

Astronomy 230: Diffuse Matter

Topics

This course covers the basic physical processes governing diffuse matter in space. We will begin with the quantum and statistical mechanical processes that govern radiation, ionization, and chemical reactions at low densities. Then we will discuss the thermodynamic and mechanical behavior of various phases of interstellar and intergalactic matter: warm ionized gas (H II regions), warm and cold atomic gas (H I), interstellar dust, molecules, and finally hot ionized gas.

Texts

Our main textbooks will be *Astrophysics of Gaseous Nebulae and Active Galactic Nuclei*, by Osterbrock & Ferland, and *Physical Processes in the Interstellar Medium*, by Spitzer. Other books that are useful references are *Physics and Chemistry of the Interstellar Medium*, by Tielens, "Radiative Processes" by Rybicky & Lightman, and *The Physics of Astrophysics* (volumes I and II), by Shu.

Syllabus

Week	Topic
1	Introduction
2	Radiative processes
3	Ionization and chemistry
4	H II regions: thermodynamics and chemistry
5	H II regions: dynamics
6	H I: radio
7	H I: Lyman α
8	H I: the two-phase model
9	Molecular gas
10	Hot, low-density gas