Tracing metal enrichement using cosmological explosions

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Abstract

There are more than 60 Gamma-ray bursts (GRB) up to redshift six for which has been possible to measure the neutral hydrogen content along their line of sight using absorption spectroscopic technique. We present the largest sample of GRB-DLAs to date and the metallicity of their hosts in order to understand if this particular subset of hosts can be the key to understand the role of metallicity in GRB formation as well as star-formation rate. We compare this sample with DLAs along quasars and demonstrated that GRB-DLAs live in a metal enriched environment, especially at $z > 4$. We also derive that our metallicity measurements are broadly consistent with a mild metallicity bias for the GRB formation. Forthcoming NIR spectroscopic capabilities at 8-30meter telescopes, JWST, and future planned mission (e.g. SVOM) will enable to study in details the metal contents of the primordial Star-formation sites, beyond what would be possible with large, magnitude limited surveys. Redshift $z > 7$ GRBs will represent the lighthouses of such discoveries, pinpointing the faintest galaxies and sites of the metal enrichments and first ionization after the dark ages.