# Physical conditions in high-$z$ $H_2$-bearing damped Lyman alpha absorbers

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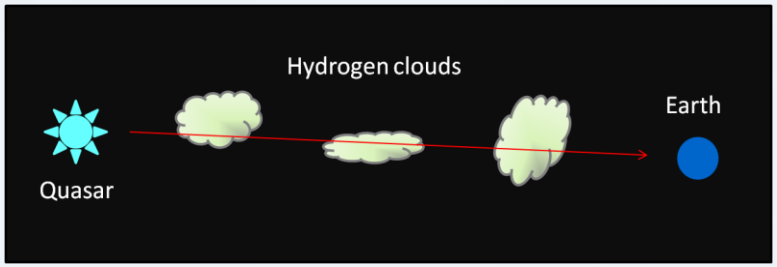
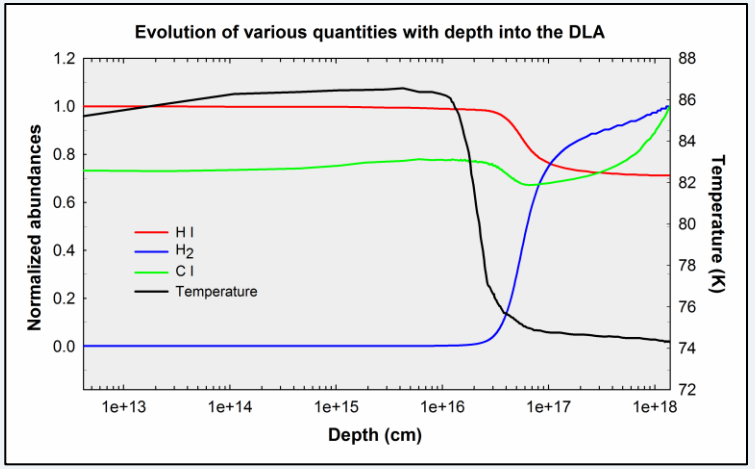
## Damped Lyman alpha absorbers (DLAs):

- Quasar absorption line systems with high column densities of neutral hydrogen, $\geq 2\times10^{20}$ cm$^{-2}$.
- Relevant to our understanding of galaxy formation & evolution.
- Studied through UV absorption lines of various atomic & molecular species.
- $H_2$ detected in ~ 10-15% DLAs. Along with C I, traces cold gas associated with star formation.




*Quasar absorption line spectroscopy*




## CLOUDY simulations:

- Constrained through population of $H_2$ rotational levels & C I fine structure levels.
- Enable us to construct the internal structure of the cloud, and study the physical mechanisms therein.
- In enriched systems, $H_2$ forms mainly on the surface of dust grains. Can be used to probe grain properties.