

Accurate Planet Properties and White Dwarfs

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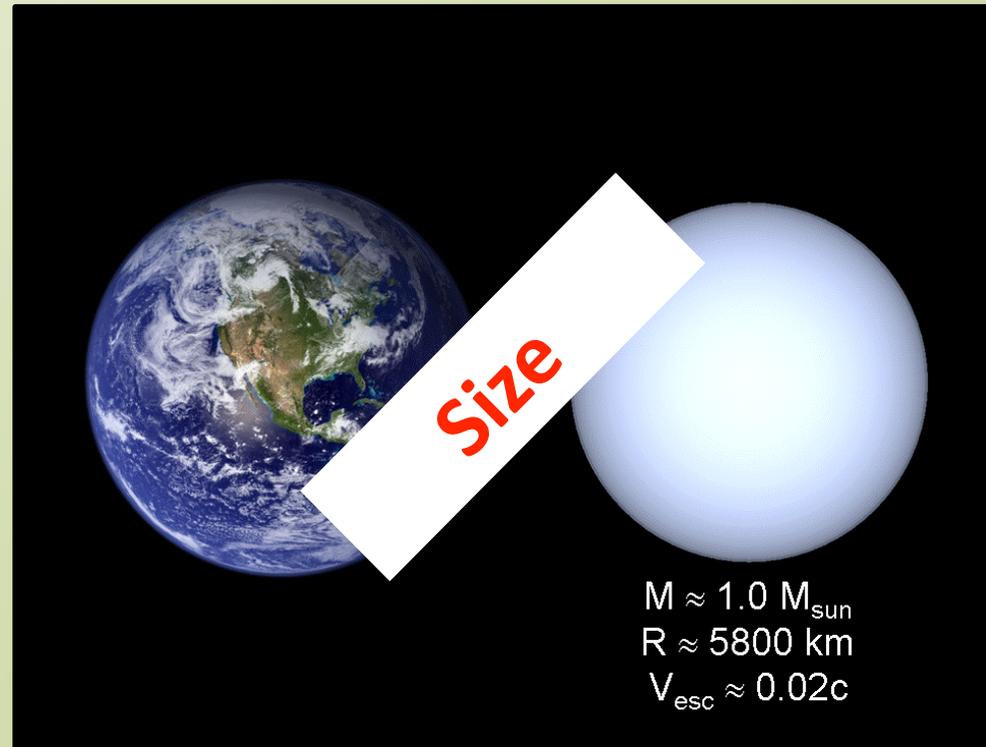
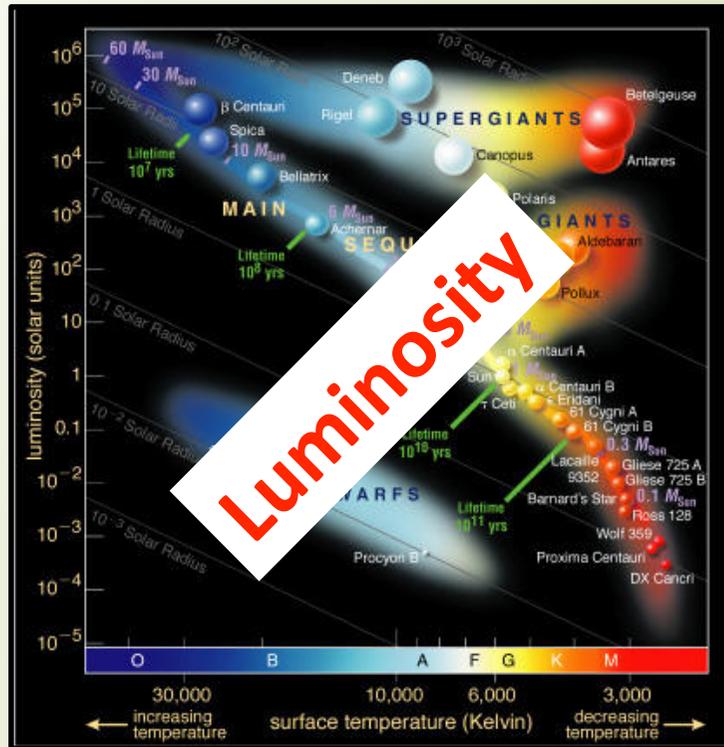


