Contributed Talk

Splinter HotStars

The stellar pulsation timing method to detect substellar companions

F. Mackebrandt[1,2], S. Schuh[1], R. Silvotti[3]

[1] *Max-Planck-Institut für Sonnensystemforschung*
[2] *International Max Planck Research School for Solar System Science at the University of Göttingen*
[3] *INAF — Osservatorio Astrofisico di Torino*

Subdwarf B stars (sdBs) are stripped He-burning cores of red giants with a thin hydrogen atmosphere. The canonical model to explain the existence of sdB stars is binary evolution. Formation scenarios for single sdBs are more controversially discussed and can be hard to reconcile with observational properties. Besides the merger of two helium white dwarfs or other merger processes for apparently single sdB stars, an alternative formation channel involves planetary systems. During the RGB the star would develop a common envelope with a giant planet that leads to the loss of the envelope.

To empirically test this scenatio, we have monitored the rapid pulsations of a number of sdBs, which allows to detect sub-stellar companions. Periodic variations in the expected arrival times of the pulsation maxima provide evidence for companions. This timing method is particularly sensitive to planets at large distances and complementary to other exoplanet detection methods which are not efficient for stars with small radii and high gravities. Thus, the timing method opens up a new parameter range in terms of the host stars and helps to understand the formation process of single sdBs.

In consideration of future photometric space missions like TESS and PLATO it is essential to enhance the diversity of potential exoplanet host stars that can be probed. We report on the development of an automated pipeline to validate this method and to apply it to a variety of both ground- and space-based observations.