Rossiter-McLaughlin analysis of WASP hot Jupiters

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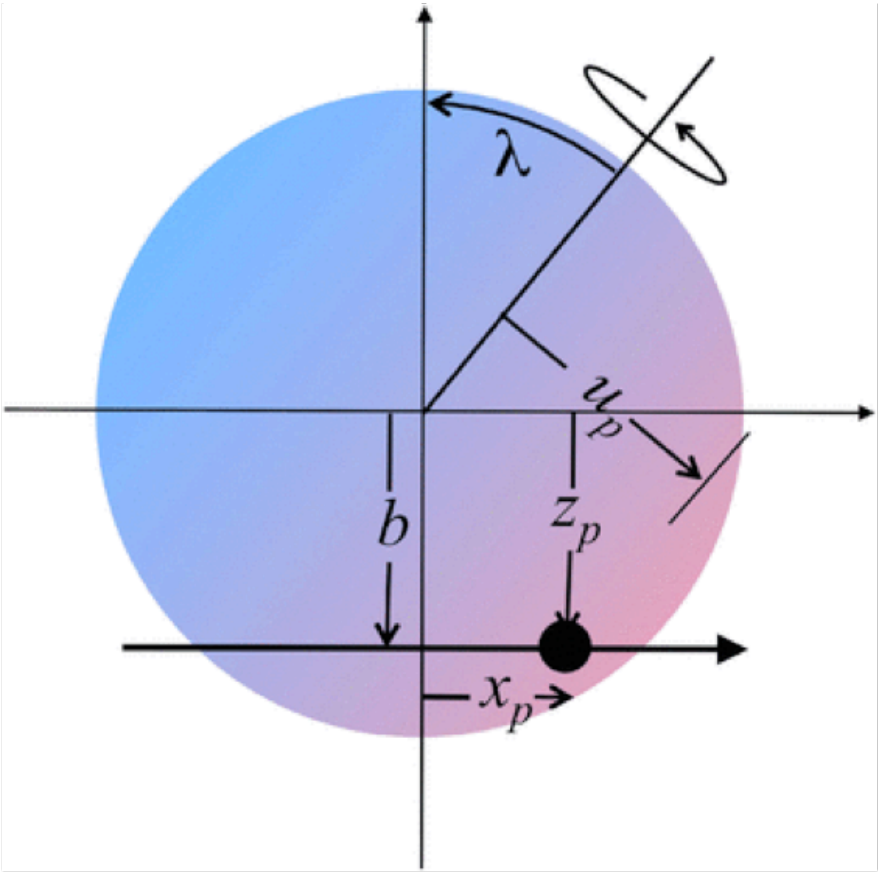
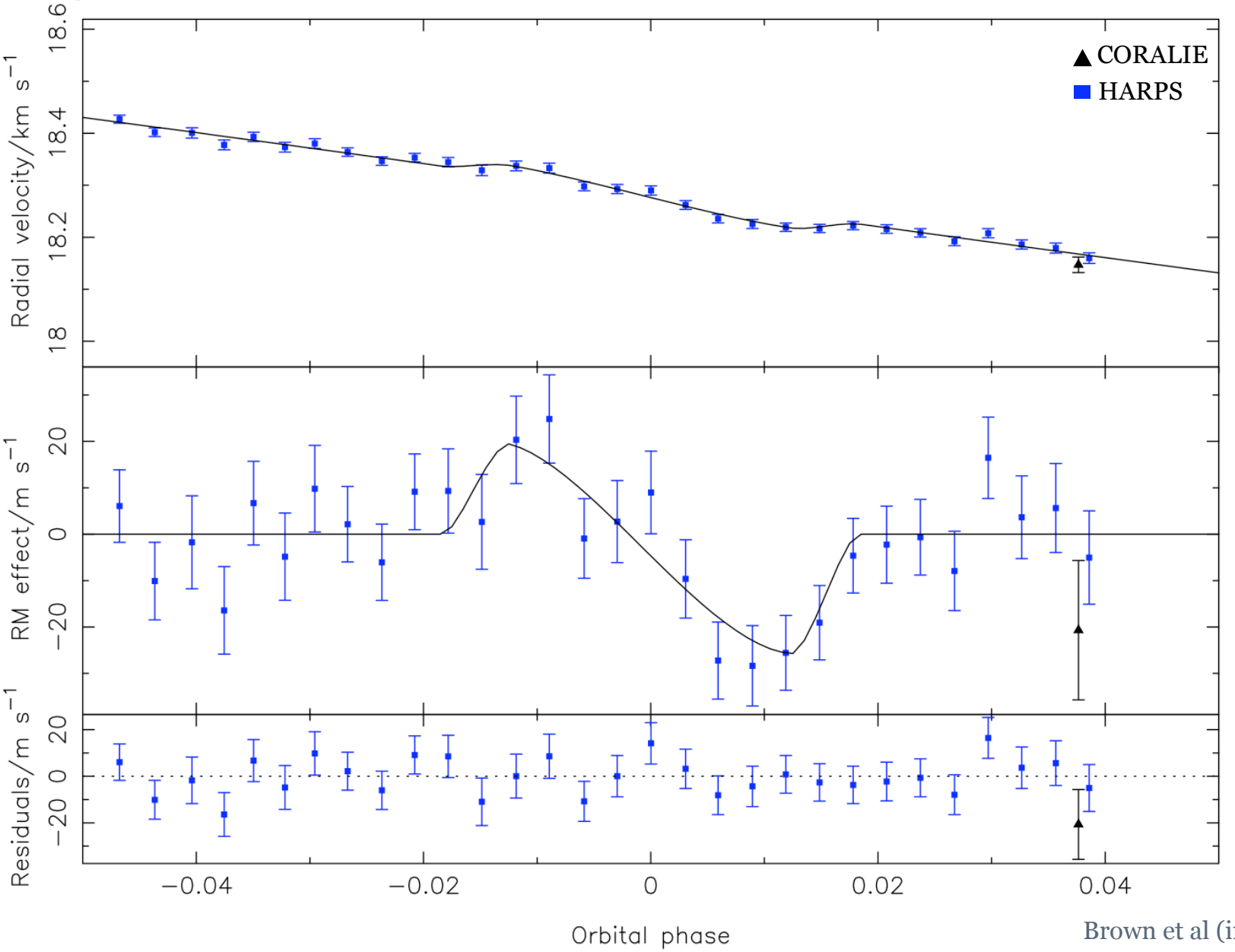
Rossiter-McLaughlin?

