Phase curve studies of known transiting systems with TESS

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TESS Science Conference I
July 30, 2019
Transiting Exoplanet Survey Satellite (TESS)
Secondary eclipse
Atmospheric brightness modulation
Ellipsoidal distortion

Doppler boosting
WASP-18

Shporer, Wong et al. (2019)
WASP-18

- Secondary eclipse depth: $341\pm18$ ppm
- All three phase curve components detected:
  - atmospheric brightness – $174\pm6$ ppm
  - ellipsoidal distortion – $191\pm6$ ppm
  - Doppler boosting – $21\pm5$ ppm
WASP-18

- Nightside flux $\sim 0$ ppm ($<1\sigma$), no phase shift ($\delta < 2.9^\circ; 2\sigma$)
  - poor day-night heat recirculation
- Low albedo ($A_g < 0.048; 2\sigma$)
WASP-19

Wong et al. (2016)
WASP-19

- Secondary eclipse depth: 470 ppm (4.5σ)
- Atmospheric brightness signal: 320 ± 50 ppm
- Nightside flux ~ 0 ppm (1.3σ)
WASP-19 emission spectrum

- Dayside temperature: 2240 ± 40 K
- TESS band albedo: 0.16 ± 0.04

Wong et al., in prep
Systematic phase curve study

• Uniform dataset and analysis framework

• Target selection:
  – TESS mag < 12.5
  – low stellar variability
  – predicted eclipse depth > 100 ppm
  – ellipsoidal and/or beaming amplitudes > 50 ppm
Some highlights

WASP-30 (60 M\textsubscript{J} brown dwarf):
5\(\sigma\) ellipsoidal distortion signal

Secondary eclipse + atmospheric brightness modulation measured for:

WASP-43, WASP-72, WASP-82, WASP-100, WASP-111, WASP-122...
Thanks!

Also check out:
- Tara Fetherolf: Global analysis of TESS phase curves from Year 1 (#47)
- Tansu Daylan: WASP-121b phase curve (#48)