

# Special Issue on Understanding the Progenitor Systems and Explosion Mechanisms of Type Ia Supernovae: Theory versus Observations

## CALL FOR PAPERS

Type Ia supernovae (SNe Ia) are a violent endpoint of stellar evolution, the result of the thermonuclear explosions of white dwarfs in binary systems. They play a fundamental role in astrophysics. They are element factories and kinetic-energy sources, as well as cosmic-ray accelerators in galaxy evolution. Using SNe Ia as accurate cosmic distance indicators led to the discovery of dark energy and the accelerating expansion of the Universe, winning the Nobel Prize in Physics for 2011. However, the progenitor systems of SNe Ia as well as the details of their explosion mechanism remain a mystery, which affects the reliability of their use as standard candles. Therefore, in order to better understand the Universe and the galaxies within, it is crucial to improve our understanding of the nature of progenitor system of SNe Ia and their explosion mechanism.

The main focus of this special issue will be on the recent progress toward understanding of SNe Ia and SN Ia applications to other astrophysical fields such as cosmology and galactic evolution. We are especially interested in the newly theoretical and observational developments in understanding the progenitor systems and explosion mechanisms of SNe Ia, including the peculiar SNe Ia such as 91bg-/91T-like and Iax events.

Potential topics include but are not limited to the following:

- ▶ General aspects
  - ▶ Rates and delay times of SNe Ia
  - ▶ Potential progenitor and explosion models of SNe Ia
  - ▶ Origin of the diversity of SNe Ia
- ▶ Observational properties
  - ▶ Preexplosion properties of SNe Ia
  - ▶ Early- or/and late-time properties of SNe Ia, for example, early radio, X-ray, optical/UV emissions, and stripped companion material
  - ▶ Polarization of SNe Ia
  - ▶ SN Ia remnants
  - ▶ Interaction of SNe Ia with their surroundings
  - ▶ Hydrodynamical and radiative transfer modelling of SNe Ia
- ▶ Stellar aspects
  - ▶ Nucleosynthesis in SNe Ia
  - ▶ Surviving companion stars of SNe Ia and runaway/hypervelocity stars
  - ▶ Common envelop evolution and accretion onto the white dwarfs
  - ▶ Triple systems and SNe Ia
  - ▶ SNe Ia and their related objects, for example, supersoft X-ray sources, symbiotic systems, and cataclysmic variables
- ▶ Cosmological/extragalactic aspects
  - ▶ The dependence of SN Ia properties on their local environments
  - ▶ Cosmology and galaxy evolution with SNe Ia

Authors can submit their manuscripts through the Manuscript Tracking System at <https://mts.hindawi.com/submit/journals/aa/upse/>.

Papers are published upon acceptance, regardless of the Special Issue publication date.

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