

Title

Exploring Extreme Explosions from the Cosmic Dawn

Abstract

Long-duration gamma-ray bursts (GRBs) are firmly associated with the deaths of massive stars, making them excellent probes of star formation in the high-redshift Universe. Measurement of the GRB rate and its evolution with redshift provides an independent constraint on the star formation rate density, while studies of the GRB progenitor population and environments provide clues to the processes shaping the birth and death of the most massive stars. Radio observations of GRB afterglows are essential for quantifying the energy release, measuring the circumburst density, and constraining ejecta collimation. In turn, these quantities inform our understanding of processes ranging from stellar feedback to the origin of cosmic magnetic fields. Current observations indicate no evolution in the properties of high-redshift GRBs compared to their $z \sim 1$ counterparts, with the possible exception of stronger beaming at higher z ; however, the sample of high- z events is extremely small. In this proposal, we request target-of-opportunity observations of one new high- z GRB in order to measure the energy, density, and degree of collimation. Our detailed observations will provide essential constraints on the progenitors and environments of the most distant explosions in the Universe.