

Against the Planetary Interpretation of PTFO 8-8695b

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ABSTRACT

PTFO 8-8695b could be the youngest, shortest-period hot Jupiter known. However it has not been shown to be a planet. TESS recently observed PTFO 8-8695 for one month. The TESS light-curve shows that the dominant variability in this system is a sinusoidal modulation with period 11.96 hours, likely caused by stellar rotation. Also present is a complex signal, previously identified as the planet candidate, that repeats every 10.74 hours. The “rotation” and “orbit” have different frequencies, and show the expected beat every 4.48 days. There is a dip in the complex, shorter-period signal. However the orbital phase of the dip has changed over the past decade, in agreement with recent observations by Tanimoto et al. Planets do not change their orbital phase. PTFO 8-8695 therefore seems broadly consistent with the “transient dipping” phenomenology observed in many young M dwarfs, and seems unlikely to be a planet.

1. INTRODUCTION

If it were a planet, PTFO8-8695b would be exceptional. A transiting hot Jupiter, orbiting a \approx 3 Myr old M dwarf in ORION would make it the youngest hot Jupiter known. Its orbital period of only 12 HOURS would also make it the shortest period hot Jupiter known.

2. OBSERVATIONS

3. ANALYSIS

3.1. Visual Inspection

3.2. Model Fitting

4. DISCUSSION

5. CONCLUSIONS

Software: astrobase (Bhatti et al. 2018), astropy (Astropy Collaboration et al. 2018), astroquery (Ginsburg et al. 2018), corner (Foreman-Mackey 2016), emcee (Foreman-Mackey et al. 2013), IPython (Pérez & Granger 2007), matplotlib (Hunter 2007), MESA (Paxton et al. 2011, 2013, 2015) numpy (Walt et al. 2011), pandas (McKinney 2010), radvel (Fulton et al. 2018), scipy (Jones et al. 2001).

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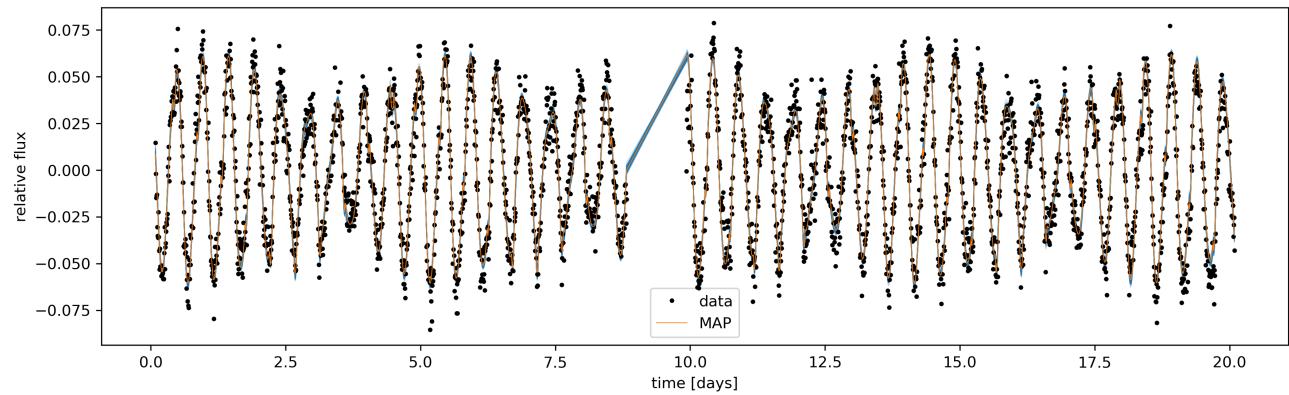


