ATOMIC AND MOLECULAR PROCESSES: ASTR-5110

This document presents topical guidelines for instructors of one of the five APS core graduate

Molecular Physics & Spectroscopy

Molecular orbitals; electronic, vibrational, & rotational spectra
Rigid rotator & harmonic oscillator descriptions of observed modes
Molecular spectroscopy selection rules for diatomic molecules
Application: ortho-para H_2 interconversion in Jupiterôs atmosphere and/or supernova shocks
Application: deriving column density from rotational emission (e.g., CO isotopologues)

Ionization and Recombination

Rate coefficients
Ionization/recombination equilibrium in the Saha, coronal, and nebular limits
Collision rates and heating
Radiative cooling of a plasma
Charge exchange; nonthermal excitation processes
Molecular formation and dissociation
Application: origin of the stellar spectral sequence (OBAFGKM)