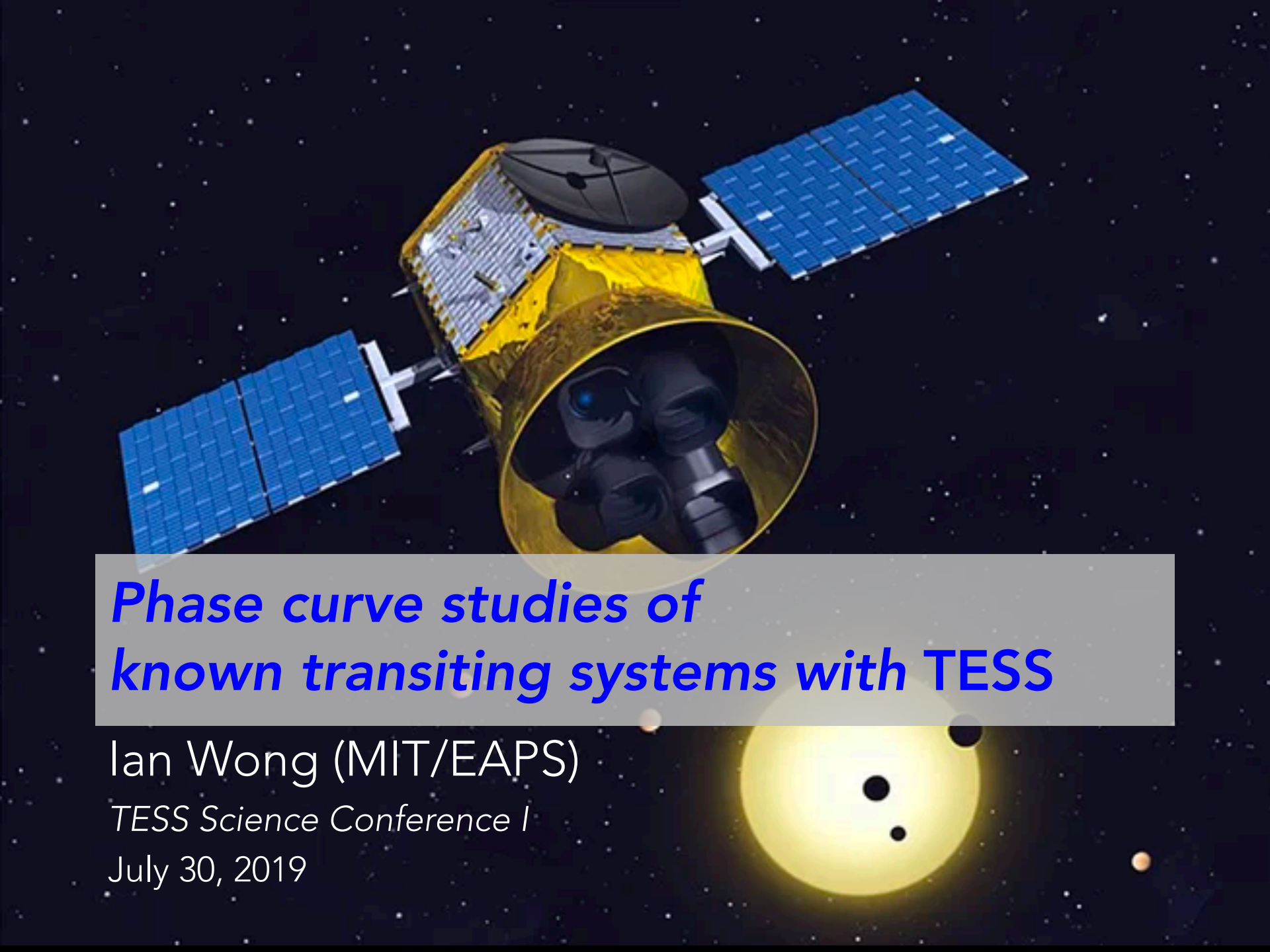


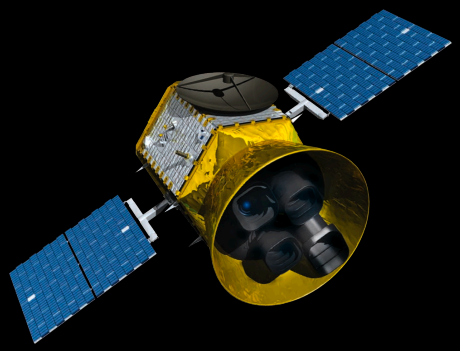
Phase curve studies of known transiting systems with TESS

