

HAW05-2005-020025

Abstract for an Invited Paper
for the HAW05 Meeting of
the American Physical Society

**Damped Lyman Alpha Systems: Neutral gas Reservoirs for Star Formation and Element Production
at High Redshifts**
ARTHUR WOLFE, UCSD

Damped Ly α systems (DLAs) are a population of quasar absorption systems that dominate the neutral-gas content of the Universe in the redshift interval $z=[0,5]$. I discuss evidence that the DLAs serve as important neutral-gas reservoirs for star formation at high redshifts, and as a result, appear to be the progenitors of modern galaxies. Specifically, accurate measurements of the neutral-gas mass per unit comoving volume, Ω_{gas} , reveals evidence for a statistically significant decrease in Ω_{gas} with time, which is suggestive of gas consumption by star formation. Further indirect evidence for star formation stems from the observed increase in metal abundance with time, which indicates element enrichment by star formation: measurements of abundance ratios such as (Si/Fe) and of the “odd-even” effect further indicate metal enrichment primarily by type II supernovae. Finally, I discuss a technique for measuring the heating rate of the gas. The most plausible heat source is shown to be UV radiation emitted by massive stars residing in DLAs. The implied UV luminosity per unit comoving volume implies that a subset of DLAs is heated by compact regions of intense star formation that are identified as the Lyman break galaxies.