40 Years Anniversary Colloquium Series

Thursday, 9 May 2019 | 17:00 – 18:00, Seminar Room, 3rd floor

The Dawn of the Era of High-Cadence and Big-Data Transient Astrophysics

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ABSTRACT

A little more than a decade ago, a small fully-automated robotic telescope in West Texas detected the first superluminous supernova marking the discovery of a rare class of stellar explosions reaching peak brightness 10-100 times larger than that of regular, core-collapse supernovae that are associated with the deaths of massive stars. In tandem, the advent of high-cadence, deep, fully-automated transient search projects enabled the discovery of more events of that class but also of new types of luminous transients that had never been seen before. The observational properties of these events, including the extraordinary peak luminosity, the diversity in light curve rise and decline time-scales as well as their spectroscopic heterogeneity posed serious challenges in our understanding of massive stellar death, stellar evolution and pre-supernova mass-loss in massive stars. Recently, with the help of sophisticated radiation hydrodynamics and radiation transport algorithms and parallel computing we were able to model several plausible scenarios and shed light into the power input mechanisms of these extraordinary events. I will discuss the current state of our understanding surrounding these events and review my contributions to the relatively young field of computational transient astrophysics.