Poster

Splinter Exoplanets

Towards Consistent Stellar Parameters for Giant Stars

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Lloyd (2011), Sousa et al. (2015) and Takeda & Tajitsu (2015) have recently shown that the mean sample masses of evolved stars targeted by Doppler searches for planets are significantly higher than masses derived by various other statistical methods. We use a Bayesian inference method to determine stellar parameters from evolutionary tracks for 1013 giant stars of the Kepler field that have available photometry and Gaia parallaxes and compare them to available asteroseismic masses and radii. Our method is also capable to distinguish between red giant branch and horizontal branch stars as it provides a probability for each case. For 86.3% of the investigated stars our determined evolutionary stage coincides with that from asteroseismology. For red giant branch stars, evolutionary track masses are systematically smaller than asteroseismic masses. The average fractional difference is $\langle \frac{M_{\mathrm{trk.}} - M_{\mathrm{ast.}}}{M_{\mathrm{ast.}}} \rangle_{\mathrm{RGB}} = -13.3 \pm 1.1\,\%$, while for horizontal branch stars we find systematically higher masses using evolutionary tracks, as the average fractional difference is $\langle \frac{M_{\mathrm{trk.}} - M_{\mathrm{ast.}}}{M_{\mathrm{ast.}}} \rangle_{\mathrm{HB}} = 19 \pm 1.2\,\%$. However, our current results are limited by the large statistical and systematic errors of the first Gaia data release. Using a sub-sample of stars with smaller observational errors decreases the average fractional difference of the red giant branch stars to $\langle \frac{M_{\mathrm{trk.}} - M_{\mathrm{ast.}}}{M_{\mathrm{ast.}}} \rangle_{\mathrm{RGB}} = -4.4 \pm 2.4\,\%$, while the average fractional difference of the horizontal branch stars is $\langle \frac{M_{\mathrm{trk.}} - M_{\mathrm{ast.}}}{M_{\mathrm{ast.}}} \rangle_{\mathrm{HB}} = 11.9 \pm 3.6\,\%$.