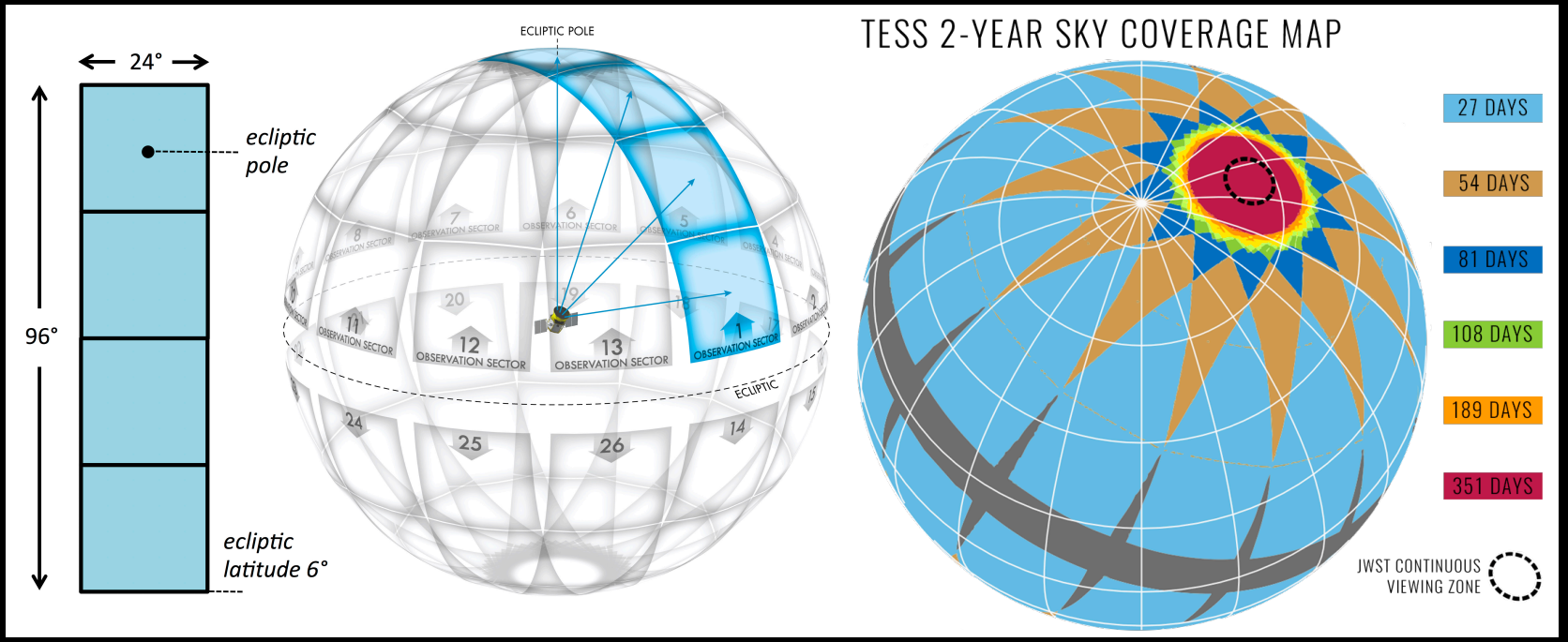
Ian Wong (MIT/EAPS)

