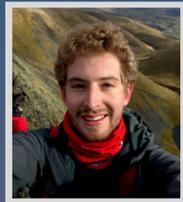


PERIODIC ECLIPSES OF PDS-110

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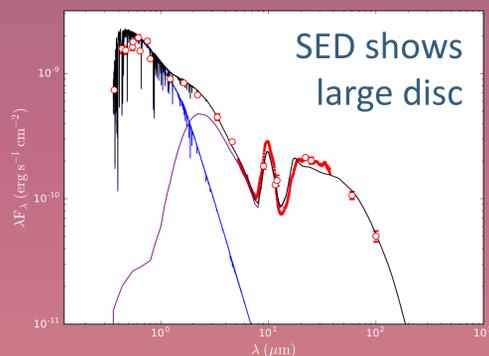
@exohugh

PHOTOMETRY



THE STAR

- Young star in OB1A association (~10Myr)
- IR excess ($L_{IR}/L_{bol} \sim 0.25$) shows large disc
- Bright ($V = 10.45$)
- Lack of reddening (0.09) suggests disc is inclined



WHT & TRES Spectra:

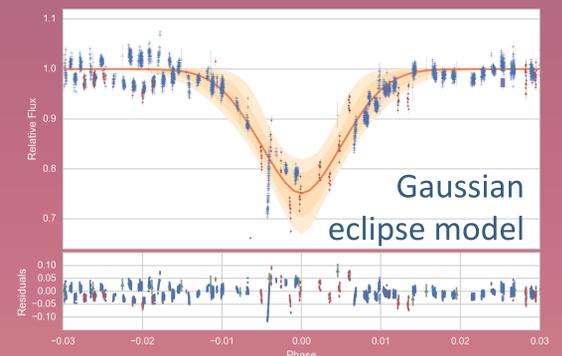
- F6 IV spectral type
- $T_{eff} = 6400 \pm 150$ K
- $R_s = 2.23 \pm 0.18 R_{sun}$
- $M_s \sim 1.6 M_{sun}$

ANALYSIS

- Extremely similar eclipses in 2008 & 2011
- Assuming periodicity - other eclipses unobserved
- Shearing means unassociated dust cloud is unlikely to maintain structure over a 2.2yr orbit

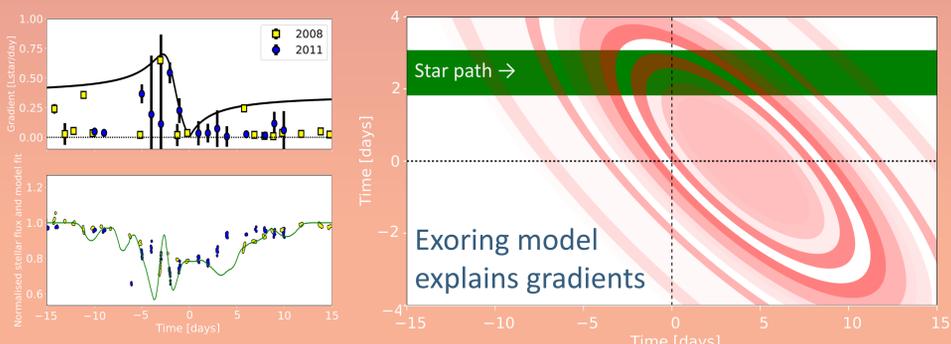
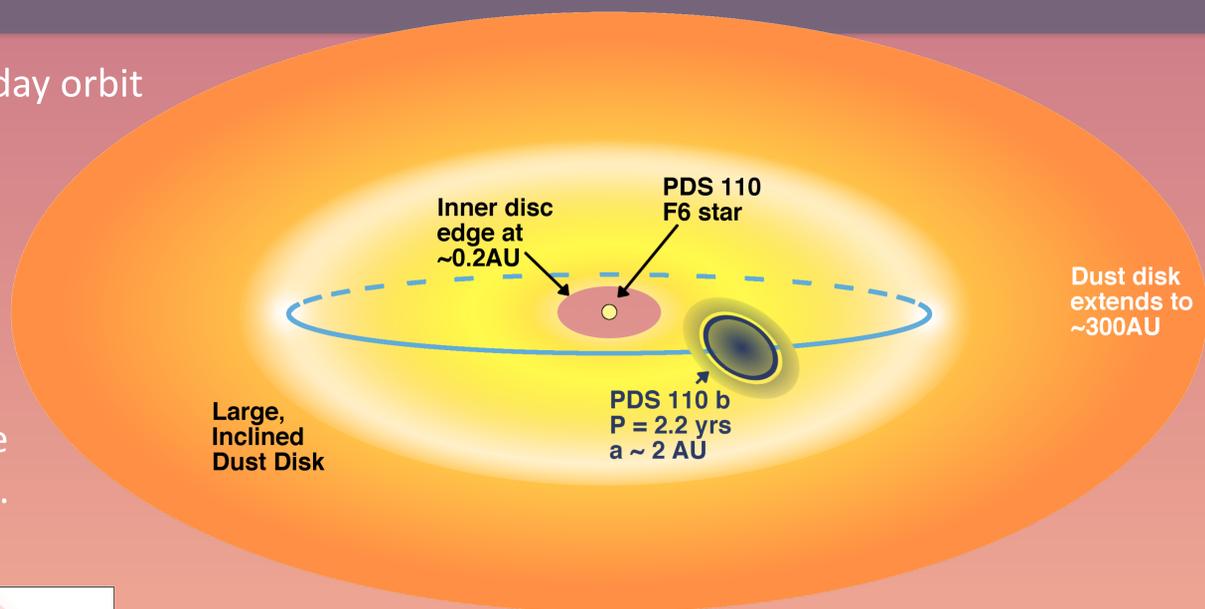
Gaussian eclipse model:

- Period: 808 ± 2 d
- Duration: $\sim 16 \pm 5$ d
- Depth: $\sim 26 \pm 6\%$



INTERPRETATION

- Dust structure is **periodic** and on a 808 ± 2 day orbit
- The dust cloud is ~ 0.3 au in diameter
- Structure is maintained by gravitational attraction of an unseen secondary with mass from $1.6-68 M_{Jup}$ (depending on Hill-sphere-filling criteria)
- Secondary is on inclined orbit above disk
- Sharp gradients seen in eclipse may be due to the presence of moon-forming **exorings**.
- Next predicted eclipse: **Sept 9 - 30 2017**



SIMILAR ECLIPSES

- J1407 – deep eclipse of ring system (Mamajek, 2012)
- UX Oris – unexplained dimmings of disc-hosting stars

REFERENCE:

Periodic eclipses of the young star PDS 110 discovered with WASP and KELT photometry, Osborn et al (2017), MNRAS