Atomic Physics Books (* = book on reserve in Physics library )


Detailed treatment of hyperfine interactions.


Alternative formalism for treating many electron atoms.


K. D. Bonin and V. V. Kresin, Electric-dipole polarizabilities of atoms, molecules and clusters, (World Scientific, Singapore, 1997).


Comprehensive and modern treatment. Includes much material on atomic collisions and molecular structure.

Atomic physics through problem solving. Treats many current research topics.

Excellent and detailed presentation of much of the most exciting atomic physics research of the last several decades.


Detailed treatment of calculation techniques for complex spectra

semiclassical approach to atomic physics


Advanced treatment of angular momentum algebra.


Written by an experimentalist, with applications to modern topics such as laser cooling and quantum computing.

Includes multichannel quantum defect theory, and calculational techniques for complex spectra.


Comprehensive treatment of highly excited Rydberg atoms.


Pedagogical and modern treatment. Some additional topics, but less detail compared to Woodgate.

Detailed coverage of optical pumping, uses non-standard notation.


Advanced level, including numerical techniques.

Advanced treatment of group theoretical methods.


**Older texts**


G. Herzberg, *Atomic spectra and atomic structure, 2nd Ed.*, (Dover, New York, 1944). Good introductory treatment


Collision theory


Angular momentum theory


Good pedagogical treatment of the theory of angular momentum.


Comprehensive compilation of formulas related to the theory of angular momentum and irreducible tensors. Not a textbook.


Astrophysical Applications


Other Applications


Quantum optics plus a good treatment of the interaction of radiation with atoms.

Covers interaction of atoms with external fields, and applications to laser cooling.

Includes a self-contained treatment of laser cooling and atomic collision theory.