

PACS 2010 Regular Edition– Sec. 50

- 50. PHYSICS OF GASES, PLASMAS, AND ELECTRIC DISCHARGES**

- 51. Physics of gases**

- 51.10.+y Kinetic and transport theory of gases** (*see also 05.20.Dd Kinetic theory in classical statistical mechanics; see also 47.70.Mc Radiation gas dynamics*)

- 51.20.+d Viscosity, diffusion, and thermal conductivity**

- 51.30.+i Thermodynamic properties, equations of state** (*see also 05.70.Ce Thermodynamic functions and equations of state in thermodynamics*)

- 51.35.+a Mechanical properties; compressibility**

- 51.40.+p Acoustical properties** (*see also 43.28.-g Aeroacoustics and atmospheric sound in Acoustics Appendix; for ultrasonic relaxation in gases, see 43.35.Fj—in Acoustics Appendix*)

- 51.50.+v Electrical properties (ionization, breakdown, electron and ion mobility, etc.)** (*see also 52.80.-s Electric discharges in physics of plasmas*)

- 51.60.+a Magnetic properties**

- 51.70.+f Optical and dielectric properties**
 - *Sorption, see 68.43.-h*
 - *Gas sensors and detectors, see 07.07.Df*

- 51.90.+r Other topics in the physics of gases (restricted to new topics in section 51)**

- 52. Physics of plasmas and electric discharges** (*for space plasma physics, see 94.05.-a; for astrophysical plasmas, see 95.30.Qd; for physics of the ionosphere and magnetosphere, see 94.20.-y and 94.30.-d respectively*)

52.20.-j Elementary processes in plasmas

52.20.Dq Particle orbits

52.20.Fs Electron collisions

52.20.Hv Atomic, molecular, ion, and heavy-particle collisions

52.25.-b Plasma properties (*for chemical reactions in plasma, see 82.33.Xj*)

52.25.Dg Plasma kinetic equations

52.25.Fi Transport properties

52.25.Gj Fluctuation and chaos phenomena (*for plasma turbulence, see 52.35.Ra; see also 05.45.-a Nonlinear dynamics and chaos*)

52.25.Jm Ionization of plasmas

52.25.Kn Thermodynamics of plasmas

52.25.Mq Dielectric properties

52.25.Os Emission, absorption, and scattering of electromagnetic radiation

52.25.Tx Emission, absorption, and scattering of particles

52.25.Vy Impurities in plasmas

52.25.Xz Magnetized plasmas

52.25.Ya Neutrals in plasmas

52.27.-h Basic studies of specific kinds of plasmas

52.27.Aj Single-component, electron-positive-ion plasmas

52.27.Cm Multicomponent and negative-ion plasmas

52.27.Ep Electron-positron plasmas

52.27.Gr Strongly-coupled plasmas

52.27.Jt Nonneutral plasmas

52.27.Lw Dusty or complex plasmas; plasma crystals

52.27.Ny Relativistic plasmas

52.30.-q Plasma dynamics and flow

52.30.Cv Magnetohydrodynamics (including electron magnetohydrodynamics) (*see also 47.65.-d Magnetohydrodynamics and electrohydrodynamics in fluid dynamics; for MHD generators, see 52.75.Fk; see also 95.30.Qd Magnetohydrodynamics and plasmas in astrophysics*)

52.30.Ex Two-fluid and multi-fluid plasmas

52.30.Gz Gyrokinetics

52.35.-g Waves, oscillations, and instabilities in plasmas and intense beams (*see also 94.20.wf Plasma waves and instabilities in physics of the ionosphere; 94.30.cq MHD waves, plasma waves, and instabilities in physics of the magnetosphere; 96.50.Tf MHD waves, plasma waves, turbulence in interplanetary physics*)

52.35.Bj Magnetohydrodynamic waves (e.g., Alfvén waves)