Outline

- Why White Dwarfs?
- Finding white dwarfs
- White Dwarfs + Brown Dwarfs
- White Dwarfs + Planets
- Summary

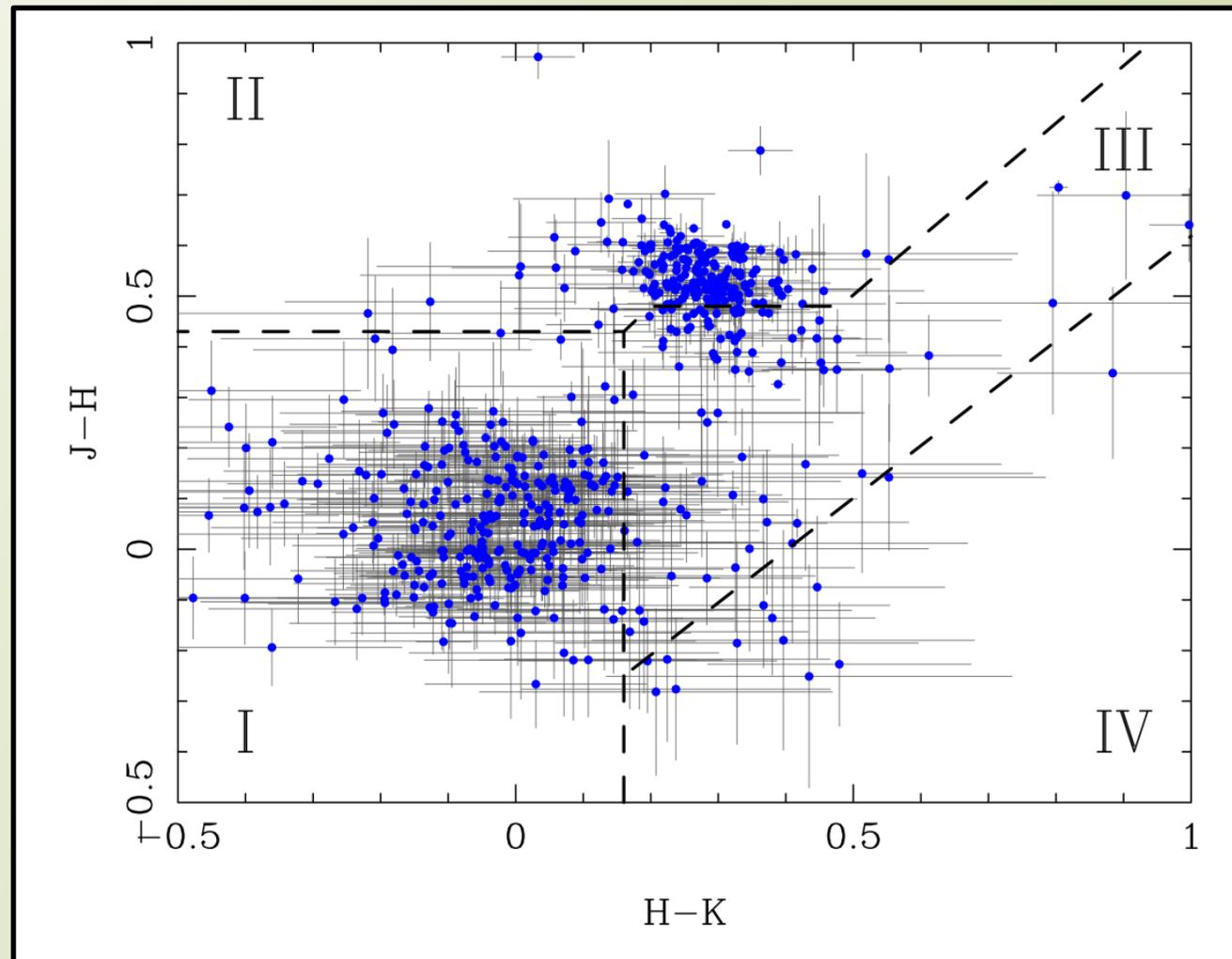


Why White Dwarfs?



