GUIDELINES FOR PRA SECTION SELECTION

(Revised December 2005)

Sections are listed below with representative specific topics. PACS numbers are included for help in selecting the *principal* PACS number of an article, which should correspond to the appropriate section. Please note that the more specific codes supersede the general category codes. The listing is not complete; secondary PACS selections are not limited to those contained here. Complete PACS listings may be accessed electronically at `http://publish.aps.org/PACS/`. An asterisk (*) after a PACS number refers to all categories following the decimal point; a dagger (†) to some categories following the decimal point.

ATOMIC, MOLECULAR, AND OPTICAL PHYSICS

1. **Fundamental concepts**

Quantum mechanics, special relativity, quantum electrodynamics, tests of fundamental laws and interactions, and related topics.

Quantum mechanics 03.65.†
- Formalism 03.65.Ca
- Functional analytical methods 03.65.Db
- Algebraic methods 03.65.Fd
- Solutions of wave equations: bound states 03.65.Ge
- Relativistic wave equations 03.65.Pm
- Semiclassical theories and applications 03.65.Sq
- Foundations of quantum mechanics; measurement theory 03.65.Ta
- Entanglement and quantum nonlocality 03.65.Ud
- Phases: geometric; dynamic or topological 03.65.Vf
- State reconstruction, quantum tomography 03.65.Wj
- Tunneling, traversal time, quantum Zeno dynamics 03.65.Xp
- Decoherence; open systems; quantum statistical methods 03.65.Yz

Special relativity 03.30.+p
Metrology 06.20.*
Charge conjugation, parity, time reversal, and other discrete symmetries in atoms 11.30.Er
Quantum electrodynamics 12.20.*
Weak-interaction effects in atoms 32.80.Ys

2. **Quantum information**

Quantum computation, quantum communication, quantum cryptography; related topics.

Quantum information 03.67.*

3. **Atomic and molecular structure and dynamics**

Static and dynamic properties of atoms and simple molecules. Calculations and mathematical techniques in atomic and molecular physics; structure; oscillator strengths; spectroscopy; lifetime measurements; exotic atoms and molecules; related topics.

Electronic structure of atoms, molecules, and ions: theory 31.† (except 31.70.Dk)
Properties of atoms and atomic ions 32.10.*
Atomic spectra 32.30.*
Intensities of atomic spectral lines 32.70.*
Other topics in atomic structure and dynamics 32.90.+a
Properties of molecules 33.15.*
Molecular spectra 33.20.*
Photoelectron spectra 33.60.*
Intensities and shapes of molecular spectral lines and bands 33.70.*
Other topics in molecular properties and interactions with photons 33.90.+h
Exotic atoms and molecules 36.10.*

4. **Atomic and molecular collisions and interactions**

Scattering theory; electron, atom, and molecule collisions; collisional line broadening.

Scattering theory
- Nonrelativistic scattering theory 03.65.Nk
- Relativistic scattering theory 11.80.*

Interactions of atoms with photons 32.80.†
- Atomic scattering, cross sections, and form factors; Compton scattering 32.80.Cy
- Autoionization 32.80.Dz
- Photoionization of atoms and ions 32.80.Fb
- Photodetachment of atomic negative ions 32.80.Gc
- Auger effect and inner-shell excitation or ionization 32.80.Hd

Photon interactions with molecules 33.80†
- Autoionization, photoionization, and photodetachment 33.80.Eh
- Diffuse spectra; predissociation, photodissociation 33.80.Gj

Atomic and molecular collision processes and interactions 34.†
- General theories and models of atomic and molecular collisions and interactions 34.10.+x
- Interatomic and intermolecular potentials and forces 34.20.*
- Intramolecular energy transfer 34.30.+h
- Scattering of atoms and molecules 34.50† (34.50.Bw and 34.50.Dy belong in A-5; 34.50.Rk belongs in A-7)
- Scattering in highly excited states (e.g., Rydberg states) 34.60.+z
- Charge transfer 34.70.+e
- Electron scattering 34.80.† (34.80.Qb belongs in A-7)
- Positron scattering 34.85.+x
- Other topics in atomic and molecular collision processes and interactions 34.90.+q

5. **Photon, electron, atom, and molecule interactions with solids and surfaces**

Energy loss and stopping power 34.50.Bw
Interactions of atoms and molecules with surfaces 34.50.Dy
Channeling phenomena 61.85.+p
Impact phenomena 79.20.*

6. **Clusters (including fullerenes)**

Atomic and molecular properties and processes of clusters.

Atomic and molecular clusters 36.40.*
Fullerenes and fullerene-related materials 61.48.+c

7. **Atomic and molecular processes in external fields**

Interactions of atoms and molecules with external fields; multiphoton excitation and ionization and other strong-field effects; optical trapping and cooling; collisions in laser fields; transient processes; optical pumping and optical preparation of superposition states.

Zeeman and Stark effects 32.60.+i, 33.55.Be
Level crossing and optical pumping 32.80.Bx, 33.80.Be
Optical cooling; trapping 32.80.Pj, 33.80.Ps

Resonance phenomena
- Nuclear resonance and relaxation 33.25.+k
- Electron resonance and relaxation 33.35.+r
- Multiple resonances 33.40.+f

Multiphoton ionization and excitation to highly excited states (e.g., Rydberg states) 32.80.Rm, 33.80.Rv
Other multiphoton processes 32.80.Wr, 33.80.Wz
Laser-modified scattering and reactions 34.50.Rk, 34.80.Qb
Coherent control of atomic interactions with photons 32.80.Qk
Strong-field excitation of optical transitions in quantum systems; multiphoton processes; dynamic Stark shift 42.50.Hz
Optical transient phenomena; quantum beats, photon echo, free-induction decay, dephasings and revivals, optical nutation, and self-induced transparency 42.50.Md
Mechanical effects of light on atoms, molecules, electrons, and ions 42.50.Vk

8. **Matter waves**

Atom and neutron optics, Bose-Einstein condensation phenomena, and related topics.

Matter waves 03.75.*
Interferometers 07.60.Ly
Atom interferometry techniques 39.20.+q

9. **Quantum optics, physics of lasers, nonlinear optics**

Interaction between atoms and quantized radiation; properties of radiation fields; cavity quantum electrodynamics; nonclassical states of the electromagnetic field; physics of lasers and other active media; nonlinear optics.

Photon statistics and coherence theory 42.50.Ar
Quantum description of interaction of light and matter; related experiments 42.50.Ct
Nonclassical states of the electromagnetic field, including entangled photon states; quantum state engineering and measurements 42.50.Dv
Cooperative phenomena in quantum optical systems 42.50.Fx
Effects of atomic coherence on the propagation, absorption, and amplification of light 42.50.Gy
Quantum fluctuations, quantum noise, quantum jumps 42.50.Lc
Quantum optical phenomena in absorbing, dispersive and conducting media 42.50.Nn
Cavity quantum electrodynamics; micromasers 42.50.Pq
Nonclassical interferometry, subwavelength lithography 42.50.St
Optical tests of quantum theory 42.50.Xa
Lasers 42.55.*
Laser optical systems: design and operation 42.60.*
Laser applications 42.62.*
Nonlinear optics 42.65.† (42.65.Tg and 42.65.Wi belong in PRE)