- Small radial velocity anomaly during planetary transit
- Shape of anomaly provides information on the sky-projected alignment angle, λ

Collier Cameron et al (2010)



WASP-32



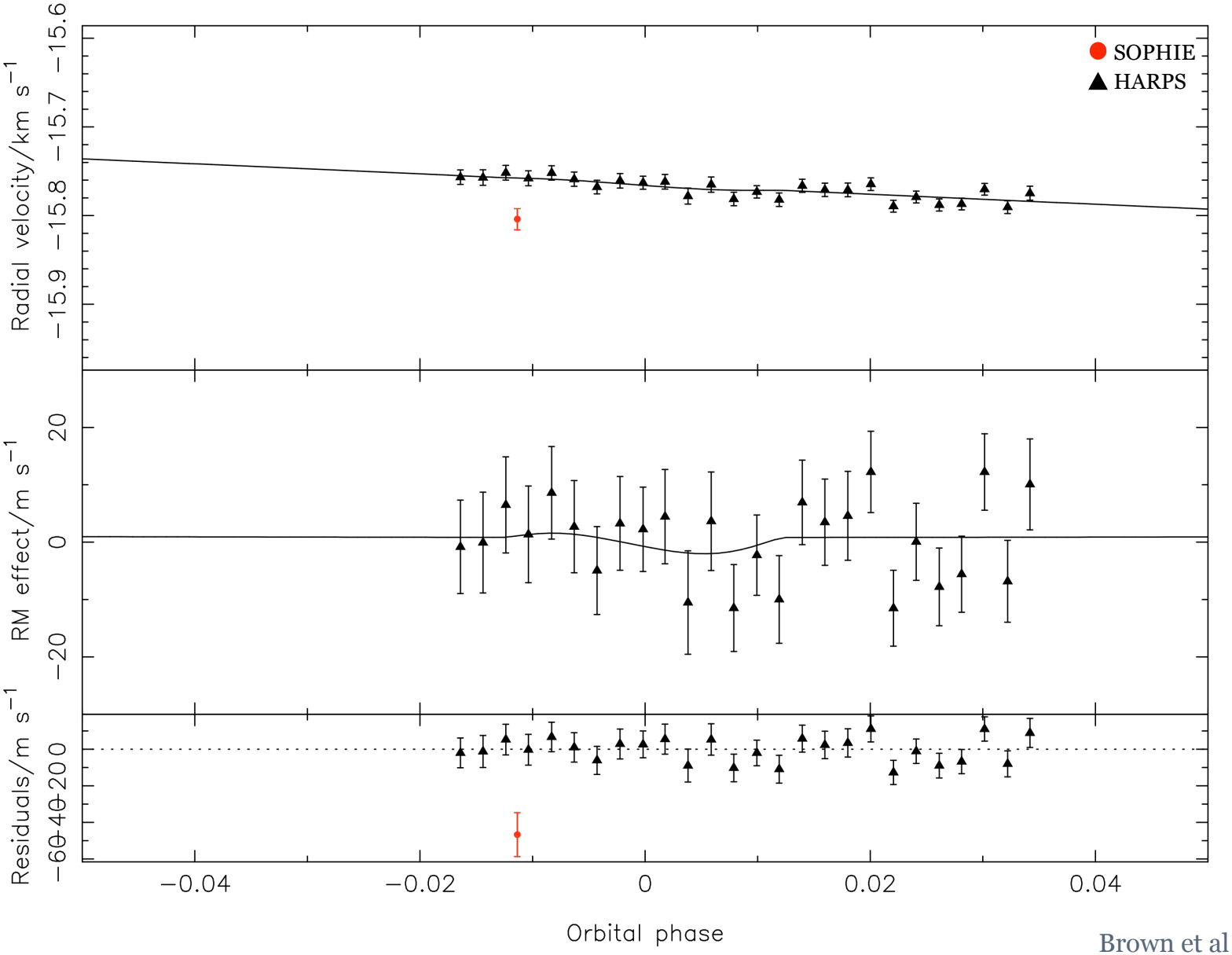
Brown et al (in prep.)

WASP-32

- Well aligned planetary orbit