TESS Science Conference I

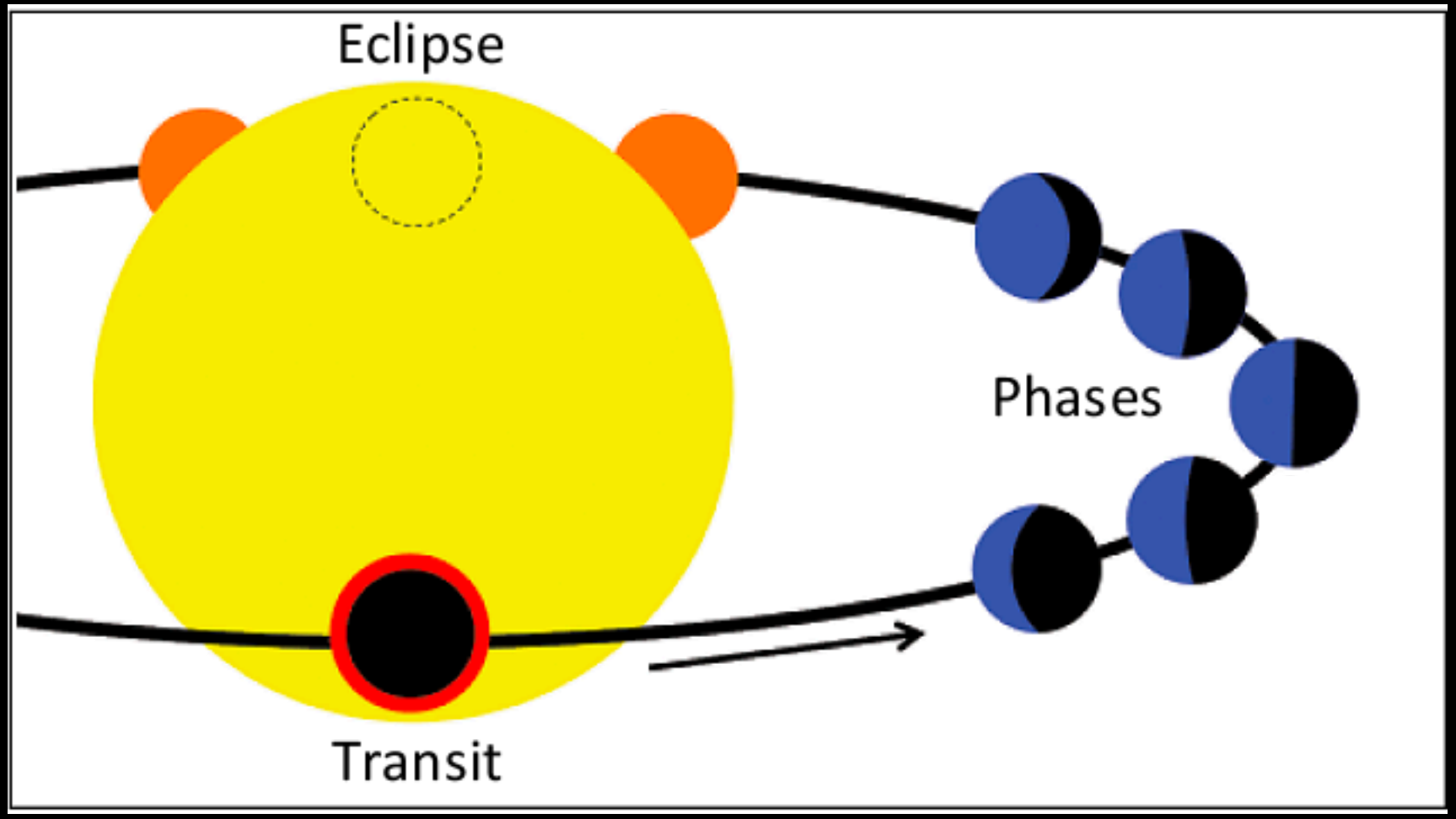
July 30, 2019

Transiting Exoplanet Survey Satellite (*TESS*)



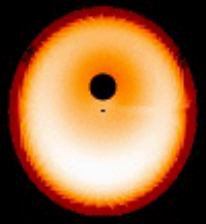


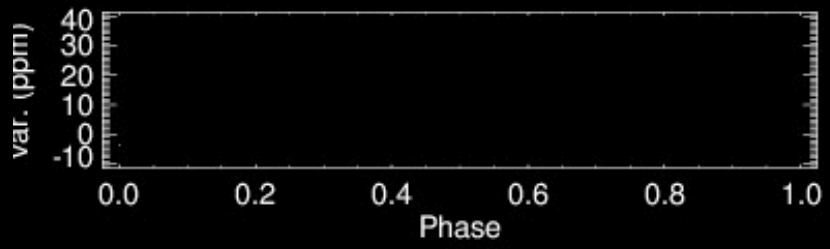
Secondary eclipse
Atmospheric brightness modulation



