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Advances in the Modeling of Type Ia Supernovae¹

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Type Ia supernovae are bright stellar explosions distinguished by a lack of hydrogen features in the observed spectra. These events produce and disseminate heavy elements and are noted for properties of their light curves that allow the standardization of events and subsequent use as cosmological distance indicators. The explosion mechanism, however, remains incompletely understood. I will present an overview of the physics of these events and competing explosion models. Many models invoke a deflagration born near the center of a white dwarf that has gained mass from a stellar companion. I will present simulations of this single-degenerate scenario in which the deflagration transitions to a detonation and describe the dependence of explosion yield on properties of the white dwarf and conditions under which the transition to detonation occurs.

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