

PHYSICS AND ASTRONOMY COLLOQUIUM

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The Restless Universe (Palomar Transient Factory)

Cosmic explosions were first noted nearly two thousand years ago. However, secure recognition and study began only a hundred years ago. What was once termed as *Stella ova* (new stars) are now divided into two major families, novae and supernovae (with real distinct classes in each). Equally the variable stars have a rich phenomenology. Together, supernovae and variable stars have contributed richly to key problems in modern astrophysics: distances to galaxies, cosmography and build up of elements in the Universe.



The Palomar Transient Factory (PTF), an innovative 2-telescope system, was designed to explicitly to chart the transient sky with a particular focus on events which lie in the nova-supernova gap. PTF is now finding an extragalactic transient every 20 minutes and a Galactic (strong) variable every 10 minutes. The results so far: identification of an emerging class of ultra-luminous supernovae, the earliest discovery of a Ia supernovae, discovery luminous red novae, the most comprehensive UV spectroscopy of Ia supernovae, discovery low energy budget supernovae, clarification of sub-classes of core collapse and thermo-nuclear explosions, mapping of the systematics of core collapse supernovae, identification of a trove of eclipsing binaries and the curious AM CVns.

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