- Moderate to slowly rotating star
- Circular orbit adopted
- No long-term velocity trend detected

- $\lambda = 8.0^{o}\ ^{+6.9}_{-6.4}$
- $v_{*}\sin(I) = 4.0 \pm 0.5$ km s^{-1}
- $T_{eff} = 6140\ ^{+90}_{-100}$ K
- $b = 0.66 \pm 0.02$

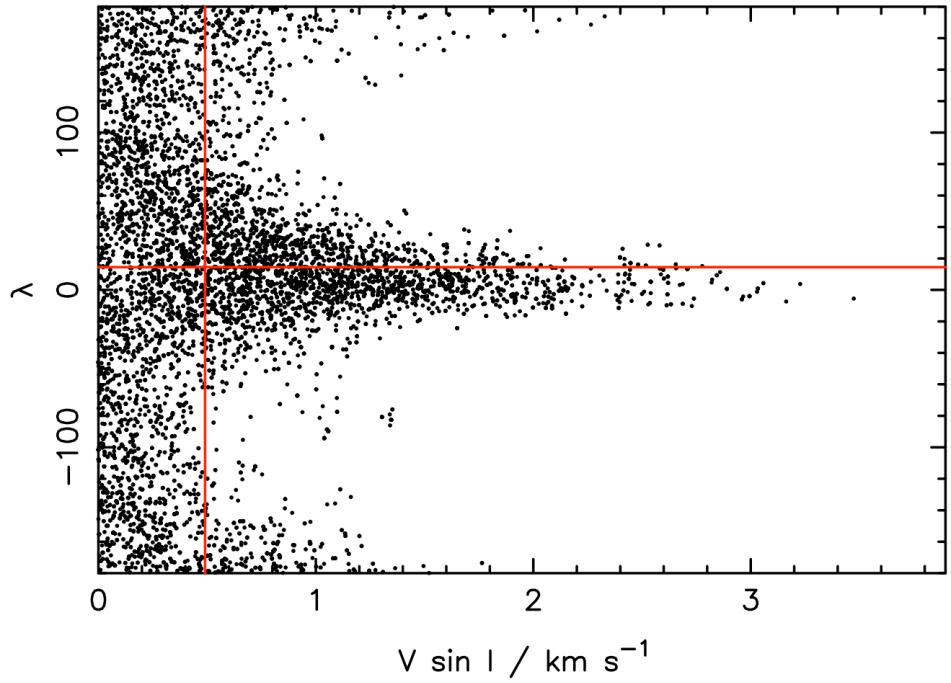
WASP-40



Brown et al (in prep.)

