

NEBULAR SPECTRA OF THE UNUSUAL TYPE Ia SUPERNOVA 1991T¹

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The nebular optical spectra of the unusual Type Ia supernova 1991T are modeled by treating important atomic processes with reliable atomic data and by assuming both Chandrasekhar-mass and sub-Chandrasekhar-mass white dwarf explosion models. Similar to the case of normal Type Ia supernovae, a better agreement between the calculated and observed spectra of SN 1991T is obtained by assuming a sub-Chandrasekhar-mass model than Chandrasekhar-mass models, though the required white dwarf mass of $\sim 1.1 M_{\odot}$ is higher for SN 1991T than the $\sim 0.9 M_{\odot}$ for normal Type Ia supernovae. This demonstrates that variation in the behavior among Type Ia supernovae can be naturally realized by a range of sub-Chandrasekhar-mass models. The optical emission of SN 1991T is well accounted for by the sub-Chandrasekhar-mass model in both brightness and spectral shape from ~ 7 to 14 months for a distance of 14 Mpc to the supernova.

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