

# The heterogeneity of Type Ia supernova progenitor systems and their use as cosmic distance indicators

Paul Ricker,<sup>1</sup> Kuo-Chuan Pan,<sup>1</sup> and Ronald Taam<sup>2,3</sup>

<sup>1</sup>Department of Astronomy, University of Illinois at Urbana–Champaign,  
1002 West Green Street, Urbana, IL 61801, USA  
email: [pmricker@illinois.edu](mailto:pmricker@illinois.edu)

<sup>2</sup>Department of Physics and Astronomy, Northwestern University, 2145 Sheridan Road,  
Evanston, IL 60208, USA

<sup>3</sup>Academia Sinica Institute of Astronomy and Astrophysics, P. O. Box 23-141, Taipei 10617,  
Taiwan

**Abstract.** Population synthesis modeling of Type Ia supernova (SN Ia) progenitors suggests that multiple binary evolution channels may give rise to SNe Ia. Independently of the ignition mechanism, the type of progenitor system involved affects the circumstellar environment into which the explosion propagates, as well as the amount of solid angle blocked by the companion (for single-degenerate models). Using three-dimensional adaptive-mesh simulations of SNe Ia in binary systems, we discuss the effects of the progenitor system on the observable characteristics of SNe Ia and the impact of these effects on systematic errors in the use of SNe Ia as cosmic distance indicators.

**Keywords.** binaries: close, methods: numerical, stars: evolution, supernovae: general

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