WASP-40

- Slowly rotating star
- Eccentric orbit adopted
- No long-term velocity trend detected
- Low S/N RM effect produces large errors in λ
  - Example of systematic discussed in Albrecht et al (2011)



WASP-40

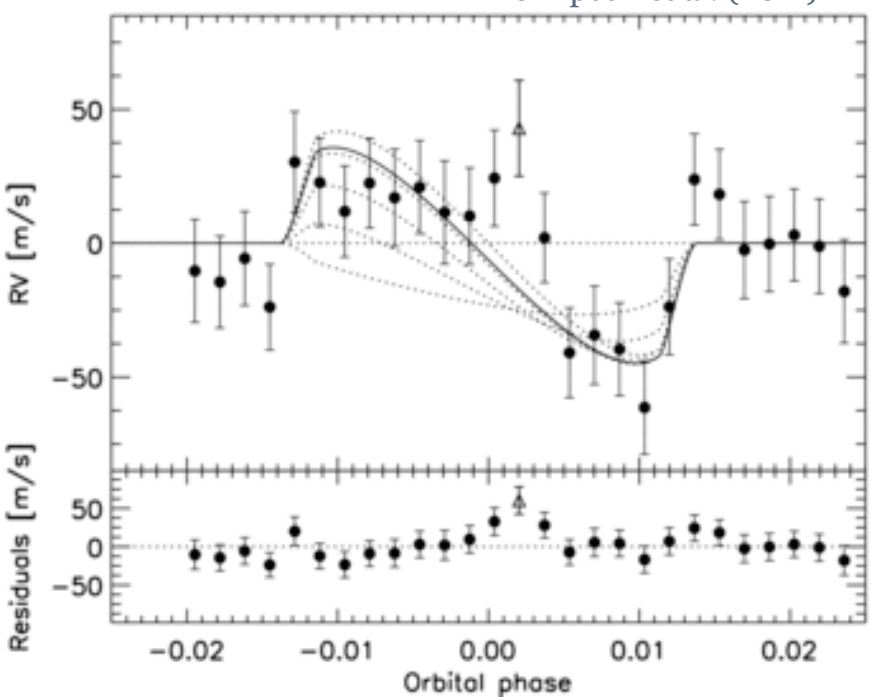
- Slowly rotating star
- Eccentric orbit adopted
- No long-term velocity trend detected
- Low S/N RM effect produces large errors in λ
  - Example of systematic discussed in Albrecht et al (2011)

- $\lambda = 14.5^{o\ +89.8}_{-62.8}$
- $v_* \sin(I) = 0.5\ ^{+0.7}_{-0.3}$ km s^{-1}
- $T_{eff} = 5200 \pm 2$ K
- $e = 0.0125\ ^{+0.0160}_{-0.0089}$
- $b = 0.90\ ^{+0.03}_{0.02}$

