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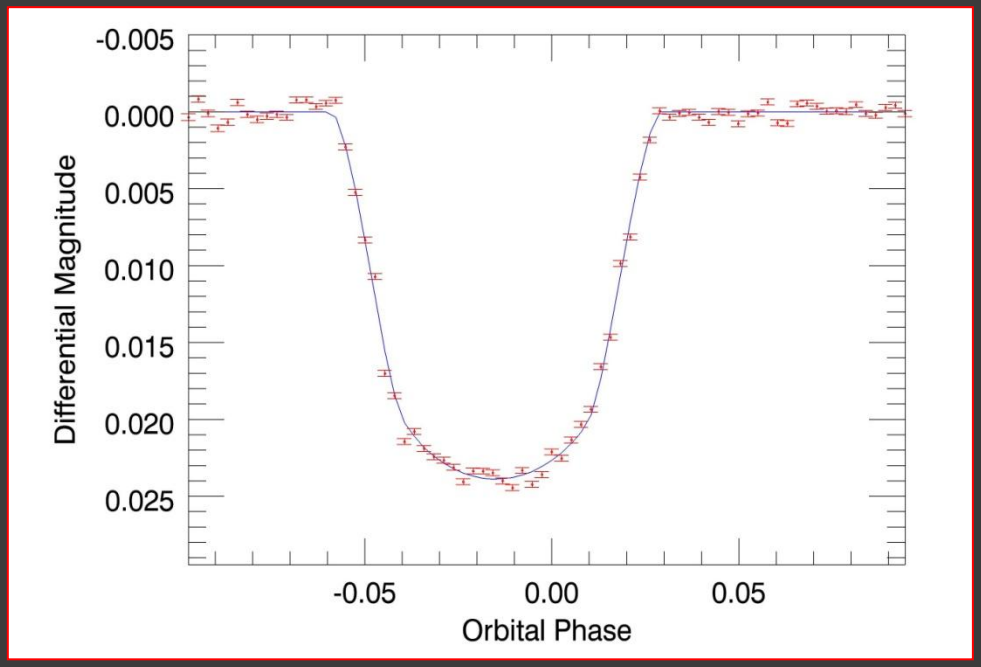
OBSERVATION AND MODELLING OF TRANSITS AND STARSPOTS IN THE WASP-19 PLANETARY SYSTEM

Supervisor :- John Southworth

Keele University

P.R.I.S.M (Planetary Retrospective Integrated Spot Model)



Wasp19 data. Obtained from the NTT at La Silla, Chile

- PRISM uses a pixilation approach to model a transiting exoplanet across a surface of an active host star.

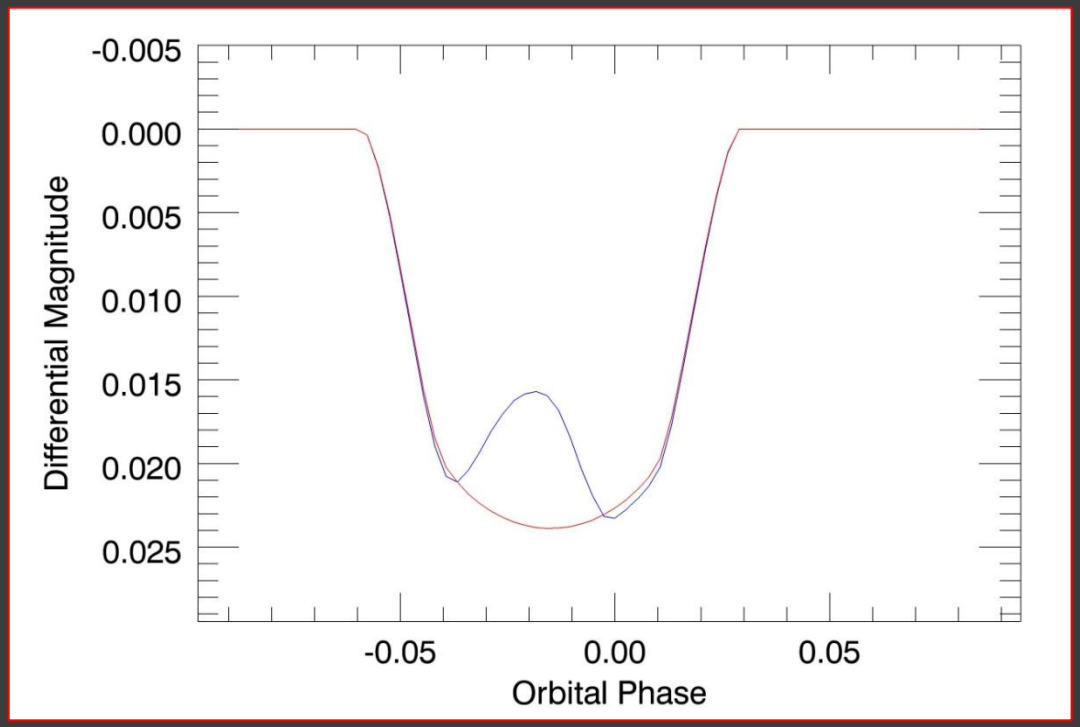
- This allows us to model starspots, Limb darkening and gravity darkening.

