Ultraviolet and X-ray Spectroscopy of Multiphase Hot Gas in the Interstellar Medium and the IGM

Todd M. Tripp*

February 3, 2006

Abstract

The Space Telescope Imaging Spectrograph and the *Far Ultraviolet Spectroscopic Explorer* have observed a large number of hot stars and low-redshift QSOs and AGNs for the purpose of studying interstellar and intergalactic gases and their roles in galaxy evolution and cosmology. The spectra of these objects show an array of remarkable absorption lines ranging from cold, molecular gas (e.g., traced by C I and H_2) to highly ionized and hot gas (e.g., traced by O VI and Ne VIII transitions). Many of the gas clouds detected in UV absorption cannot be studied by any other technique, especially in intergalactic regions where the densities are likely to be quite low. The O VI absorption lines detected in intervening gas clouds have particularly important implications regarding the chemical enrichment, physical conditions, and baryonic content of intergalactic gas in the nearby universe. For example, these absorbers can be used to search for the "warm-hot intergalactic medium", a shock-heated phase of the IGM that is theoretically predicted to be a major baryon reservoir at the present epoch. In parallel, X-ray telescopes with grating spectrographs have detected absorption lines of even more highly ionized species (e.g., O VII and Ne IX) that complement the UV studies. This talk will briefly review studies of the low-z IGM based on UV and X-ray observations of O VI and related absorption lines, including findings on the metallicity, ionization, and cosmological mass of these systems as well as their relationships with galaxies. Comments will be interspersed about how these science programs require and motivate supporting work from laboratory astrophysics.

*University of Massachusetts