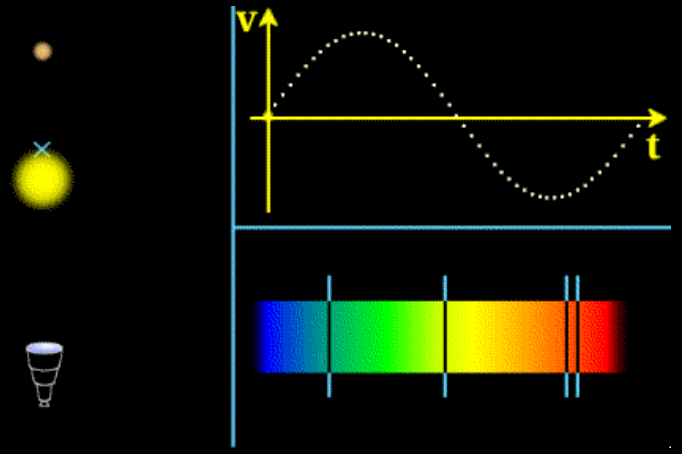
Nick Cowan

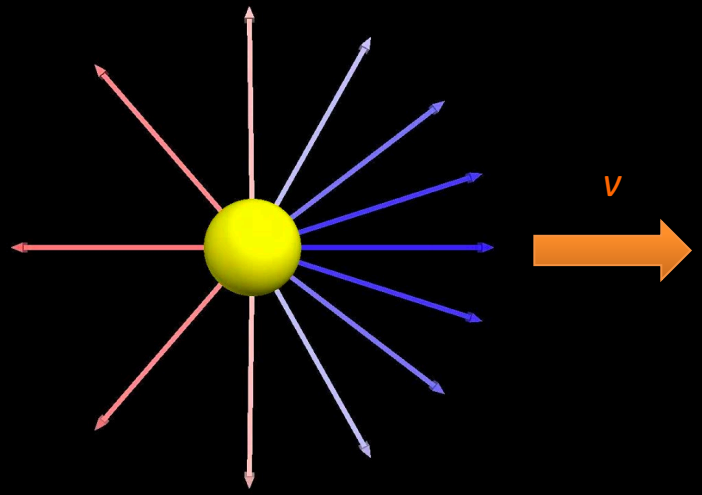
Ellipsoidal distortion



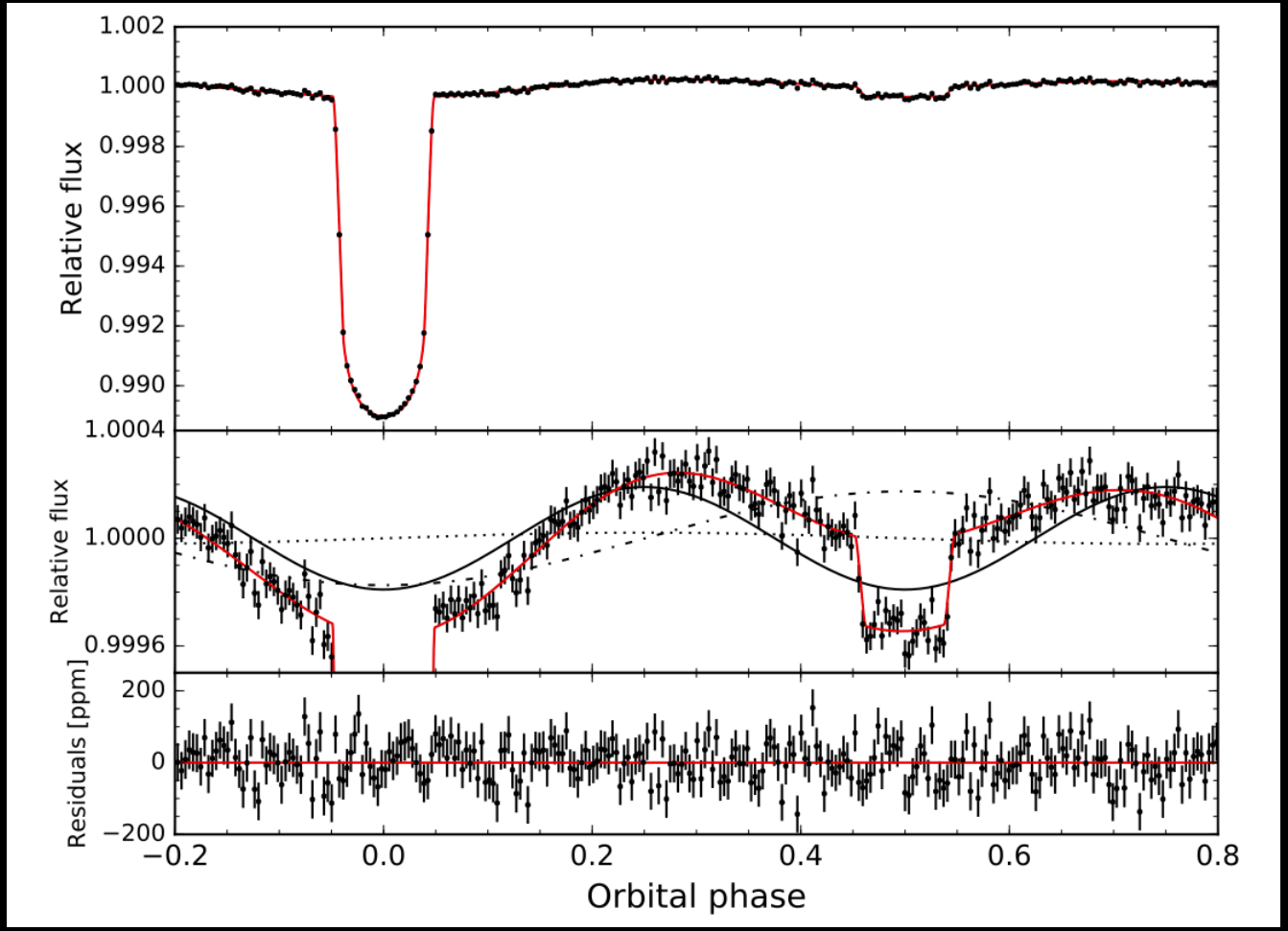