- <u>Preliminary Results.</u>

r_p/r_s	0.1433	+/-	0.0012
$r_p + r_s$	0.3235	+/-	0.0025
u1	0.563	+/-	0.058
i	79.45	+/-	0.24

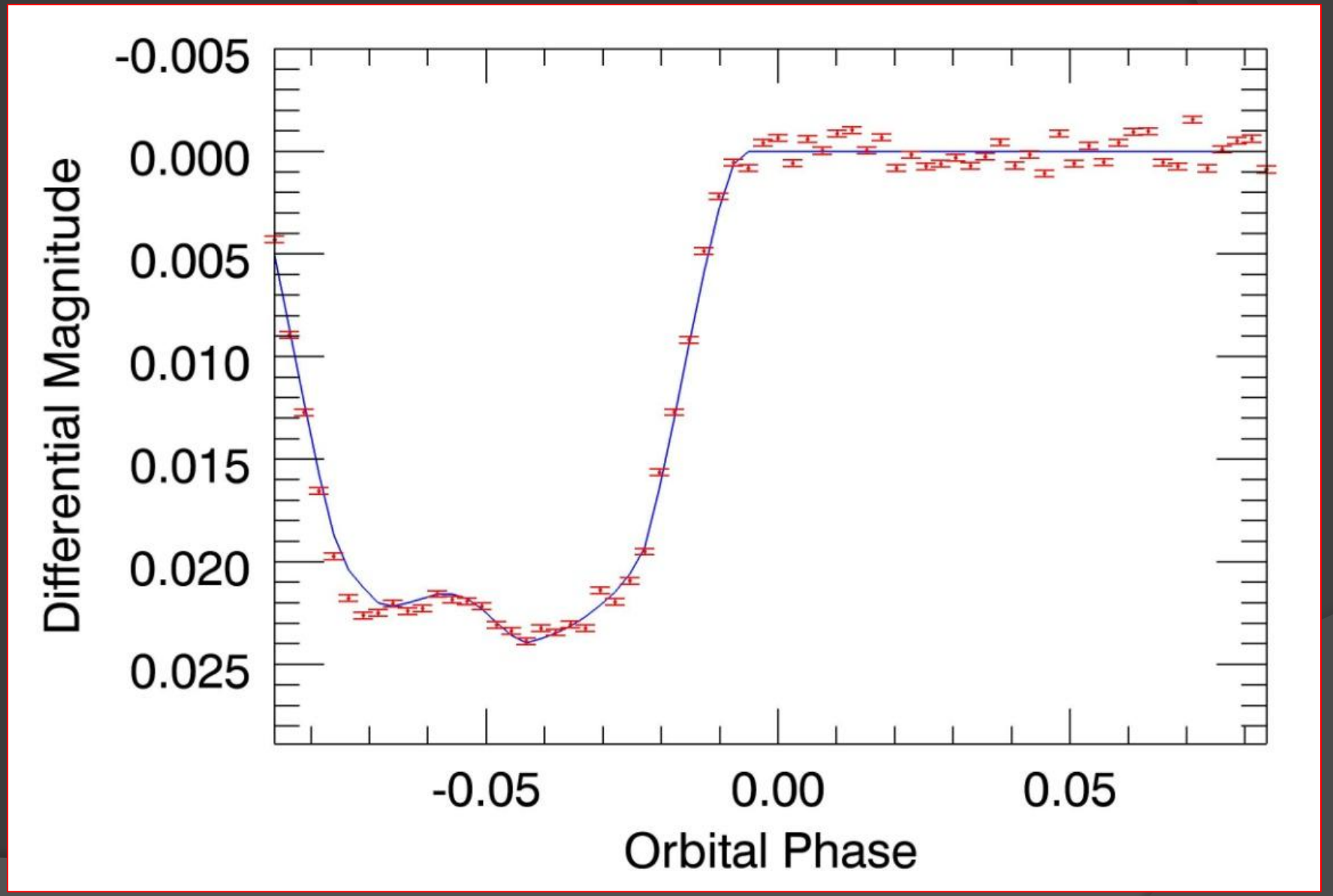
The preliminary results agree with previously published results of the same data.
Hellier et al. 2011 & Anderson et al. 2011

