

Can we detect the chemical signature of Pop III stars at $z \sim 6$? A view from quasar absorption spectra

Wednesday 17 May 2023 10:00 (30 minutes)

I will present the study of the abundances of the chemical elements present in the gas associated with cosmological structures at redshift ~ 6 . The goal is to look for the nucleosynthetic traces of the Pop III stars and, more generally, to understand which generation of stars contributed to the enrichment of metals in the gas of galaxies at that time.

To determine these abundances, we studied the absorption spectra of 42 high redshift quasars (QSOs) from the literature and from the observing program called XQR-30. This program obtained 248 hours of observations with the VLT X-Shooter spectrograph, and collected optical and infrared spectra of 30 QSOs in the redshift interval $5.8 < z < 6.6$.

Among all the detected absorption line systems, those with low ionization were selected, characterized by the presence of the neutral oxygen absorption line; this ion is present when there is a large amount of HI shielding the ionizing radiation and therefore these systems are probably associated with the interstellar medium of high redshift galaxies.

The relative abundances of most of the observed systems are in agreement with the average abundances of analogue systems observed at low redshift ($2 < z < 4.5$), and with those predicted in gas enriched by the explosion of Pop II stars in CCSN.

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