Doppler boosting



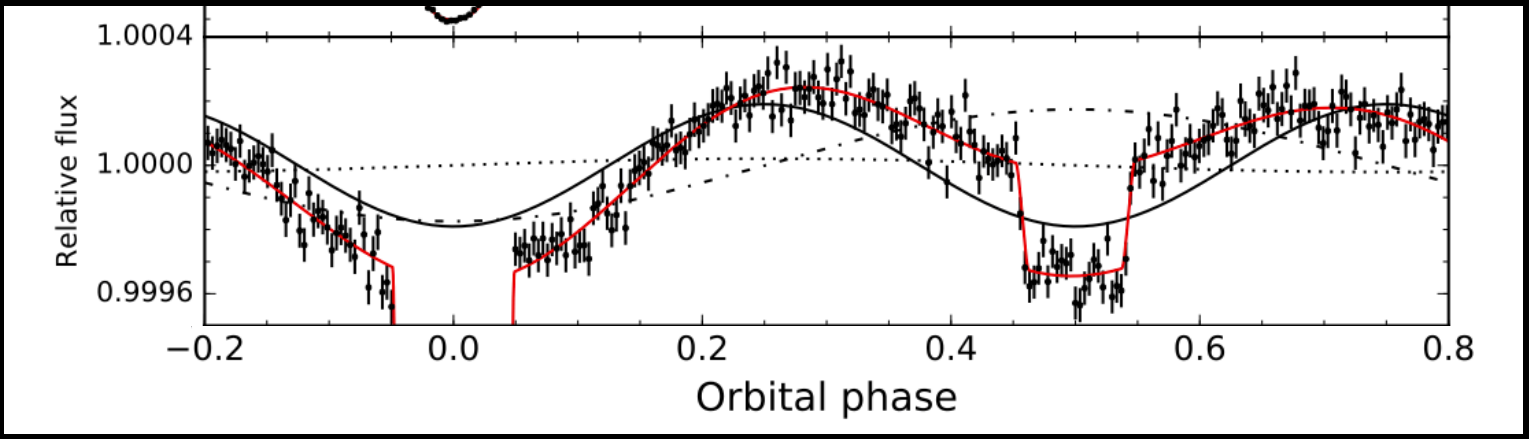


WASP-18



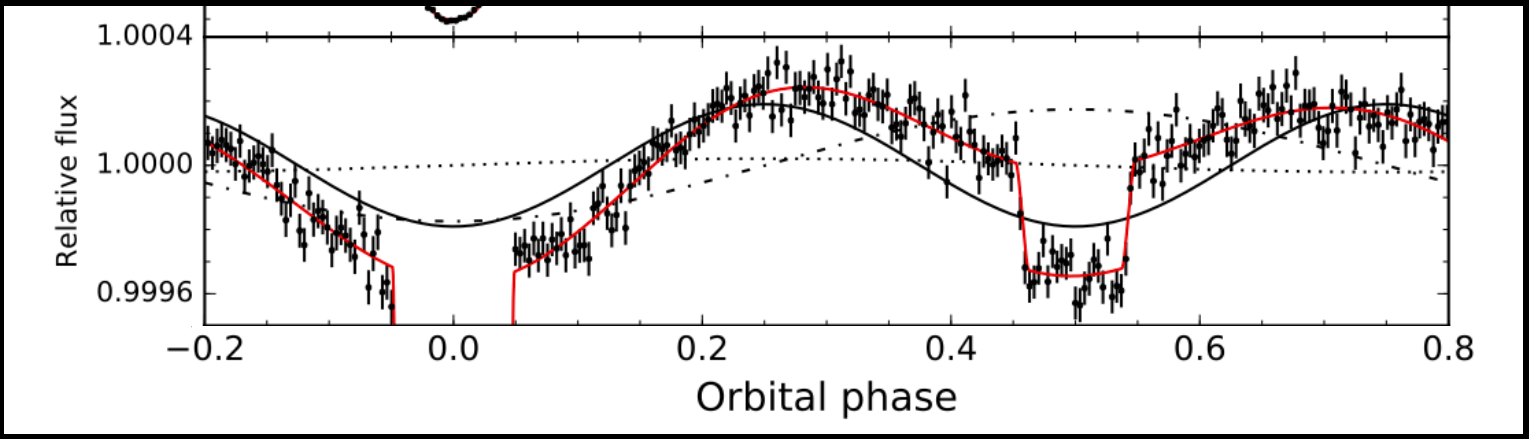
Shporer, Wong et al. (2019)