- Fantastic age calibrators.

Finding White Dwarfs



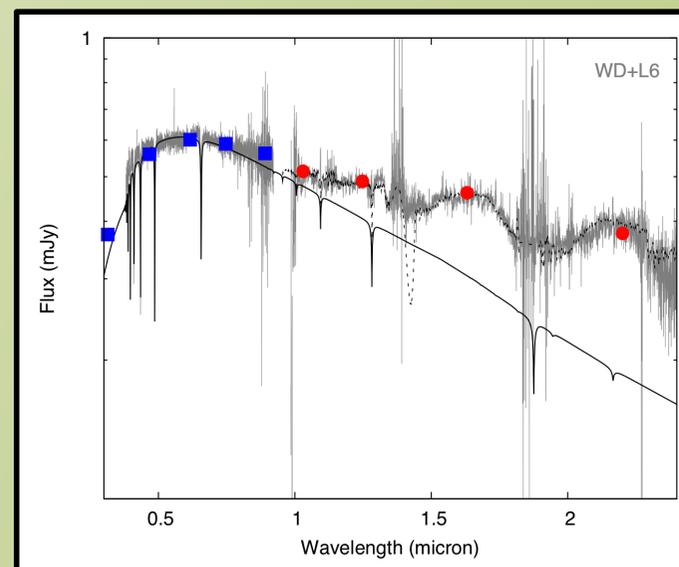
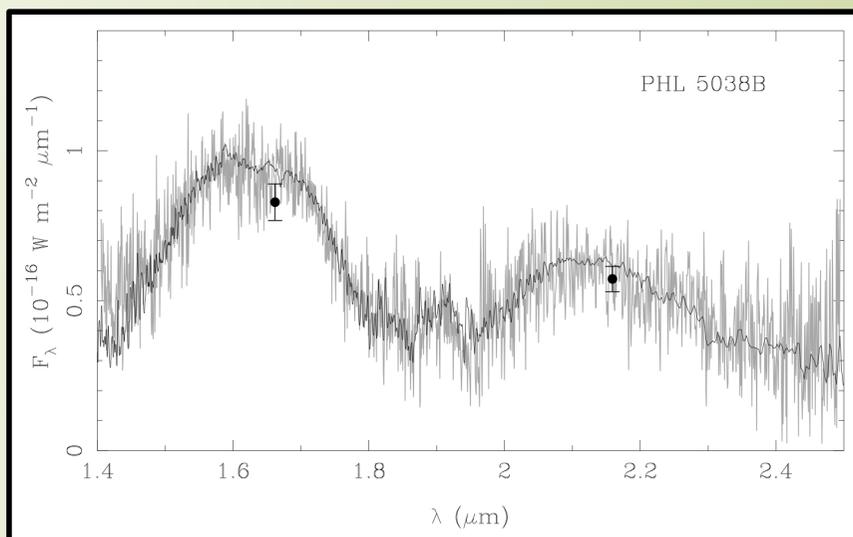
White Dwarfs + Brown Dwarfs

- Photometric/Proper motion searches ongoing for WD+BD systems.
- Only 5 Confirmed systems
 - GD165 (Becklin & Zuckerman 1988)
 - PHL5038 (Steele et al. 2009)
 - LSPM1459+0857 (Day-Jones et al. 2010)
 - WD0137-349 (Maxted et al. 2006)
 - GD1400 (Farihi & Christopher 2004)
- WD+BD binaries are rare (1-2%, Steele et al., in prep)

