# STOKED* with TESS: KELT-11b and WASP-127b

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*STudy of Known Exoplanet re-Discoveries

## Introduction

The Transiting Exoplanet Survey Satellite (TESS) has been conducting a search for exoplanets since its launch in April of 2018. Transmission Spectroscopy Metric (TSM) and Emission Spectroscopy Metric (ESM) are two values that characterize a planet's expected amenability to further atmospheric characterization (Kempton et al., 2018). The highly inflated KELT-11b and WASP-127b are two top TSM candidates. This analysis combines new TESS data with previous datasets to provide updated ephemerides to be used for future observations done by the James Webb Space Telescope (JWST) to be launched in 2021.

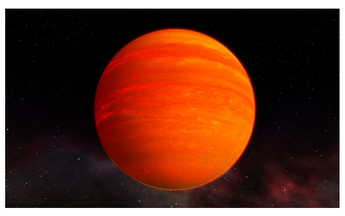
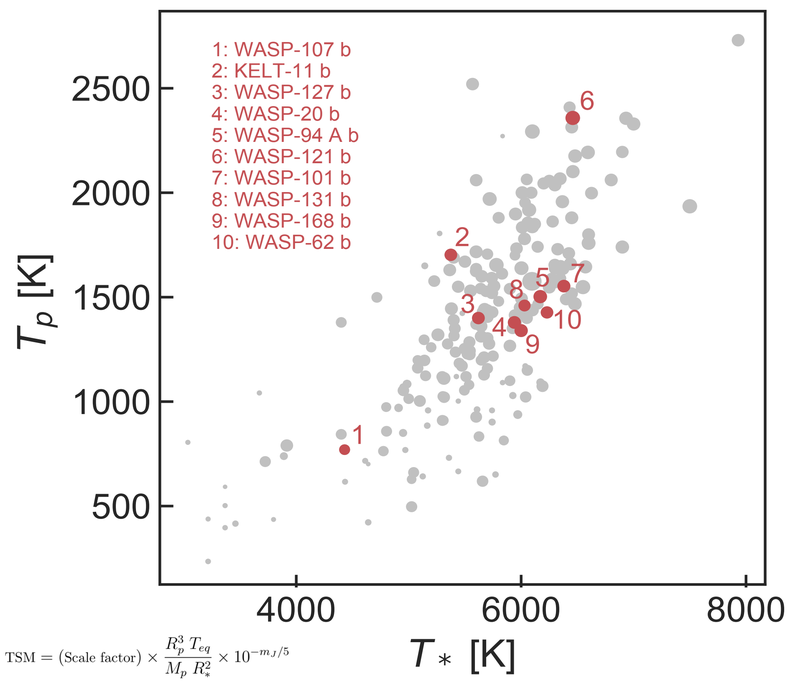