WASP-18



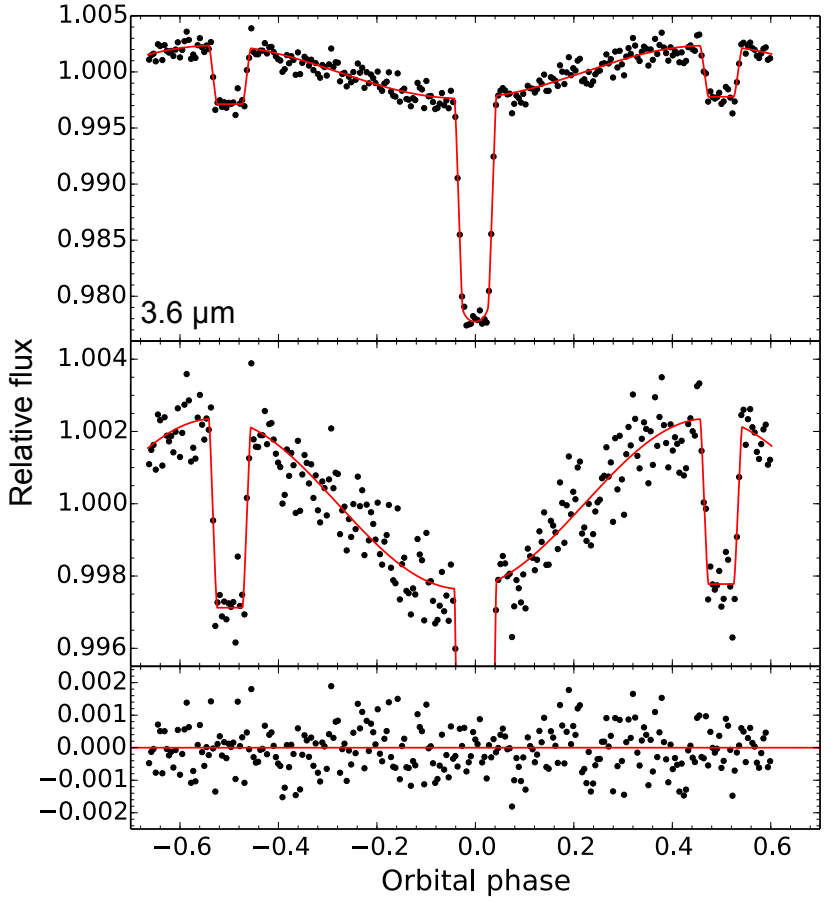
- Secondary eclipse depth: 341±18 ppm
- All three phase curve components detected:
  - atmospheric brightness – 174±6 ppm
  - ellipsoidal distortion – 191±6 ppm
  - Doppler boosting – 21±5 ppm

