

Burst of the Century? A Case Study of the Afterglow of Nearby Ultra-Bright GRB 130427A

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Abstract

GRB 130427A is the brightest gamma-ray burst observed by any satellite in almost 30 years and one of the most thoroughly observed. I will present a summary of the worldwide campaign to monitor the afterglow of this event from GHz to TeV energies and from seconds to years after the explosion. Remarkably, the entire data set can be described to good agreement using standard synchrotron afterglow theory, providing strong support for the validity the basic model in describing the evolution of this event and for GRB afterglows generally. Distinct forward and reverse shock components are resolved in both the SED and multifrequency light curves; the late-time high-energy emission seen by LAT is produced by the forward shock. We also infer a tenuous, wind-stratified medium surrounding this burst, suggesting a massive, low-metallicity progenitor. While GRB 130427A was an incredibly rare and fortuitous event its properties are probably not intrinsically unusual, and it provides lessons for what might be routinely achieved in the future with faster and deeper multiwavelength follow-up of gamma-ray bursts.