Figure 1. foo. bar

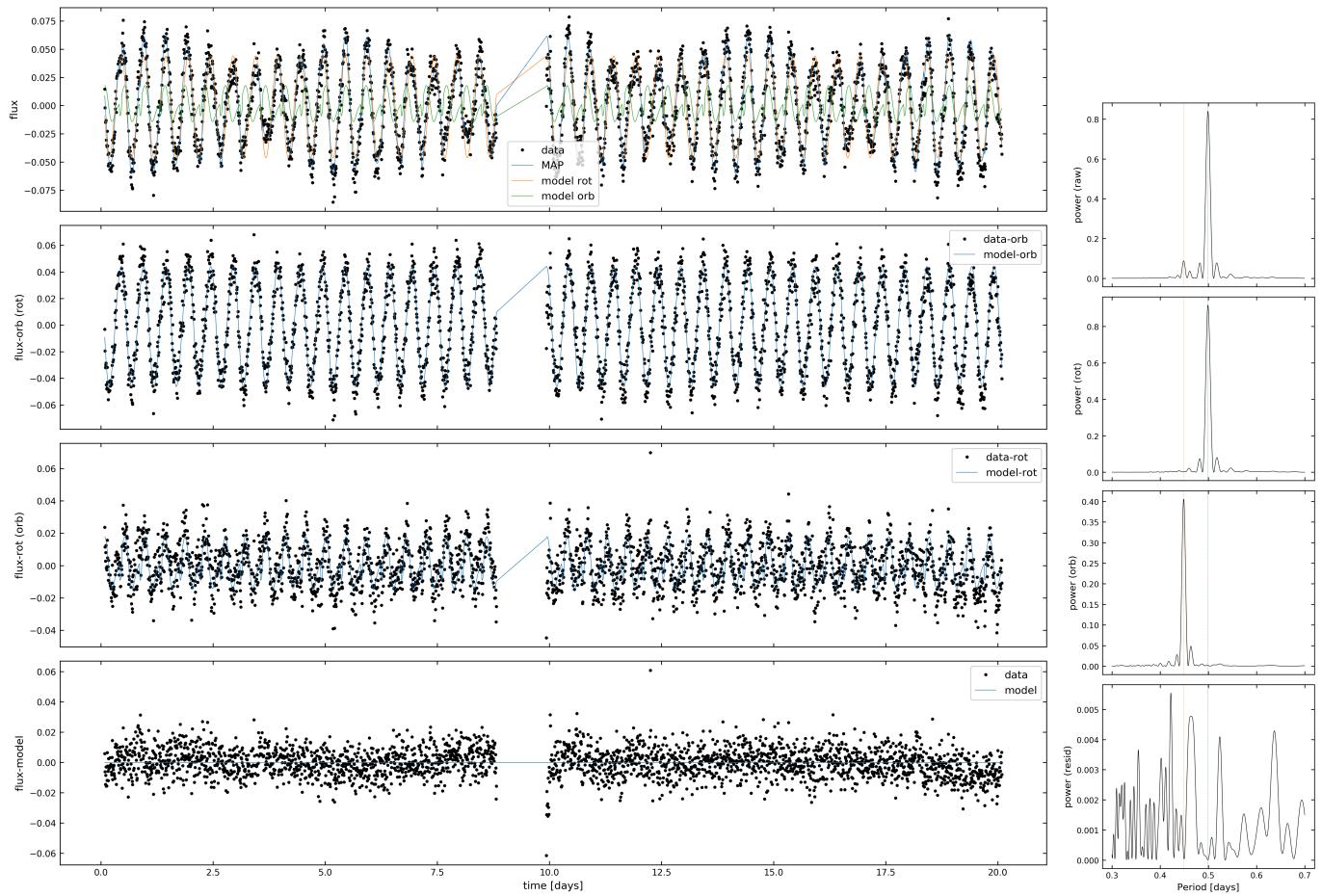