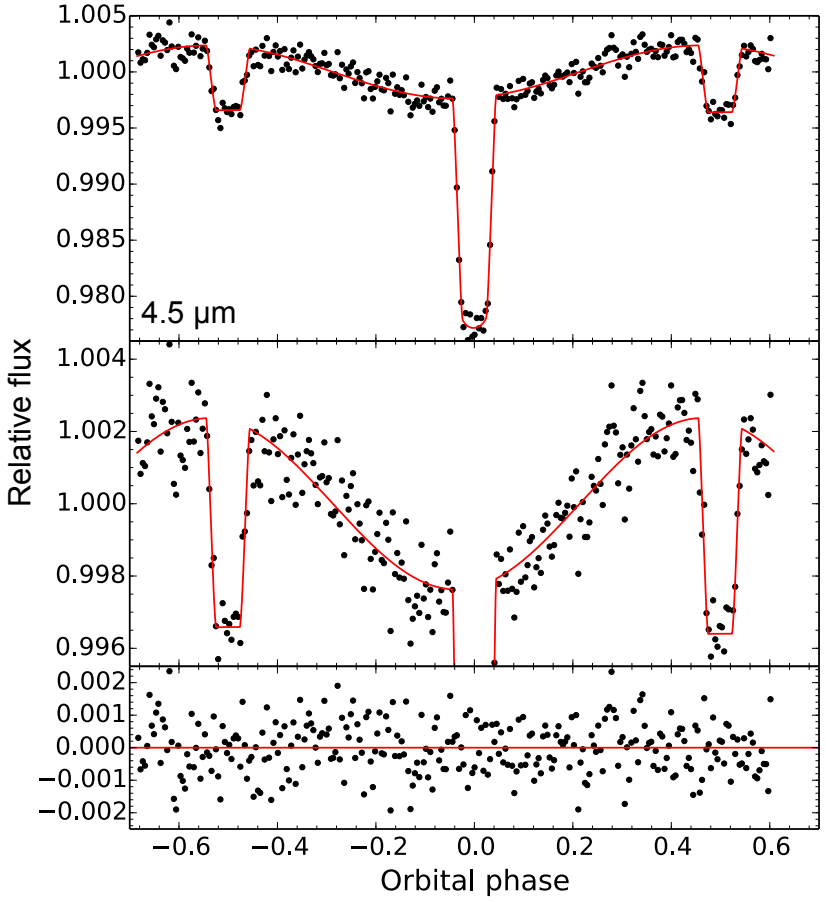
WASP-18



- Nightside flux ~ 0 ppm (<1σ), no phase shift (δ < 2.9°; 2σ)
  - poor day-night heat recirculation
- Low albedo (A_g < 0.048; 2σ)