The Trouble with Spots

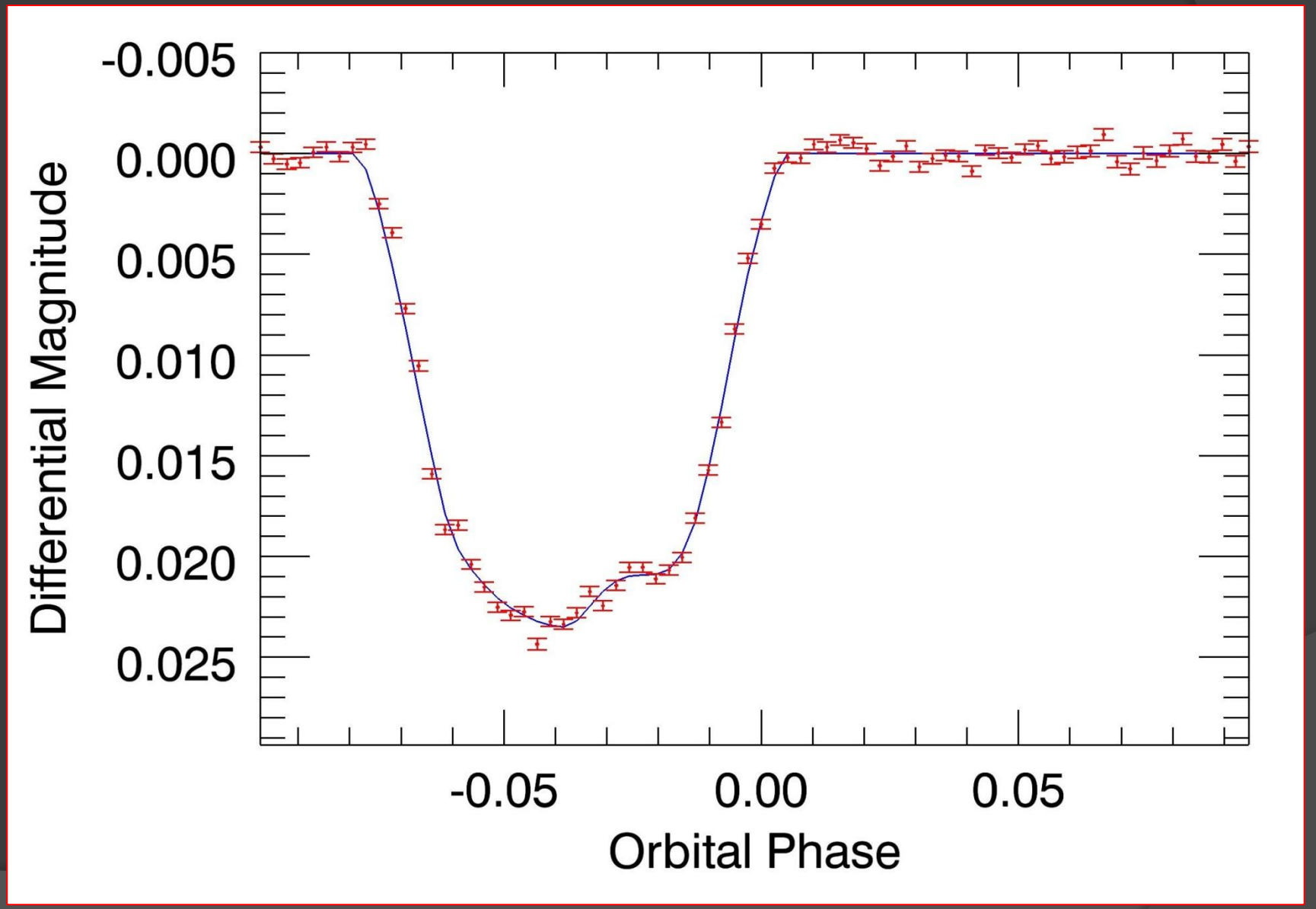


- Spots on the surface of a star will affect the transit shape/depth.
- Normal methods model the spot based on the residuals after the transit has been modelled.
- This leads to errors in the calculation of the system parameters such as the planetary radius.
- PRISM circumvents this problem by using a pixellation approach.