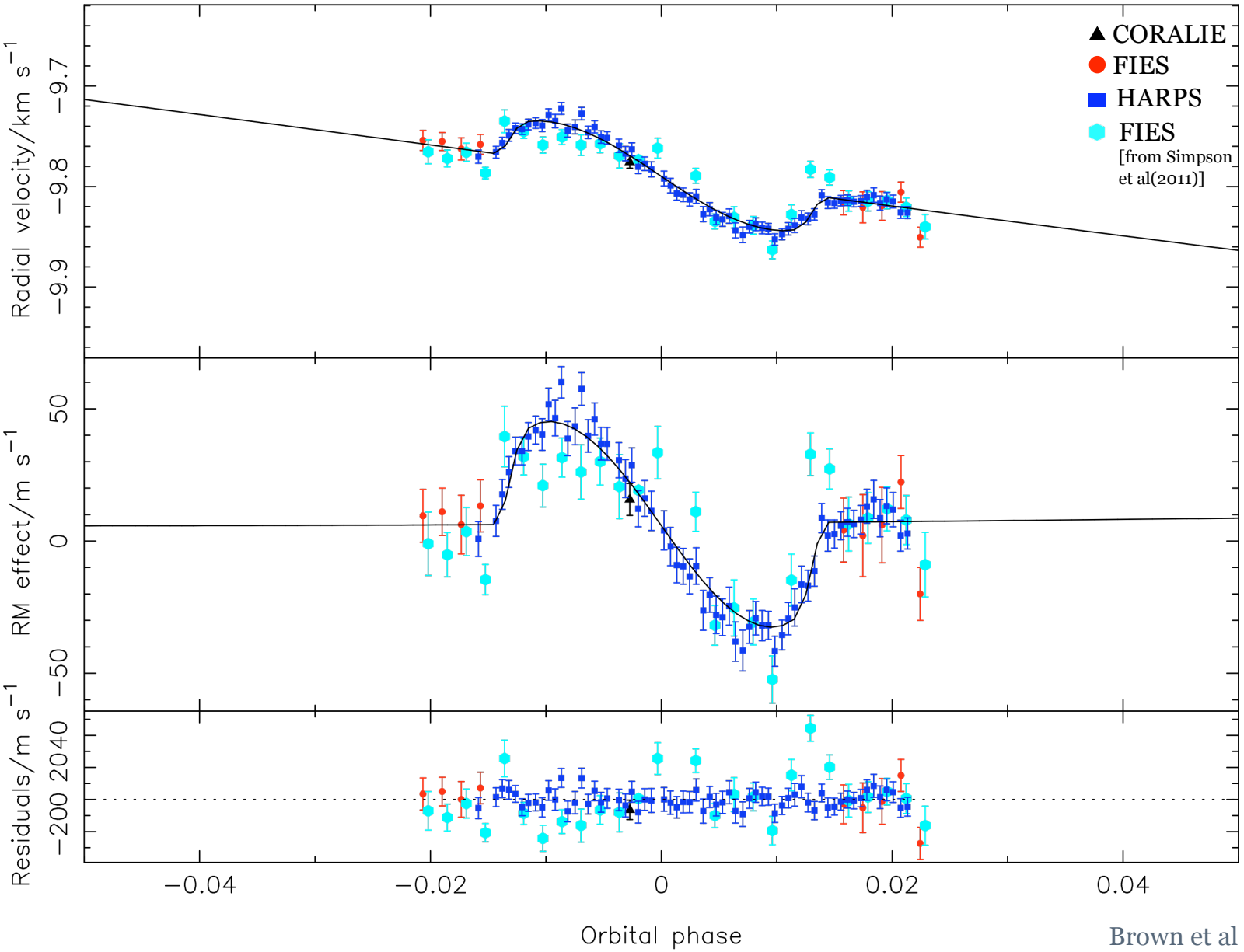
WASP-38: previous work

- Simpson et al . (2011)
  - FIES observations in transit
  - $\lambda = 15^{o}\ ^{+33}_{-43}$
  - $v_{*}\sin(I) = 8.58 \pm 0.39$ km s^{-1}
  - Very high misalignment angles ruled out
  - Used eccentric orbit from Barros et al. (2011)
    - $e = 0.0314\ ^{+0.0046}_{-0.0041}$

Simpson et al. (2011)



