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### **Charting the Transient Sky: The Palomar Transient Factory**

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Only about a hundred years ago astronomers came to recognize cosmic explosive events. What was once termed as Stella Nova are now divided into two major families, novae and supernovae (with real distinct classes in each). The variables and the explosions have been interesting in their own right and contributed richly to key problems in modern astrophysics: distances to galaxies and cosmography. The area of transient and variable stars is once again undergoing a renaissance due to wide field optical surveys. The Palomar Transient Factory (PTF) was designed to explicitly to chart the transient sky with a particular focus on events which lie in the nova-supernova gap.. With its innovative two-telescope architecture it achieves both high cadence and large areal rate of coverage. PTF was commissioned during the summer of 2009. PTF is now finding an extragalactic transient every 20 minutes and a Galactic (strong) variable every 10 minutes. Spectroscopy undertaken at Keck and Palomar has allowed us: identify an emerging class of ultra-luminous supernovae, discover luminous red novae, undertake UV spectroscopy of Ia supernovae, discover supernovae powered by something other than Nickel-56, clarification of sub-classes of core collapse and thermo-nuclear explosions, map the systematics of core collapse supernovae, a trove of eclipsing binaries and many others.