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Sinopsis

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This primer provides a systematic and rigorous introduction to the spectra and electronic structure of atoms in the gas phase. Throughout the book, the author explains observed spectra in terms of underlying quantum mechanical principles while at the same time illustrating experimental aspects and chemical applications. The book begins with a review of elementary quantum mechanics as applied to spherically symmetric problems and a discussion of electromagnetic radiation properties. It goes on to detail the spectra of hydrogenic atoms, the alkali metals, the helium atoms, and many-electron atoms at all stages. Topics such as spin-orbit coupling, the Zeeman effect, spin-correlation and the Pauli Principle, Russel-Saunders, and jj-coupling are included. Modern applications and techniques such as lasers and cooling of atoms are briefly discussed. Many topics are covered at two levels in separate sections, so that a newcomer can gain qualitative understanding by omitting some sections and then return later for a more detailed quantitative picture.