What did we know about giant planets transiting giant stars before TESS?

1) Stellar evolution from the main sequence to the giant phase can re-inflate warm Jupiters.

2) Transiting giant planets seem to prefer moderately eccentric orbits around evolved stars.

3) Warm/hot Jupiters are roughly equally common around main sequence and low luminosity red giant branch (LLRGB, 3-8 R\(_{\odot}\)) stars.


e = 0.06 ± 0.02

e = 0.15 ± 0.02, 0.04

For P\(_{\text{orb}}\) < 30 d:

What will TESS teach us about giant planets transiting giant stars in the future?

TESS will reveal the dependence of planet inflation, migration, and inspiral as a function of stellar mass and evolutionary stage.

Toi-197: A Hot Saturn Orbiting an Oscillating Late Subgiant Discovered by TESS (Huber+ 2019)

TOI-866: The First TESS Object of Interest Identified Around a Giant Star

Though technically not a giant star, TOI-197 is similar to the typical giant star systems expected from TESS. The precise constraint on stellar and planet density allows a direct test of planet inflation and evolution scenarios.

If confirmed, TOI-866 would be the largest star to host a transiting planet discovered to date. This would make TOI-866 a benchmark for understanding the late stage survival and evolution of gas giant planets!

TESS Full Frame Image Predicted Yield for Stars >3 R\(_{\odot}\):

TESS is predicted to find hundreds of more planet candidates in the Full Frame Image data, exploration of which has only just begun!

Full sky coverage of TESS—more opportunities for short-period, small planet detections

CVZs: more opportunities for longer-period planet detections, enhancing completeness of this plot

1) Compare detection of giant star TOIs in 2-minute cadence data to FFI, 30-minute cadence data detection.

2) Perform systematic search of bright giants in FFI data with TASOC lightcurves

3) Search all giant stars in FFIs where oscillations can be detected!

Interested in getting involved?

Email me: skg3@hawaii.edu
@ me on Twitter: skgrunblatt
Or find me here this week!