

SYMPOSIUM ON TECHNOLOGICAL REQUIREMENTS FOR FUTURE SPACE ASTRONOMY AND
 SOLAR-SYSTEM SCIENCE MISSIONS (A7)
 Scientific Motivation and Requirements for Future Space Astronomy and Solar System Science Missions (2)

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GALEX/PTF SEARCH FOR EARLY ULTRAVIOLET OBSERVATIONS OF SUPERNOVAE IN
 PREPERATION FOR ULTRASAT - A DEDICATED WIDE-FIELD UV SURVEY

Abstract

The radius and surface composition of the progenitor of an exploding massive star, and its explosion energy per unit mass can be measured using early UV observations of core collapse supernovae (SNe). Such measurements can only be made from space.

Initial results from a simultaneous GALEX/Palomar Transient Factory (PTF) search for early UV SNe light curves clearly detected 6 Type II SNe and 1 Type II superluminous SN (SLSN-II) in the GALEX NUV data. The detection rate matches theoretical estimates for early, shock-cooling UV light curves calculated from models and taking into account the observed volumetric SN rate.

The calculated rates assume red supergiants (RSGs) explode with fiducial radii of $500 R_{\odot}$, explosion energies of 10^{51} erg, and ejecta masses of $10 M_{\odot}$.

We describe how such observations can be used to derive the progenitor radius, surface composition and explosion energy per unit mass of such SN events, and we demonstrate why UV observations are critical for such measurements.

Our pilot GALEX/PTF project convincingly demonstrated that a dedicated, systematic SN survey at the Near UV band is a compelling method to study how massive stars die. The proposed wide-field UV explorer ULTRASAT mission is expected to find > 100 SNe per year (~ 0.5 SN per deg^2), down to an Near UV detection limit of 21.5 mag AB, independent of host galaxy extinction.

(submitted on behalf of a larger collaboration)