Subject index
Volume 51, 2008

[This subject index is based on the Physics and Astronomy Classification Scheme (PACS 2008)]
12. Specific theories and interaction models; particle systematics

12.10. –g Unified field theories and models
12.10.Kt Unification of couplings; mass relations 253
12.20. –m Quantum electrodynamics 1171, 1175
12.20.Ds Specific calculations 1171, 1175
12.20.Fv Experimental tests 1171, 1180
12.38. –t Quantum chromodynamics 631
12.38.Aw General properties of QCD 616
12.60. –i Models beyond the standard model 1091

14. Properties of specific particles

14.20. –c Baryons (including antiparticles)
14.20.Dh Protons and neutrons 831
14.40. –n Mesons
14.40.Nd Bottom mesons 831
14.60. –z Leptons
14.60.Ef Muons 831
14.65. –q Quarks
14.65.Ha Top quarks 831
14.80. –j Other particles (including hypothetical)
14.80.Bn Standard-model Higgs bosons 831

20. NUCLEAR PHYSICS

28. Nuclear engineering and nuclear power studies

28.41. –i Fission reactors 911
28.52. –s Fusion reactors 1047
28.52.Cx Fueling, heating and ignition 109
28.70. +y Nuclear explosions 911

29. Experimental methods and instrumentation for elementary-particle and nuclear physics

29.27. –a Beams in particle accelerators
29.27.Bd Beam dynamics; collective effects and instabilities 645
29.40. –n Radiation detectors 1091

30. ATOMIC AND MOLECULAR PHYSICS

31. Electronic structure of atoms and molecules: theory

31.30. –i Corrections to electronic structure
31.30.Gs Hyperfine interactions and isotope effects 1171, 1175
31.30.J– Relativistic and quantum electrodynamic (QED) effects in atoms, molecules, and ions 1171, 1175

32. Atomic properties and interactions with photons

32.10. –f Properties of atoms
32.10.Fn Fine and hyperfine structure 1171, 1180
32.30.Jc Visible and ultraviolet spectra 1171, 1180
32.80. –t Photoionization and excitation 319

34. Atomic and molecular collision processes and interactions

34.50. –s Scattering of atoms and molecules 319
34.70. +e Charge transfer 291

36. Exotic atoms and molecules; macromolecules; clusters

36.40. –c Atomic and molecular clusters 319, 427

40. ELECTROMAGNETISM, OPTICS, ACOUSTICS, HEAT TRANSFER, CLASSICAL MECHANICS, AND FLUID DYNAMICS

41. Electromagnetism; electron and ion optics

41.20. –q Applied classical electromagnetism 163, 485
41.20.Jb Electromagnetic wave propagation; radiowave propagation 101, 355, 363
41.50. +h X-ray beam source magnets and x-ray optics for control of particle beams 57
41.60. –m Radiation by moving charges 363, 989
41.75. –i Charged-particle beams
41.75.Jv Laser-driven acceleration 793

42. Optics

42.15. –i Geometrical optics 375
42.25. –p Wave optics
42.25.Bs Wave propagation, transmission and absorption 355
42.25.Dd Wave propagation in random media 395
42.25.Gy Edge and boundary effects; reflection and refraction 375, 981
42.25.Hz Interference 355
42.30. –d Imaging and optical processing 1161
42.50. –p Quantum optics
42.50.Ex Optical implementations of quantum information processing and transfer 645
42.55. –f Lasers 955, 969
42.60. –v Laser optical systems: design and operation
42.60.By Design of specific laser systems 955, 969
42.62. –b Laser applications 899
42.62.Fi Laser spectroscopy 1171, 1180
42.65. –k Nonlinear optics 815, 899, 955, 969
42.65.Dr Stimulated Raman scattering; CARS 591
42.65.Ky Frequency conversion; harmonic generation, including higher-order harmonic generation 591
42.65.Re Ultrafast processes; optical pulse generation and pulse compression 591
42.65.Wi Nonlinear waveguides 591
42.70. –a Optical materials
42.70.Ce Glasses, quartz 899
42.79. –e Optical elements, devices, and systems 1161
42.81. –i Fiber optics
42.81.Pa Sensors, gyros 205