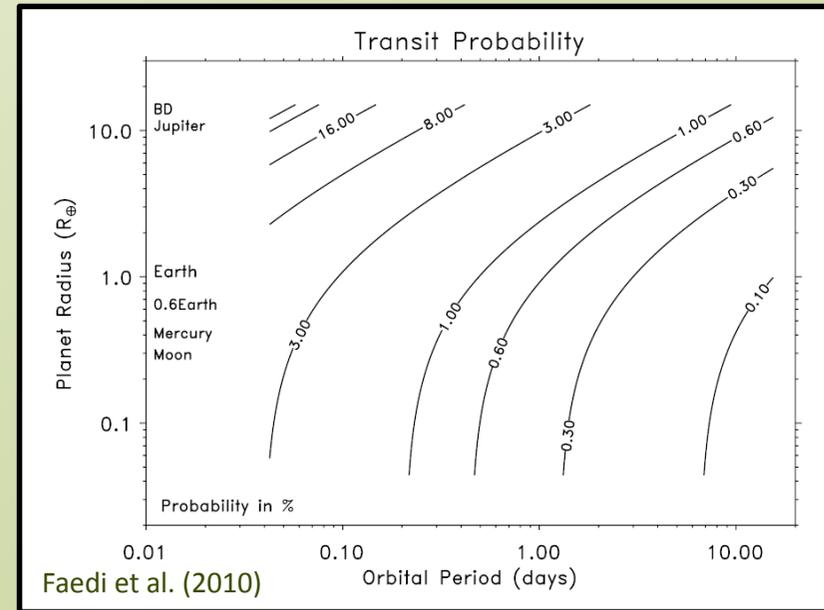
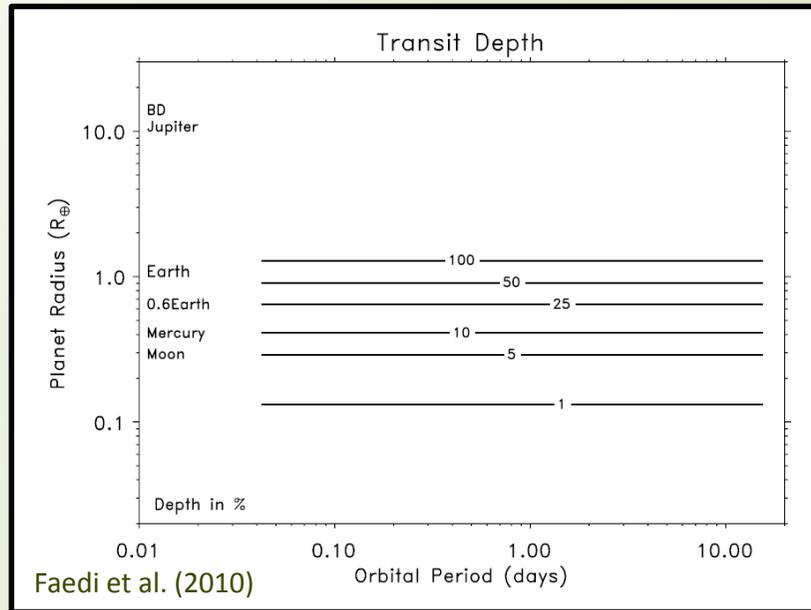


White Dwarfs + Brown Dwarfs

- Thesis results: 10 new candidate WD+BD binaries from UKIDSS (<2'').
- A number of these are part of ongoing programs on the VLT/Gemini/ITRF to spectroscopically confirm BD.



White Dwarfs + Planets



$$\delta_{tr} = \frac{\Delta F}{F} = \frac{R_p^2}{R_*^2} \quad \text{for } R_p \leq R_*$$

$$1 \quad \text{for } R_p > R_*$$

$$P_{tr} \approx \left(\frac{4\pi^2}{GM_*} \right)^{1/3} \frac{R_p + R_*}{P^{2/3}}$$

- So need a large sample of stars...
- Faedi et al. (2010) - 194, Drake et al. (2010) – 12k

White Dwarfs + Planets

- Can we use WTS to search for planets around WDs?
- Don't need high precision photometry so can probe to much fainter magnitudes.
- Will make good use of Difference Imaging analysis.
- Can extend to other surveys e.g. PanPlanets.
- Detections will yield very accurate planet properties (Age, Radius) due to well know WD physics.
- The evolution and fate of planetary systems.



Summary

- White dwarfs are ideal for searches for sub-stellar companions due to low luminosity and relative size.
- WDs + brown dwarfs can be revealed through NIR-MIR photometry, radial velocity follow-up will reveal close companions. Find new benchmark objects.
- WDs + planets can be detected via transits. None found so far, but search is ongoing.... WTS?
- Detections will yield very accurate properties for the companion (Radius, age etc.)



The End

