Pulsating red giant stars in eccentric binary systems discovered from Kepler space-based photometry

Paul Beck*[1]

[1]Service d'Astrophysique, IRFU/DSM/CEA Saclay (CEA-Saclay) – CEA – L'Orme des Merisiers, bat. 709 91191 Gif-sur-Yvette Cedex, France

Abstract

P. G. Beck, K. Hambleton, Joris Vos, and the coauthors of Beck et a. 2013, arXiv: 1312.4500
The unparalleled photometric data obtained by NASA's Kepler space telescope has led to an improved understanding of red giant stars and binary stars. Seismology allows us to constrain the properties of red giants. Therefore, red giants in binaries are ideal cases to study binary star interactions. We studied 18 eccentric systems containing red-giant stars, which were observed with NASA's space telescope, Kepler. These systems undergo significant gravitational distortions at periastron. As their characteristic light curves look like cardiograms, these stars are colloquially referred to as Heartbeat stars. Both stellar and orbital information can be obtained from fitting Heartbeat star light- and radial velocity curves. With unparalleled photometry from Kepler, we can also use asteroseismology to derive accurate masses and radii for the red-giant components and therefore determine the system parameters to a high precision. In addition to Kepler, we intensively monitored the radial velocity of these systems with the HERMES high-resolution spectrograph, mounted at the Mercator telescope to derive the orbital parameters, independently.

In this talk we discuss the results of the combined analysis of KIC5006817 and other selected red giant heartbeat stars. We also discuss rotation, circularization as well as the spin-orbit alignment. Futhermore, we investigate which of these eccentric binary systems are possible the progenitors of hot subdwarf B (sdB) stars.

*Speaker