52.35.Dm Sound waves

- 52.35.Fp Electrostatic waves and oscillations (e.g., ion-acoustic waves)
- 52.35.Hr Electromagnetic waves (e.g., electron-cyclotron, Whistler, Bernstein, upper hybrid, lower hybrid)
- 52.35.Kt Drift waves
- 52.35.Lv Other linear waves
- 52.35.Mw Nonlinear phenomena: waves, wave propagation, and other interactions (including parametric effects, mode coupling, ponderomotive effects, etc.)
- 52.35.Py Macroinstabilities (hydromagnetic, e.g., kink, fire-hose, mirror, ballooning, tearing, trapped-particle, flute, Rayleigh-Taylor, etc.)
- 52.35.Qz Microinstabilities (ion-acoustic, two-stream, loss-cone, beam-plasma, drift, ion- or electron-cyclotron, etc.)
- 52.35.Ra Plasma turbulence
- 52.35.Sb Solitons; BGK modes
- 52.35.Tc Shock waves and discontinuities
- 52.35.Vd Magnetic reconnection (*see also 94.30.cp in physics of the magnetosphere*)
- 52.35.We Plasma vorticity
- 52.38.-r Laser-plasma interactions** (*for plasma production and heating by laser beams, see 52.50.Jm*)
- 52.38.Bv Rayleigh scattering; stimulated Brillouin and Raman scattering
- 52.38.Dx Laser light absorption in plasmas (collisional, parametric, etc.)

52.38.Fz Laser-induced magnetic fields in plasmas

52.38.Hb Self-focussing, channeling, and filamentation in plasmas

52.38.Kd Laser-plasma acceleration of electrons and ions (*see also 41.75.Jv Laser-driven acceleration in electromagnetism; electron and ion optics*)

52.38.Mf Laser ablation (*see also 79.20.Ds, Laser-beam impact phenomena*)

52.38.Ph X-ray, γ -ray, and particle generation

52.40.-w Plasma interactions (nonlaser)

52.40.Db Electromagnetic (nonlaser) radiation interactions with plasma (*for electromagnetic wave propagation in the ionosphere and magnetosphere, see 94.20.Bb and 94.30.Tz respectively*)

52.40.Fd Plasma interactions with antennas; plasma-filled waveguides

52.40.Hf Plasma-material interactions; boundary layer effects

52.40.Kh Plasma sheaths (*see also 94.30.cj Magnetosheath*)

52.40.Mj Particle beam interactions in plasmas

52.50.-b Plasma production and heating (*see also 52.80.-s Electric discharges*)

52.50.Dg Plasma sources

52.50.Gj Plasma heating by particle beams

52.50.Jm Plasma production and heating by laser beams (laser-foil, laser-cluster, etc.)

- 52.50.Lp Plasma production and heating by shock waves and compression
- 52.50.Nr Plasma heating by DC fields; ohmic heating, arcs
- 52.50.Qt Plasma heating by radio-frequency fields; ICR, ICP, helicons
- 52.50.Sw Plasma heating by microwaves; ECR, LH, collisional heating
- 52.55.-s Magnetic confinement and equilibrium** (*see also 28.52.-s Fusion reactors*)
- 52.55.Dy General theory and basic studies of plasma lifetime, particle and heat loss, energy balance, field structure, etc.
- 52.55.Ez Theta pinch
- 52.55.Fa Tokamaks, spherical tokamaks
- 52.55.Hc Stellarators, torsatrons, heliacs, bumpy tori, and other toroidal confinement devices
- 52.55.Ip Spheromaks
- 52.55.Jd Magnetic mirrors, gas dynamic traps
- 52.55.Lf Field-reversed configurations, rotamaks, astrons, ion rings, magnetized target fusion, and cusps
- 52.55.Pi Fusion products effects (e.g., alpha-particles, etc.), fast particle effects
- 52.55.Rk Power exhaust; divertors
- 52.55.Tn Ideal and resistive MHD modes; kinetic modes
- 52.55.Wq Current drive; helicity injection

52.57.-z Laser inertial confinement

52.57.Bc Target design and fabrication

52.57.Fg Implosion symmetry and hydrodynamic instability (Rayleigh-Taylor, Richtmyer-Meshkov, imprint, etc.)