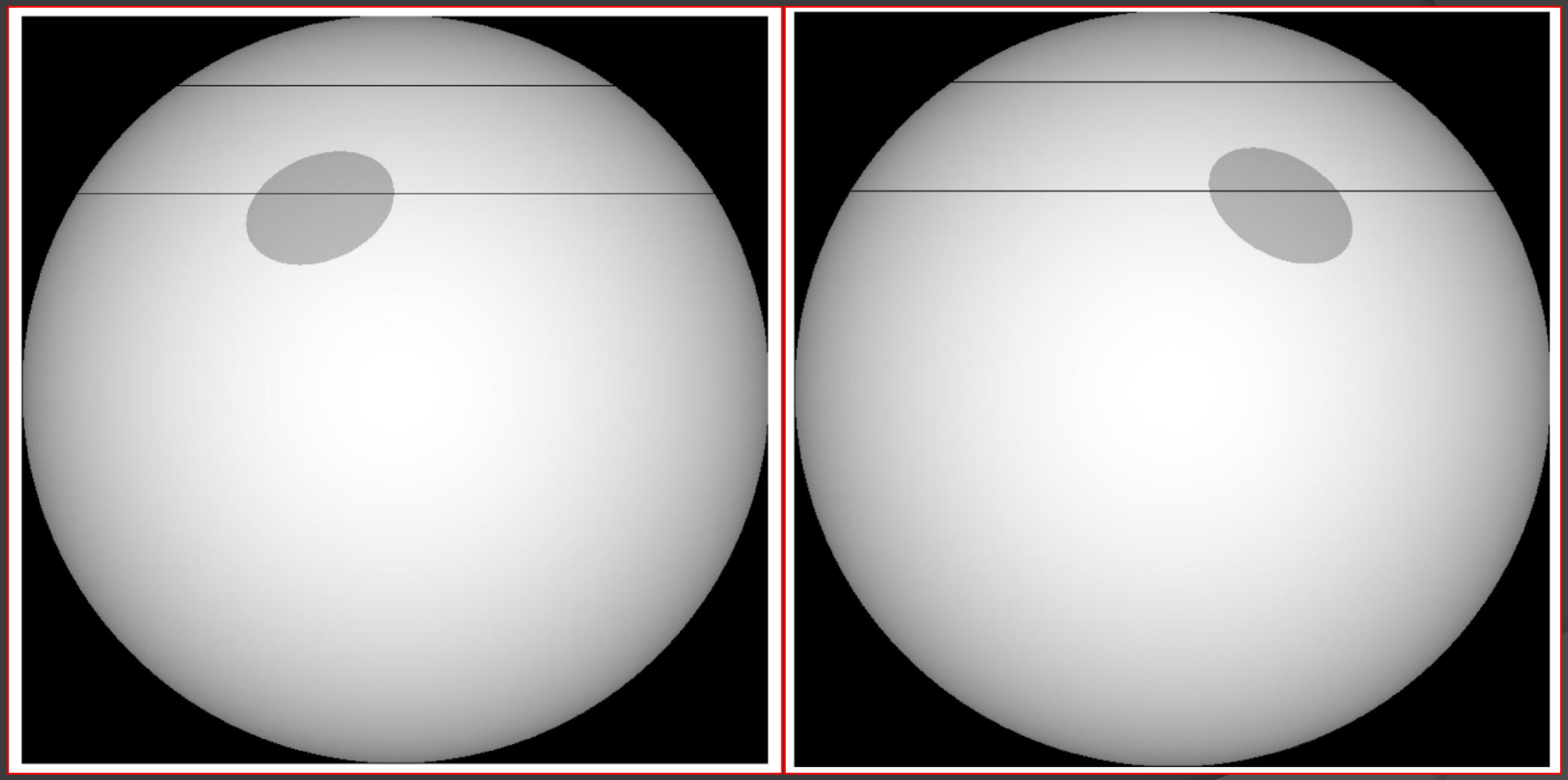
Preliminary Results



Preliminary Results



Preliminary Results



Preliminary Results Latitudinal Rotation and System Obliquity

- WASP-19b orbital period is 19 hours

- The separation between the spot in each data set is approximately 2% of the orbital phase.

- This means that the spot as travelled 28° in 19 hours and 22 minutes.

- This equates to a rotation period of 10.38 ± 0.23 Days for the spot's latitudinal band.

- We also find the obliquity of the system to be $\lambda = 0.5° \pm 1.3°$

- Spectroscopic measurements gave $\lambda = 4.6° \pm 5.2°$ (Hellier et al., 2011)


Questions?