Figure 2. foo. bar

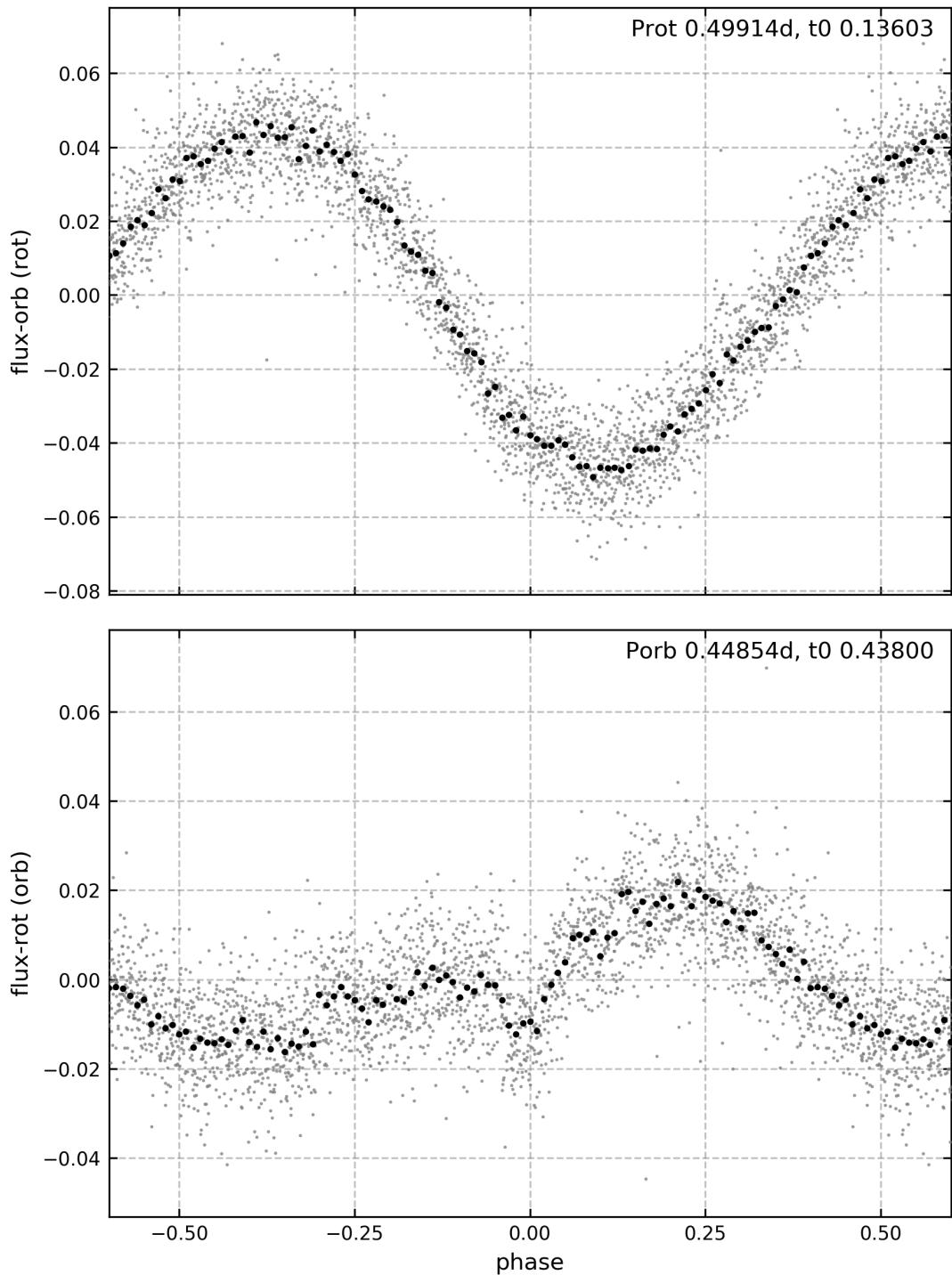


Figure 3. foo. bar

