

Contribution ID: 84

Type: **Either**

Modeling Stellar Spot Signals on T Tauri Stars: Toward Detecting Young Exoplanets

Friday, May 16, 2025 4:15 PM (15 minutes)

Our ultimate goal is to enhance our understanding of planet formation by identifying the youngest exoplanets orbiting T Tauri Stars (TTs), systems typically aged around or below 5 Myr. Detecting planets around TTs poses significant challenges because of the strong stellar activity and interference from protoplanetary disks. Stellar spots, prominent on young stars, generate strong radial velocity (RV) variations, often overshadowing or mimicking planetary signals and complicating exoplanet detection. As star spots rotate with the stellar surface, they induce periodic signals observable in photometry, RV, and average surface effective temperature. By modeling these variations across multiple wavelengths and comparing them with observational data, we can reconstruct stellar spot patterns, isolate spot-induced RV signals, and enhance sensitivity for detecting underlying planetary signals.

In this presentation, we outline our current progress in stellar spot modeling. We introduce our simulation techniques, highlight improvements in the accuracy of stellar model spectra, and present preliminary results. Among these results is a surprising discovery revealing that spot-induced RV signal strength can vary dramatically—by as much as 5 km/s—within a narrow spectral window of only 500 Å, demonstrating the efficacy and importance of our modeling approach.

Section

Stars/Star Clusters

Primary author: TANG, Shih-Yun (Rice University/Lowell Observatory)

Co-authors: Prof. JOHNS-KRULL, Christopher (Rice University); Dr PRATO, Lisa (Lowell Observatory)

Presenter: TANG, Shih-Yun (Rice University/Lowell Observatory)

Session Classification: Stars and star clusters