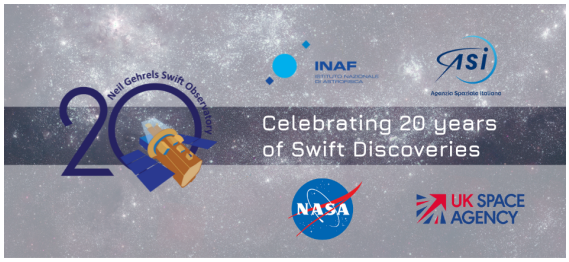

Contribution ID: **176** Type: **Contributed talk**

BTSbot-nearby: Rapid, autonomous follow-up of nearby infant supernovae with Swift/UVOT

Thursday 27 March 2025 15:05 (15 minutes)

Despite great advances in our understanding of transients over the ~20 years of Swift operations, it remains extremely challenging to link a transient to a progenitor with certain properties and to constrain the final phases of its life. Very early follow-up of supernovae (SNe), however, can provide critical insights into the progenitor: flash spectroscopy can reveal short-lived CSM interaction in core-collapse SNe and an early UV flux excess is a possible signpost for companion interaction in Type Ia SNe. These features are ephemeral, typically requiring rapid multi-wavelength follow-up to be well characterized, but traditional follow-up workflows require human action which can add hours to days of latency. We present "BTSbot-nearby,"a machine learning-based tool which fully autonomously identifies and triggers target-of-opportunity (ToO) follow-up for nearby (D<60 Mpc) young (<48 hours since first light) transients. BTSbot-nearby autonomously identified the recent Type IIP SN 2024jlf and obtained a spectrum showing flash ionization features just 7 minutes after the trigger and 17 hours after first light. SN 2024jlf's UV light curve, collected by Swift/UVOT, provided crucial constraints when matching to sophisticated radiative hydrodynamic models and inferring the progenitor's mass-loss rate shortly prior to explosion ($10^{-3} M_{\odot}$ yr^{-1}), a key parameter which is best constrained in the UV. In collaboration with the Swift team, BTSbot-nearby now autonomously triggers "urgency 0"ToOs to Swift/UVOT for new transients it identifies. This technology is at the very forefront of expediting follow-up for new, important transient events, and the integration with Swift will maximize the chances of observing early-time UV phenomena which informs us to the nature of the transient and its progenitor.

Primary author: REHEMTULLA, Nabeel (Northwestern University)

Co-authors: Dr MILLER, Adam (Northwestern University); Dr SINGH, Avinash (Stockholm University); Mr DU LAZ, Theophile (California Institute of Technology); Dr JACOBSON-GALÁN, Wynn (California Institute of Technology)

Presenter: REHEMTULLA, Nabeel (Northwestern University)

Session Classification: Thermonuclear Supernovae, Core-Collapsed Supernovae and FBOTs