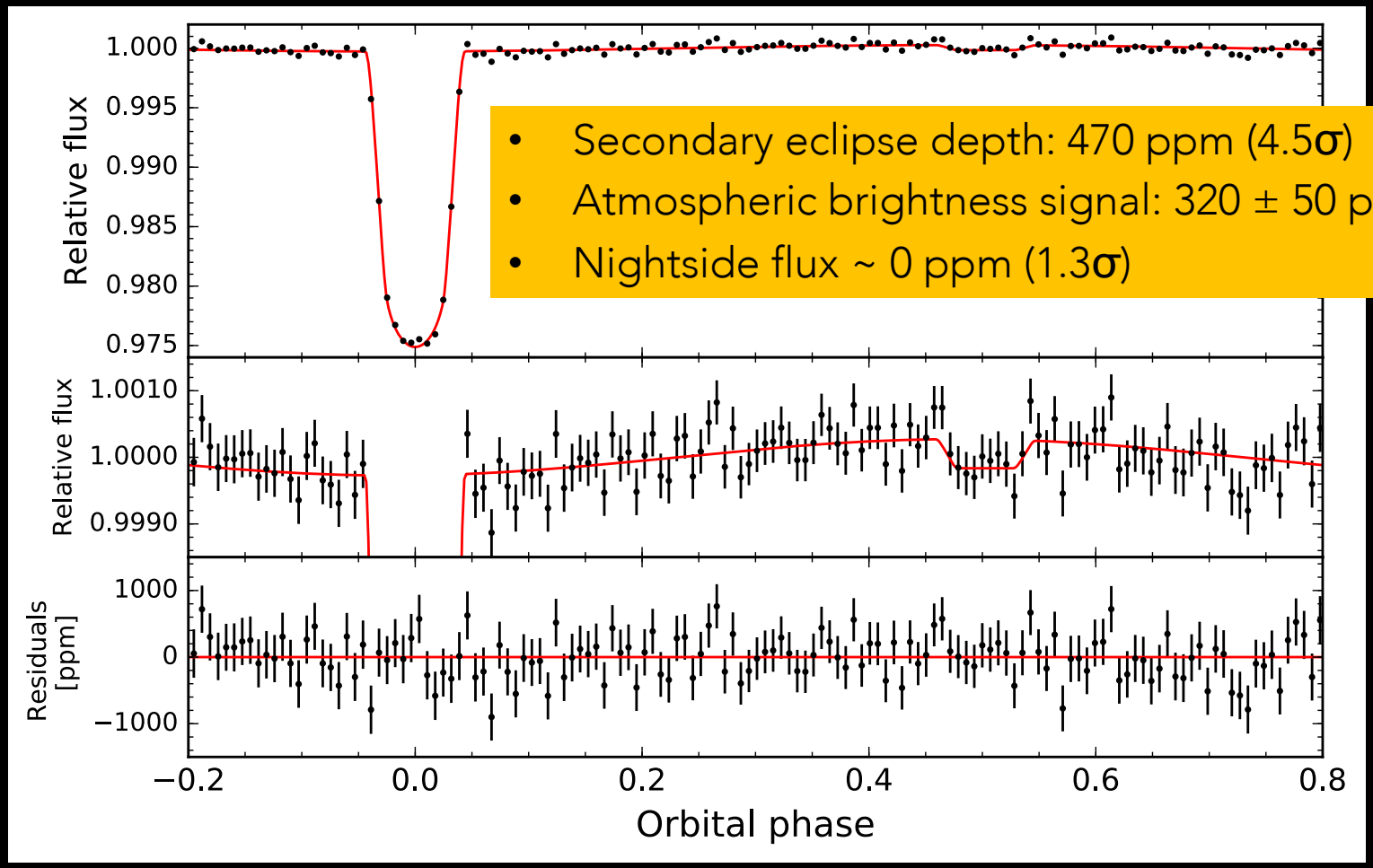
WASP-19





Wong et al. (2016)

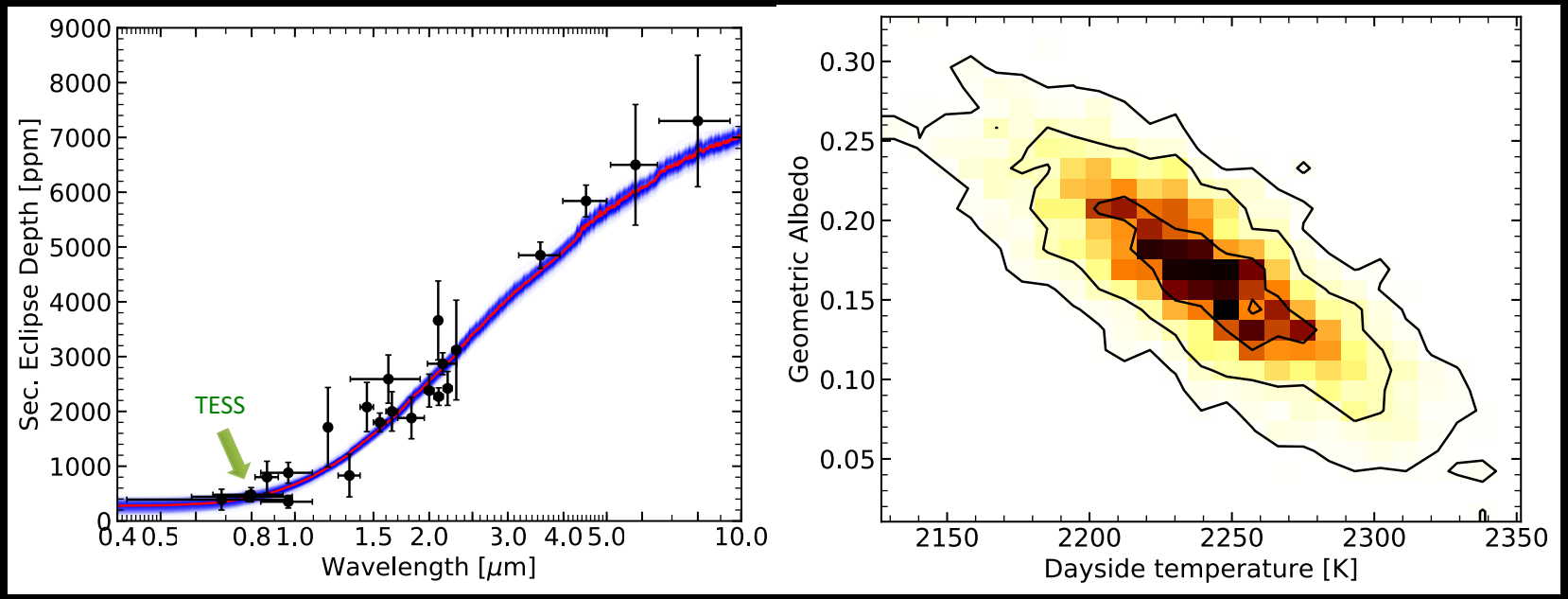
WASP-19



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

Wong et al., in prep

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_J brown dwarf):

5σ 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)