43. Acoustics

43.25. +y Nonlinear acoustics
43.25.Cb Macrosonic propagation, finite amplitude sound; shock waves 319
43.30. +m Underwater sound 1171
43.60. +d Acoustic signal processing 1171
44. Heat transfer
44.05. +e Analytical and numerical techniques 231
45. Classical mechanics of discrete systems
45.05. +x General theory of classical mechanics of discrete systems 465
46. Continuum mechanics of solids
46.65. +g Random phenomena and media 395
47. Fluid dynamics
47.20. –k Flow instabilities 213
47.20.Dr Surface-tension-driven instability 1027
47.27. –i Turbulent flows 551, 577
47.27.E – Turbulence simulation and modeling
47.27.eb Statistical theories and models 395
47.55. –t Multiphase and stratified flows
47.55.N – Interfacial flows
47.55.nb Capillary and thermocapillary flows 1027
47.55.P – Buoyancy-driven flows; convection
47.55.pf Marangoni convection 1027
47.80. –v Instrumentation and measurement methods in fluid dynamics 213
50. PHYSICS OF GASES, PLASMAS, AND ELECTRIC DISCHARGES
52. Physics of plasmas and electric discharges
52.20. –j Elementary processes in plasmas 291
52.25. –b Plasma properties
52.25.Fi Transport properties 291
52.25.Os Emission, absorption, and scattering of electromagnetic radiation 645
52.27. –h Basic studies of specific kinds of plasmas
52.27.Ep Electron–positron plasmas 839, 844
52.35. –g Waves, oscillations, and instabilities in plasmas and intense beams 989, 1123
52.38. –r Laser-plasma interactions 793
52.40. – w Plasma interactions (nonlaser)
52.40.Fd Plasma interactions with antennas; plasma-filled waveguides 493
52.40.Mj Particle beam interactions in plasmas 989
52.50. –b Plasma production and heating 493
52.59. –f Intense particle beams and radiation sources 109
52.80. – s Electric discharges 79
52.80.Pi High-frequency and RF discharges 493
60. CONDENSED MATTER: STRUCTURAL, MECHANICAL, AND THERMAL PROPERTIES
61. Structure of solids and liquids; crystallography
61.43. –j Disordered solids 699, 863
61.46. – w Structure of nanoscale materials 839
61.46.Bc Structure of clusters 839
61.50. – f Structure of bulk crystals
61.50.Ks Crystallographic aspects of phase transformations; pressure effects 1055, 1064, 1066
61.66. – f Structure of specific crystalline solids
61.66.Fn Inorganic compounds 699
61.72. – y Defects and impurities in crystals; microstructure 863
61.72.Lk Linear defects; dislocations, disclinations 437
61.80. – x Physical radiation effects, radiation damage
61.80.Jh Ion radiation effects 955
62. Mechanical and acoustical properties of condensed matter
62.20. – x Mechanical properties of solids 681, 863
62.25. – g Mechanical properties of nanoscale systems 437
62.50. – p High-pressure effects in solids and liquids (for high pressure apparatus and techniques 1055, 1066
63. Lattice dynamics
63.20. – e Phonons in crystal lattices
63.20.K – Phonon interactions
63.20.kp Phonon-defect interactions 839, 848
63.22. – m Phonons or vibrational states in low-dimensional structures and nanoscale materials 839, 848
64. Equations of state, phase equilibria, and phase transitions
64.10. + h General theory of equations of state and phase equilibria 109
64.60. – i General studies of phase transitions 955, 965
64.60.Ht Dynamic critical phenomena 603
64.70. – p Specific phase transitions
64.70.K – Solid-solid transitions 955, 1055, 1059, 1064
68. Surfaces and interfaces; thin films and nanosystems
68.35. – p Solid surfaces and solid-solid interfaces: structure and energetics
68.35.Dv Composition, segregation; defects and impurities 699
70. CONDENSED MATTER: ELECTRONIC STRUCTURE, ELECTRICAL, MAGNETIC, AND OPTICAL PROPERTIES
71. Electronic structure of bulk materials
71.10. – w Theories and models of many-electron systems 603
71.15. – m Methods of electronic structure calculations 1055, 1077
71.15.Mb Density functional theory, local density approximation, gradient and other corrections 535
71.18. + y Fermi surface; calculations and measurements; effective mass, g factor 1055, 1070
71.20. – b Electron density of states and band structure of crystalline solids
71.20.Nr Semiconductor compounds 887
71.27. + a Strongly correlated electron systems; heavy fermions 23
71.30.+h Metal-insulator transitions and other electronic transitions 3, 23
71.35. –y Excitons and related phenomena
71.35.Ji Excitons in magnetic fields; magnetooexcitons 727
71.45. –d Collective effects
71.45.Gm Exchange, correlation, dielectric and magnetic response functions, plasmons 839
71.55. –i Impurity and defect levels
71.55.Jv Disordered structures; amorphous and glassy solids 699

72. Electronic transport in condensed matter
72.15. –v Electronic conduction in metals and alloys
72.15.Rn Localization effects 3
72.25. –b Spin polarized transport
409, 412
72.80. –r Conductivity of specific materials
72.80.Rj Fullerenes and related materials 727, 744

73. Electronic structure and electrical properties of surfaces, interfaces, thin films, and low-dimensional structures
73.20. –r Electron states at surfaces and interfaces 1055, 1070
73.20.Mf Collective excitations 727
73.21. –b Electron states and collective excitations in multilayers, quantum wells, mesoscopic, and nanoscale systems 727
73.43. –f Quantum Hall effects 727, 744
73.43.Nq Quantum phase transitions 3

