

Type Ia Supernovae: Explosions, Nucleosynthesis, and Cosmology

James W. Truran

*Department of Astronomy & Astrophysics, University of Chicago
Illinois 60637, USA*

Type Ia supernovae play a significant role in diverse areas of astrophysics. Their high peak luminosities, together with an observed correlation of peak brightness with the width of the light curve, make possible their effective use as probes of the distance scale of the Universe. The burning of approximately 0.6 to 0.8 solar masses from ^{12}C and ^{16}O to iron-peak nuclei in the explosive ejection of their progenitor white dwarf cores provides 1/2 to 2/3 of the abundance of ^{56}Fe in our Galaxy.

We review the calculated behaviors of recent models of SNe Ia explosions as revealed in recent numerical models, their predictions for nucleosynthesis, possible dependences of their outburst characteristics upon their initial composition, and significance for cosmology. We then identify and explore some implications of the delayed input of the nuclear products of SNe Ia for the early star formation and abundance evolution of galaxies.