ARE PRESSURE-CONFINED CLOUDS IN GALACTIC HALOS POSSIBLE MODELS OF LYMAN ALPHA CLOUDS?

KEIKO MIYAHATA AND SATORU IKEUCHI
Department of Earth and Space Science, Faculty of Science, Osaka University, Machikaneyama-cho, Toyonaka, Osaka 560

Our understanding of the Lyα forest has changed considerably following observations by *HST* and Keck. Lyα clouds at low redshifts ($z < 1.7$) observed by *HST* showed two unexpected features: Lanzetta et al. (1995) found that most luminous galaxies at such redshifts produce Lyα absorptions at mean impact parameter $\sim 160h^{-1}$kpc, and established the association between Lyα clouds and galaxies. Ulmer (1996) pointed out the strong clustering of Lyα clouds in this redshift range. Motivated by the above, we propose a two-component protogalaxy model for the Lyα clouds based upon our previous work (Miyahata & Ikeuchi 1995). In our model, the Lyα clouds are stable cold clouds confined by the pressure of ambient hot gas in a galactic halo. We determine the properties of these cold clouds and hot gas on the basis of theoretical and observational constraints. We take into account the stability of a cold cloud in the galactic halo in addition to the general stability conditions in a two-component medium (e.g. Ikeuchi & Ostriker 1986), and compare the derived quantities of Lyα clouds in the galactic halo and in the intergalactic medium at both high and low redshifts. We conclude that the ciondition that a cloud is stable against both evaporation and tidal disruption by a hot galactic halo is very restrictive. In the most noteworthy example at $z \sim 0.5$, a pressure-confined, stable spherical Lyα cloud with $N_{\rm HI} = 10^{14}{\rm cm}^{-2}$ cannot survive in the galactic halo, although much higher column density clouds of $N_{\rm HI} = 10^{17}{\rm cm}^{-2}$ can. Miyahata & Ikeuchi (1997) discuss how these results constrain an alternative model for Lyα clouds associated with the galaxies observed by Lanzetta et al. (1995).

References

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