Stellar Forensics with Explosions: Supernovae, Gamma-Ray Bursts, and their Environments

Nature’s two magnificent explosions, long-duration gamma-ray bursts (GRBs) and stripped-envelope supernovae (SN), are both products of collapsing massive stars. Yet, over the last 15 years, we have not determined the detailed make-up of the stellar progenitors of each kind of explosion, nor the conditions lead to each kind of explosion in massive stripped stars. While long-duration gamma-ray bursts (GRBs) emit relativistic jets of high-energy radiation, stripped SN are core-collapse explosions whose massive progenitors have been stripped of their hydrogen and helium envelopes.

Dr. Modjaz will present a number of comprehensive observational studies that probe the progenitor environments, their metallicities and the explosion parameters of SN with and without GRBs, as well as those of normal Stripped SN, with the goal of constraining their progenitor systems. She will conclude with an outlook on how the most promising venues of research - using the many existing and upcoming innovative surveys such as Palomar Transient Factory and LSST - have and will shed new light on the diverse deaths of massive stars.