***Fig. 1:*** *An artist's interpretation of WASP-127 b*

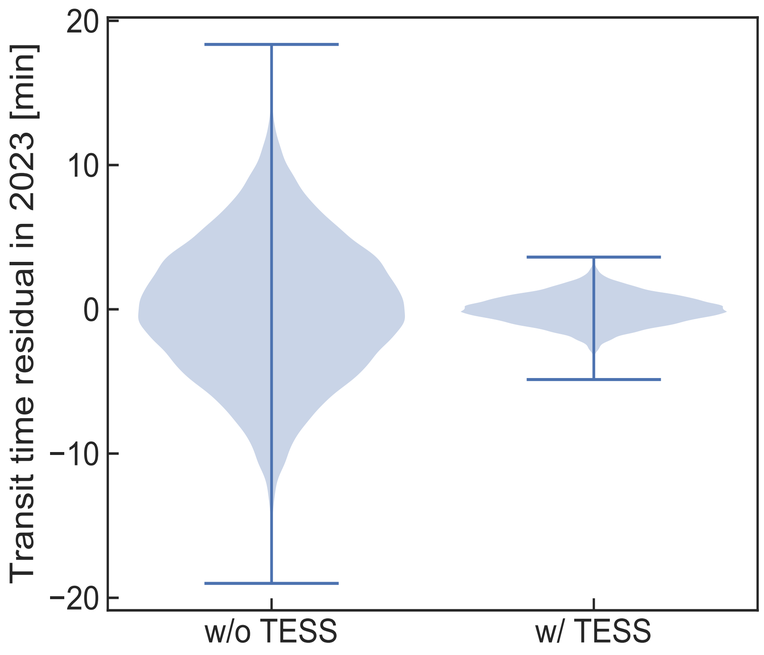



*Top 10 TSM year-1 candidates are shown in red*

## Methodology

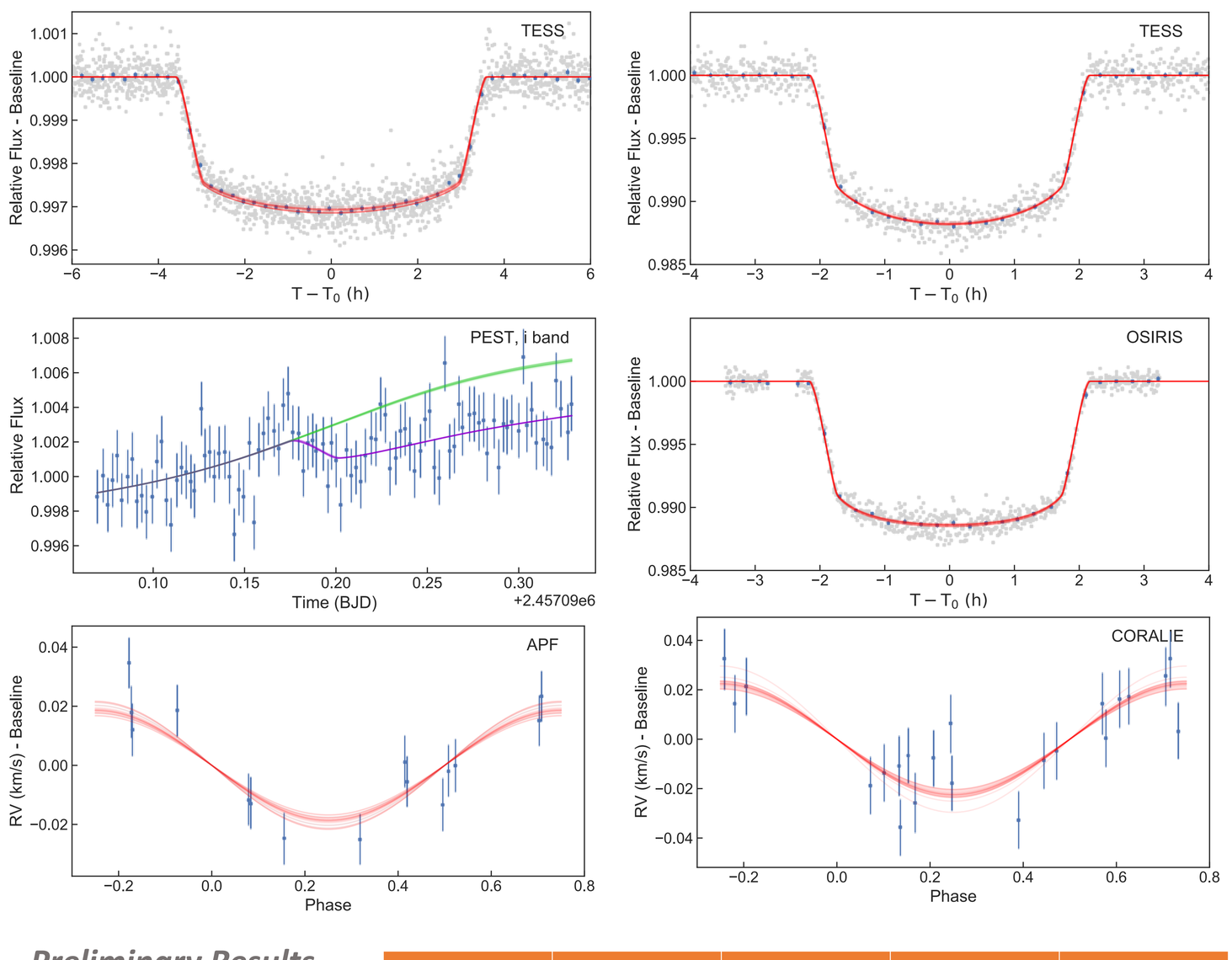
**Allesfitter** (Günther & Daylan 2019[9]) provides a means of modelling photometric and radial velocity data using either Markov Chain Monte Carlo (MCMC) or Nested Sampling fits. For each planet, we fit each instrument's dataset individually to account for red noise and then fix these parameters in the final run of combined datasets in order to determine astrophysical parameters.

## Results and Discussion




Our analyses have produced refined astrophysical parameters for KELT-11b and WASP-127b, as shown in the bottom table. Error values for most parameters showed a decrease, which is particularly important for factors like epoch and period, since they contribute over time to the compounding uncertainty of transit time. Precise measurements for epoch and period will increase efficiency for future JWST observations by optimizing the transit time predictions. As shown in the violin plot above for projected transit timing in the year 2023, the inclusion of the TESS data greatly optimizes transit time predictions and minimizes room for error.

### KELT-11 b




### WASP-127 b




*Preliminary Results for KELT-11b and WASP-127 b:*

*Green: baseline*
*Red: baseline - model*
*Purple: model*

| Parameter | KELT-11 Value | KELT-11 1σ Error | WASP-127 Value | WASP-127 1σ Error |
|---|---|---|---|---|
| $R_p/R_*$ | 0.0545769 | 0.00037980 | 0.1018772 | 0.00044245 |
| $(R_p+R_*)/a$ | 0.2482975 | 0.00562648 | 0.1485991 | 0.00218303 |
| cos(i) | 0.1538745 | 0.00841569 | 0.0594063 | 0.0044090 |
| Period (d) | 4.7362108 | 1.304278E-06 | 4.1780646 | 1.196365E-06 |
| Epoch (BJD) | 2456356.2118 | 0.00046967 | 2456559.3615 | 0.00053697 |
| K (km/s) | 0.0185169 | 0.00198034 | 0.0216804 | 0.00225447 |

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*Data was used from:*

***KELT-11 b***[6] WCO, MORC, MINERVA, PEST Observatory, ICO, PvdK, MVRC, HIRES, and APF.

***WASP-127 b*** SuperWASP[7], EulerCam[7], TRAPPIST[7], RISE[7], ZEISS[7], SOPHIE[7], CORALIE[7], OSIRIS[8]

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[6] Pepper et al., 2017, [7] Lam et al., 2017, [8]Chen et al., 2018, [9]ascl:1903.003