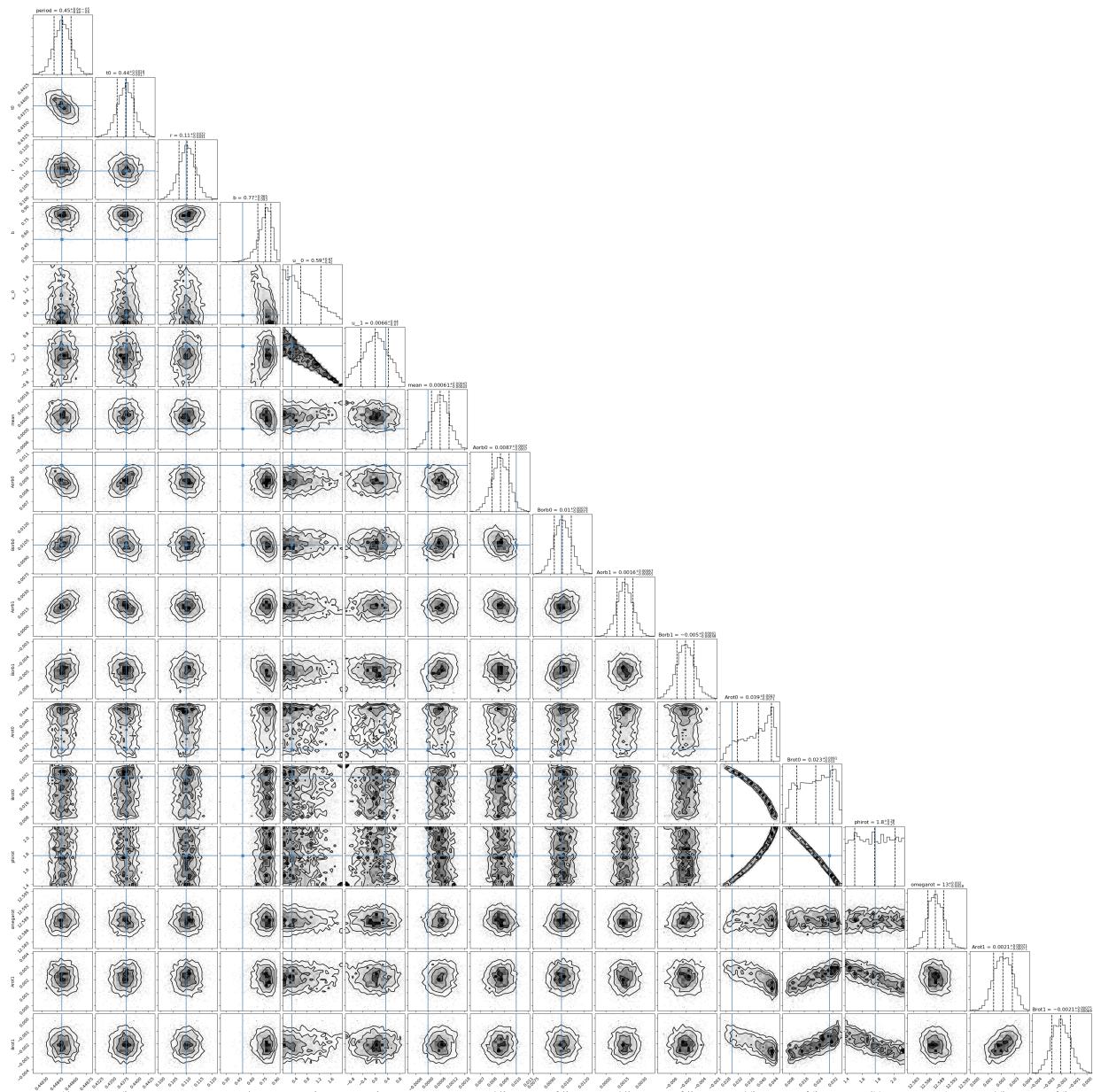


Figure 4. foo. bar