps in lattice.
* See also Vacancies BWQ GV

G . . . Point defects
. . . . *Processes*
GS . . . . . Defect motion
GT . . . . . Defect cluster
GV . . . . Vacancies
GW . . . . Interstitial point defects, grain boundary defects?
H . . . Perfect crystals
* Without defects.

J . . . Twin crystals, twinning
Types of lattice structures
L . Space groups
LS . . Electron densities (lattice structures)
LU . . Unit cells
LV . . . Bravais lattices
M . . . Primitive crystal lattices
N . . . Face-centred cells

Crystals

Physics B
Crystals BW
Structural crystallography BWO T
. . . . Space groups BWQ L
. . . . . Unit cells BWQ LU
. . . . . Face-centred cells BWQ N

BWQ P . . . . . Body-centred cells
Q . . . . . Side-centred cells
S . . . . . Slip planes, gliding planes
* Planes of molecular weakness allowing movement along them without actual fracture.
SBX D . . . . . Dislocation
SBX GH . . . . . Axial glides
SBX GL . . . . . Diagonal glides
SBX GN . . . . . Diamond glides
T . . . . Reciprocal lattices
Subsystems
* For crystal faces, see BWP W; for impurities, see lattice defects BWQ D.
V . Microstructure (crystals), grain structure, crystal texture
W . . Crystallites
X . . Grains
* Aggregations of crystallites in which crystal structure is continuous across each grain.
XOG . . . Growth
* See also Annealing BWQ DR
XQD . . . Defects
XR . . . Grain boundaries
Y . . Mixed crystals, solid solutions (crystals)
* Arrangement of atoms or molecules of different species within same lattice.
YNR . . . Transformation
YNR S . . . . Order-disorder transformations
YR . . . Interstitial solid solutions
YS . . . Substitutional solid solutions
BWR B . Surfaces
* Normal synthesis is resumed here after its interruption at BWO.
* Add to BWR B letters B/V following BVQ if applicable; eg Smoothness BWR BNB.
Systems, types of crystals
* Types defined by physical properties are collocated with the properties unless otherwise indicated.
* Add to BW letters RN/U following BV so far as applicable, with the modifications indicated below; eg
M . Crystal systems (general)
* See also semi-conductors systems BVI
. *By number of phases*
BWS RB . . Plastic crystals
BWU L . . Liquid crystals
. *By positional properties*
BWV D . . Disordered systems, disordered crystalline alloys
* Atoms are displaced from crystal lattice (eg, by ionizing radiation) to positions which are not part of the lattice.

Physics B
Condensed matter BTX
Solids BV
Crystals BW
By positional properties
. Disordered systems BWV D

By dimensional properties
BWV F . Thin crystals
H . Powder crystals
By number of components, aggregation
J . Single crystals
* For twin crystals, see BWQ J.
K . Polycrystalline crystals
* Aggregates of single interlocking crystals.
By symmetry
M . Crystal classes (general)
* If distinguished from crystal systems.
N . Body-centred crystals
P . Face-centred crystals
Q . Close-packed crystals
By crystal form
SD . Pedion
SF . Pinacoid
SH . Dome
SJ . Prism (crystal forms)
SL . Sphenoid
SN . Bisphenoid
SP . Pyramid
SQ . Bipyramid
ST . Trapezohedron
SV . Scalenohedron
By relation of planes to axes
V . Isotropic crystals
X . . Cubic crystals, regular crystals, isometric crystals
BWW B . Anisotropic crystals
C . . Uniaxial crystals
D . . . Tetragonal crystals
E . . . Hexagonal crystals
F . . . Trigonal crystals
G . . . . Rhombohedral crystals
J . . Biaxial crystals
K . . . Rhombic crystals, orthorhombic crystals
L . . . Monoclinic crystals
M . . . Triclinic crystals
By linearity & behaviour
O . Non-linear crystal systems
P . Piezoelectric crystal systems
Q . Electro-optical crystal systems
S . Scintillation crystal systems
By space group symmetry
BWX . Space group symmetry classes
* This location, is reserved for libraries wishing to use the detailed system (of some 230 classes) based on the Federov-Schoenthes system.
By bonding
* For metal bond crystals, see BWY S.
BWY C . Molecular crystals

Crystals

Physics B
Condensed matter BTX
Solids BV
Crystals BW
By bonding
. Molecular crystals BWY C

BWY F . Ionic crystals, electrovalent crystals
. . Coupling
FFR U . . . Polariton
J . Covalent crystals, valence crystals
By specific element or compound
P . Chemical crystallography
* An alternative (not recommended) to subordinating this class to the elements & compounds in C Chemistry. If this option is taken, proceed as follows:
Q . . Metallic bond crystals, metal physics
* See also triclinic crystals BWT H
S . . Other chemical substances
* Add to BWY S letters letter following C (except for metals). Notation is povisional.