Understanding Supernova Explosions in the GOTTA Era

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Abstract

Supernovae (SNe) are spectacular explosions of dying massive stars and accreting/merging white dwarfs. They play a major role in many astrophysical processes, serve as laboratories to study extreme physics, and are important sources of multi-messenger radiation. Type Ia SNe are also standard candles to measure the rate of cosmic expansion. However, there are still so many open questions regarding their progenitors and explosion mechanisms. To resolve these questions, it is key to observe SNe shortly after explosion, but this is very difficult without high-cadence transient surveys. This field will be revolutionized by the GOTTA project, which will observe the entire night sky every 30 min in 3 filters down to 21 mag. GOTTA will capture extremely young SNe soon after their explosion and trigger rapid photometric+spectroscopic follow-up observations. This unprecedented opportunity will provide astronomers with pivotal insights into the SN progenitors and their explosion mechanisms.