Advances in Astronomy

Special Issue on

# Gamma-Ray Bursts: Progenitors and Central Engines

# CALL FOR PAPERS

Gamma-Ray Bursts (GRBs) are transient and intense flashes of $\gamma$-rays observed throughout the Universe. The prompt $\gamma$-ray emission lasts from a fraction of a second to several hundred seconds, followed by a long-lived "afterglow" emitted at multiwavelengths. GRBs are commonly divided into two classes according to their prompt emission duration: short-duration, hard-spectrum bursts, with the typical duration of less than about 2 seconds, and long-duration, soft-spectrum bursts, in many cases are associated with supernova explosions.

Although the early discovery of GRBs can be dated back a half century ago, the progenitors and central engines of GRBs are still unclear. Multiwavelength observations have provided growing evidence that short bursts may originate from the mergers of compact star binaries, and long bursts originate from the collapse of massive stars. Two leading central engine models have been proposed in the literature: the "hyperaccreting disk" model and the "millisecond magnetar" model. The former proposes that massive star collapse or compact object mergers give rise to a central black hole or protoneutron star with a debris torus around it. A transient accretion disk with a huge accretion rate up to $\sim 1 M_\odot \mathrm{yr}^{-1}$ is produced around the central compact object, driving a collimate relativistic jet via either neutrino annihilation or magnetic processes. On the other hand, the magnetar model suggests that newly formed rapidly rotating neutron stars with a millisecond spin period and surface magnetic field $\geq 10^{14}$–$10^{15}$ Gauss drive magnetical relativistic winds and produce GRBs.

We are pleased to invite investigators to contribute to original and review papers on GRB progenitors and central engine models and comparison to recent GRB prompt emission and afterglow observations at multiwavelengths.

Potential topics include but are not limited to the following:

- Compact object mergers and short bursts
- Massive star collapse and long bursts
- Type Ic supernovae associated with long bursts, theoretical models, and observations
- Hyperaccreting disks around stellar-mass black holes/neutron stars, neutrino annihilation, and other energy production mechanisms
- Birth of millisecond magnetars, promagnetar winds, and GRBs
- Long-lived central engine activity, compared with afterglow observations
- Central engines and X-ray flares

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