Variable Stars as Cosmic Swiss Army Knives

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While the study of variable stars dates back over 100 years, the launch of the Kepler space telescope in 2009 has triggered a golden age in the study of stellar oscillations. Oscillating stars are extremely useful tools that have applications to a wide variety of topics ranging from exoplanets to stellar structure and evolution to the formation of the Milky Way galaxy. In this talk, I will discuss several ongoing projects that use data on oscillating stars from Kepler and a variety of ground-based telescopes to study stellar evolution in star clusters, mass transfer in binary systems, and the formation of our own galaxy. I will also discuss the development of new data reduction techniques that will enable Kepler data to be utilized to a greater extent than ever before; these techniques will also be extremely valuable for Kepler's new K2 mission.