WASP-38



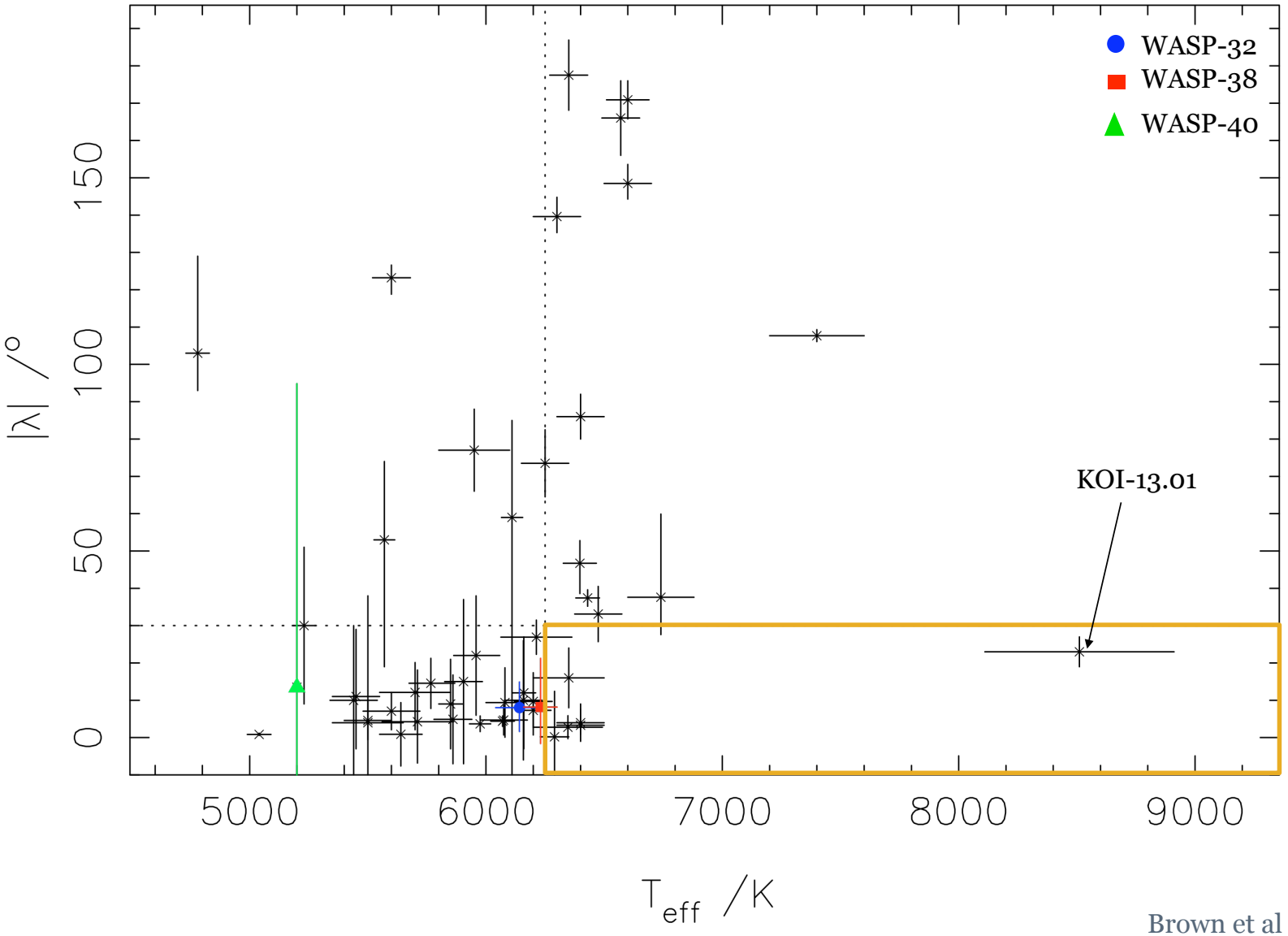
Brown et al (in prep.)

WASP-38

- Orbit appears well aligned
- Rapidly rotating star
- Eccentric orbit adopted
- No long-term velocity trend detected
- New data has reduced uncertainty in λ

- $\lambda = 8.2^{o\ +13.1}_{\ -9.8}$
- $v_* \sin(I) = 7.3 \pm 0.3$ km s^{-1}
- $T_{eff} = 6230 \pm 70$ K
- $e = 0.0286\ ^{+0.0029}_{-0.0027}$
- $b = 0.07\ ^{+0.08}_{-0.04}$

Integrating into the ensemble



Brown et al (in prep.)

Conclusions

- 3 new Rossiter-McLaughlin measurements of WASP planets
  - WASP-32 & -38 appear well aligned
  - Uncertainty in WASP-38 angle has decreased
  - Non-detection for WASP-40

- No impact on overall picture of planet migration
  - More ‘hot’ systems need to be looked at