Photoelectric Absorption from Metals in Quasar Damped Lyman-Alpha Systems

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Abstract

Observations in the 21 cm emission-line of neutral hydrogen permit sensitive investigations of the distribution of neutral gas in the local Universe. Most of the local neutral gas appears to be associated with luminous spirals. However, at redshifts exceeding about z=0.1, 21 cm observations become ineffective probes of the neutral gas due to radio receiver and sensitivity limitations. At higher redshifts, observations of cosmologically intervening damped Lyman-alpha (DLA) absorption systems in the spectra of background quasars provide the best way to track the bulk of the neutral gas.

Metallicity measurements of this gas are important because of the constraints they provide on cosmic chemical evolution. However, the wavelengths of useful transitions make ground-based metallicity measurements impossible at redshifts less than about z=0.6, and space-UV measurements are often difficult due to the faintness of the quasars. Here we discuss CHANDRA-ACIS observations of quasars with low-redshift DLA absorption. We evaluate the metallicity of the DLA gas by considering photoelectric absorption due to metals (primarily oxygen). Such measurements can provide fundamental constraints on the chemical enrichment history of neutral gas in a redshift range that is virtually unexplored.

CATEGORY: NORMAL GALAXIES