

SN 2016iyc: A Type IIb supernova arising from a low-mass progenitor

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In this work, photometric and spectroscopic analyses of a very low-luminosity Type IIb supernova (SN) 2016iyc have been performed. SN 2016iyc lies near the faintest end among the distribution of similar supernovae (SNe). Given lower ejecta mass (M_{ej}) and low nickel mass (M_{Ni}) from the literature, combined with SN 2016iyc lying near the faintest end, one-dimensional stellar evolution models of 9 - 14 M_{\odot} zero-age main-sequence (ZAMS) stars as the possible progenitors of SN 2016iyc have been performed using the publicly available code MESA. Moreover, synthetic explosions of the progenitor models have been simulated using the hydrodynamic evolution codes STELLA and SNEC. The bolometric luminosity light curve and photospheric velocities produced through synthetic explosions of ZAMS stars of mass in the range 12 - 13 M_{\odot} having a pre-supernova radius $R_0 = (240 - 300) R_{\odot}$, with $M_{\text{ej}} = (1.89 - 1.93) M_{\odot}$, explosion energy $E_{\text{exp}} = (0.28 - 0.35) \times 10^{51}$ erg, and $M_{\text{Ni}} < 0.09 M_{\odot}$, are in good agreement with observations; thus, SN 2016iyc probably exploded from a progenitor near the lower mass limits for Type IIb SNe.

Track

SNR/PWNe

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