52.57.Kk Fast ignition of compressed fusion fuels

52.58.-c Other confinement methods

52.58.Ei Light-ion inertial confinement

52.58.Hm Heavy-ion inertial confinement

52.58.Lq Z-pinches, plasma focus, and other pinch devices

52.58.Qv Electrostatic and high-frequency confinement

52.59.-f Intense particle beams and radiation sources (*see also 29.25.-t Particle sources and targets, and 29.27.-a Beams in particle accelerators, in instrumentation for elementary-particle and nuclear physics*)

52.59.Bi Grid- and ion-diode-accelerated beams

52.59.Dk Magneto-plasma accelerated plasmas

52.59.Fn Multistage accelerated heavy-ion beams

52.59.Hq Dense plasma focus

52.59.Mv High-voltage diodes (*for high-current and high-voltage technology, see 84.70.+p*)

52.59.Px Hard X-ray sources

52.59.Qy Wire array Z-pinches

52.59.Rz Free-electron devices (*for free-electron lasers, see 41.60.Cr*)

52.59.Sa Space-charge-dominated beams

52.59.Tb Moderate-intensity beams

52.59.Wd Emittance-dominated beams

52.59.Ye Plasma devices for generation of coherent radiation

52.65.-y Plasma simulation

52.65.Cc Particle orbit and trajectory

52.65.Ff Fokker-Planck and Vlasov equation

52.65.Kj Magnetohydrodynamic and fluid equation

52.65.Pp Monte Carlo methods

52.65.Rr Particle-in-cell method

52.65.Tt Gyrofluid and gyrokinetic simulations

52.65.Vv Perturbative methods

52.65.Ww Hybrid methods

52.65.Yy Molecular dynamics methods

52.70.-m Plasma diagnostic techniques and instrumentation

52.70.Ds Electric and magnetic measurements

52.70.Gw Radio-frequency and microwave measurements

52.70.Kz Optical (ultraviolet, visible, infrared) measurements

52.70.La X-ray and γ -ray measurements

52.70.Nc Particle measurements

52.72.+v Laboratory studies of space- and astrophysical-plasma processes (*see also 94.05.Rx in space plasma physics*)

52.75.-d Plasma devices (*for ion sources, see 29.25.Lg, Ni; for plasma sources, see 52.50.Dg*)

52.75.Di Ion and plasma propulsion

52.75.Fk Magnetohydrodynamic generators and thermionic convertors; plasma diodes (*see also 84.60.Lw, Ny in direct-energy conversion and storage*)

52.75.Hn Plasma torches

52.75.Kq Plasma switches (e.g., spark gaps)

52.75.Xx Thermionic and filament-based sources (e.g., Q machines, double- and triple-plasma devices, etc.)

52.77.-j Plasma applications

52.77.Bn Etching and cleaning (*see also 81.65.Cf Surface cleaning, etching, patterning in surface treatments*)

52.77.Dq Plasma-based ion implantation and deposition (*see also 81.15.Jj Ion and electron beam-assisted deposition*)

- 52.77.Fv High-pressure, high-current plasmas (plasma spray, arc welding, etc.) (*see also 81.15.Rs Spray coating techniques*)
- *Chemical synthesis; combustion synthesis, see 81.20.Ka*
- 52.80.-s Electric discharges** (*see also 51.50.+v Electrical properties of gases; for plasma reactions including flowing afterglow and electric discharges, see 82.33.Xj in physical chemistry and chemical physics*)
- 52.80.Dy Low-field and Townsend discharges
- 52.80.Hc Glow; corona
- 52.80.Mg Arcs; sparks; lightning; atmospheric electricity (*see also 92.60.Pw Atmospheric electricity, lightning in meteorology*)
- 52.80.Pi High-frequency and RF discharges
- 52.80.Qj Explosions; exploding wires
- 52.80.Sm Magnetoactive discharges (e.g., Penning discharges)
- 52.80.Tn Other gas discharges
- 52.80.Vp Discharge in vacuum
- 52.80.Wq Discharge in liquids and solids (*for electric breakdown in liquids, see 77.22.Jp*)
- 52.80.Yr Discharges for spectral sources (including inductively coupled plasma)
- 52.90.+z Other topics in physics of plasmas and electric discharges (restricted to new topics in section 52)**