



SN 2008jb: A "Lost" Core-Collapse Supernova in a Star-Forming Dwarf Galaxy at ~10 Mpc

Jose L. Prieto, J. C. Lee, A. J. Drake, R. McNaught, G. Garradd, J. F. Beacom, E. Beshore, M. Catelan, S. G. Djorgovski, G. Pojmanski, K. Z. Stanek, D. M. Szczygiel

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We present the discovery and follow-up observations of SN 2008jb, a core-collapse supernova in the dwarf irregular galaxy ESO 302-14 at 9.6 Mpc. This transient was missed by galaxy-targeted surveys and was only found in archival optical images obtained by CRTS and ASAS. It was detected shortly after explosion and reached a bright optical maximum, $V_{\max} = 13.6$ mag ($M_{V_{\max}} \sim -16.5$). The shape of the light curve shows a plateau of 100 days, followed by a drop of 1.4 mag in V-band to a decline with the approximate C_{56} decay slope, consistent with 0.04 M_{sun} of Ni 56 synthesized in the explosion. A spectrum obtained 2 years after explosion shows a broad, boxy H α emission line, which is unusual for type IIP supernovae. We detect the supernova in archival Spitzer and WISE images obtained 8-14 months after explosion, which show clear signs of warm dust emission. The dwarf irregular host galaxy has a low gas-phase oxygen abundance, $12 + \log(\text{O}/\text{H}) = 8.2$ ($\sim 1/5$ Solar), similar to those of the SMC and the hosts of long gamma-ray bursts and luminous core-collapse supernovae. We study the host environment using GALEX FUV, R-band, and H α images and find that the supernova occurred in a large star-formation complex. The morphology of the H α emission appears as a large shell ($R = 350$ pc) surrounding the FUV and optical emission. We estimate an age of ~ 9 Myr and a total mass of $\sim 2 \times 10^5 M_{\text{sun}}$ for the star-formation complex. These properties are consistent with the expanding H α supershells observed in well-studied nearby dwarf galaxies, which are tell-tale signs of feedback from the cumulative effect of massive star winds and supernovae. The age estimated for the star-forming region suggests a relatively high-mass progenitor star with initial mass of $\sim 20 M_{\text{sun}}$. We discuss the implications of these findings in the study of core-collapse supernova progenitors. (Abridged)

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