
Transitioning HI-H2 clouds at high redshift

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Abstract

My project aims at studying the transitioning HI-H2 clouds in the early universe. We do this by looking at absorption lines created in the background quasar light in a specific line of sight. High column density atomic gas leads to saturation of the QSO light at specific wavelengths (like Lyman-alpha, beta, etc.) creating a damped voigt profile and hence, a specific class of these systems called the Extremely Strong Damped Lyman-Alpha Absorbers (or ESDLAs) are tracers of very high-column density gas. ESDLAs are found, in the past, to be located within their host galaxy. Hence, probing ESDLAs with the highest HI column density ($N(\text{HI}) > 10^{21.8}$), we are likely to detect HI-H2 transitioning gas, inter-stellar medium (ISM)/molecular clouds (in absorption at Lyman-Werner bands) and possibly star-forming regions (in Lyman-alpha emission, optical emission lines), at high redshift, in a way which is not selected based on the strength of the emission, and hence represents the general star-forming population at high redshifts. Using X-SHOOTER, we have observed a set of 11 ESDLAs selected based on high HI column density, which were positively predicted to contain molecular hydrogen. We would like to emphasize results of very interesting ESDLAs spectra, which also has active star-forming signature. Along with this, I would also present some brief statistical results which we have obtained by analysing the entire sample.

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