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The Nuclear Physics of Type Ia Supernovae¹

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Type Ia supernovae (SNe Ia) are the thermonuclear incineration of white dwarfs, which are the evolutionary terminus of low-mass stars; these supernovae are a primary source of iron in the universe and the premier distance indicator for cosmological studies. Current and future observational surveys are uncovering tantalizing clues about the as-yet-unknown progenitors of these explosions. In this talk, I shall review the nuclear physics of the explosion, with a particular emphasis on the role of weak interactions. Electron captures during the pre-explosive “simmering” and the explosion make the nucleosynthetic yields more neutron-rich. This provides in principle a way to constrain the nature of the progenitor from observations. I shall also highlight recent experimental constraints on electron-capture rates and prospects for further experimental studies, such as at the *Facility for Rare Isotope Beams*.

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