74. Superconductivity
74.10. +v Occurrence, potential candidates 1229
74.20. –z Theories and models of superconducting state 167, 535, 1055, 1077, 1201, 1229, 1261
74.20.Fg BCS theory and its development 603
74.20.Mn Nonconventional mechanisms 191
74.25. –q Properties of type I and type II superconductors 1201, 1229, 1261
74.45. +c Proximity effects; Andreev effect; SN and SNS junctions 170
74.62. –c Transition temperature variations 180, 1201, 1261
74.70. –b Superconducting materials 180, 427, 1055, 1066, 1201, 1261
74.70.Dd Ternary, quaternary, and multinary compounds 1229
74.72. –h Cuprate superconductors 23, 167, 191, 535
74.78. –w Superconducting films and low-dimensional structures 170, 180
74.78.Na Mesoscopic and nanoscale systems 427

75. Magnetic properties and materials
75.10. –b General theory and models of magnetic ordering 23, 1055, 1077
75.30. –m Intrinsic properties of magnetically ordered materials 23
75.40. –s Critical-point effects, specific heats, short-range order 199, 513, 955, 965
75.75. +a Magnetic properties of nanostructures 409, 412

78. Optical properties, condensed-matter spectroscopy and other interactions of radiation and particles with condensed matter
78.20. –e Optical properties of bulk materials and thin films
78.20.Bh Theory, models, and numerical simulation 887
78.20.Cl Optical constants 375, 485, 887, 981
78.55. –m Photoluminescence, properties and materials
78.55.Ap Elemental semiconductors 133
78.66. –w Optical properties of specific thin films
78.66.Tr Fullerenes and related materials 887
78.67. –n Optical properties of low-dimensional, mesoscopic, and nanoscale materials and structures
78.67.Pt Multilayers; superlattices 981

79. Electron and ion emission by liquids and solids; impact phenomena
79.20. –m Impact phenomena
79.20.Ds Laser-beam impact phenomena 793
79.20.Rf Atomic, molecular, and ion beam impact and interactions with surfaces 319

80. INTERDISCIPLINARY PHYSICS AND RELATED AREAS OF SCIENCE AND TECHNOLOGY

81. Materials science
81.05. –t Specific materials: fabrication, treatment, testing, and analysis
81.05.Bx Metals, semimetals, and alloys 863
81.05.Cy Elemental semiconductors 437
81.05.Eu III-V semiconductors 437
81.05.Rm Porous materials; granular materials 485
81.05.Uw Carbon, diamond, graphite 727, 744
81.07. –b Nanoscale materials and structures: fabrication and characterization 133, 319, 839
81.10. –h Methods of crystal growth; physics of crystal growth 231
81.15. –z Methods of deposition of films and coatings; film growth and epitaxy 170, 437
81.16. –c Methods of nanofabrication and processing 133
81.40. –z Treatment of materials and its effects on microstructure and properties 681
81.40.Wx Radiation treatment 955

84. Electronics; radiowave and microwave technology; direct energy conversion and storage
84.30. –r Electronic circuits 465
84.70. +p High-current and high-voltage technology: power systems; power transmission lines and cables 79

85. Electronic and magnetic devices; microelectronics
85.40. –e Microelectronics: LSI, VLSI, ULSI; integrated circuit fabrication technology
85.40.Sz Deposition technology 437
85.45. – w Vacuum microelectronics 79
85.75. – d Magnetoelectronics; spintronics: devices exploiting spin polarized transport or integrated magnetic fields 409, 412

87. Biological and medical physics

87.10. – e General theory and mathematical aspects 295, 304
87.15. – v Biomolecules: structure and physical properties
87.15.A – Theory, modeling, and computer simulation 231
87.19. – j Properties of higher organisms
87.19.L – Neuroscience 304
87.53. – j Effects of ionizing radiation on biological systems 109
87.59. – e X-ray imaging 57
87.64. – t Spectroscopic and microscopic techniques in biophysics and medical physics
87.64.Bx Electron, neutron and X-ray diffraction and scattering 57
87.64.M – Optical microscopy 1161

89. Other areas of applied and interdisciplinary physics

89.20. – a Interdisciplinary applications of physics
89.20.Bb Industrial and technological research and development 681
89.75. – k Complex systems
89.75.Da Systems obeying scaling laws 723

90. GEOPHYSICS, ASTRONOMY, AND ASTROPHYSICS

92. Hydrospheric and atmospheric geophysics

92.10. – c Physical oceanography
92.10.H – Ocean waves and oscillations
92.10.hr Planetary waves, Rossby waves 577
92.10.Vz Underwater sound 1171
92.60. – e Properties and dynamics of the atmosphere; meteorology 577

95. Fundamental astronomy and astrophysics; instrumentation, techniques, and astronomical observations

95.35. + d Dark matter 283, 759, 1091
95.36. + x Dark energy 253

96. Solar system; planetology

96.60. – j Solar physics 1123

97. Stars

97.10. – q Stellar characteristics and properties
97.10.Gz Accretion and accretion disks 551
97.10.Ld Magnetic and electric fields; polarization of starlight 839, 844
97.10.Sj Pulsations, oscillations, and stellar seismology 1123
97.60. – s Late stages of stellar evolution
97.60.Jd Neutron stars 839, 844
97.80. – d Binary and multiple stars 551