

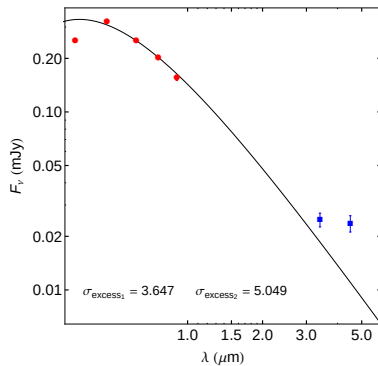
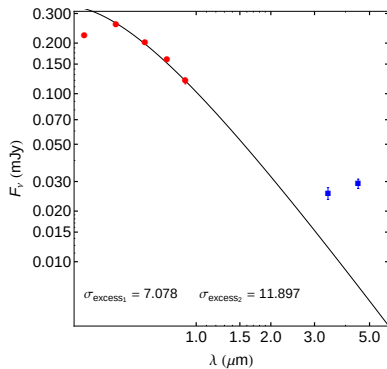
Do Massive Stars Have Planets?

Sara D. Barber

Advisor: Dr. Mukremin Kilic

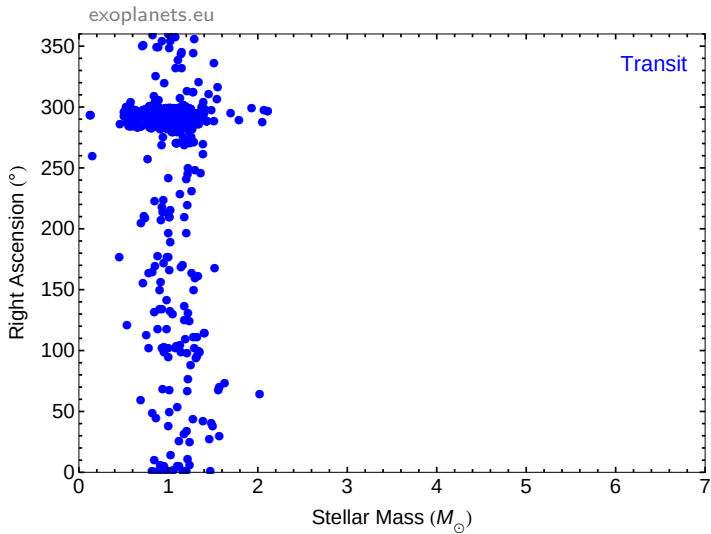
University of Oklahoma

YES!

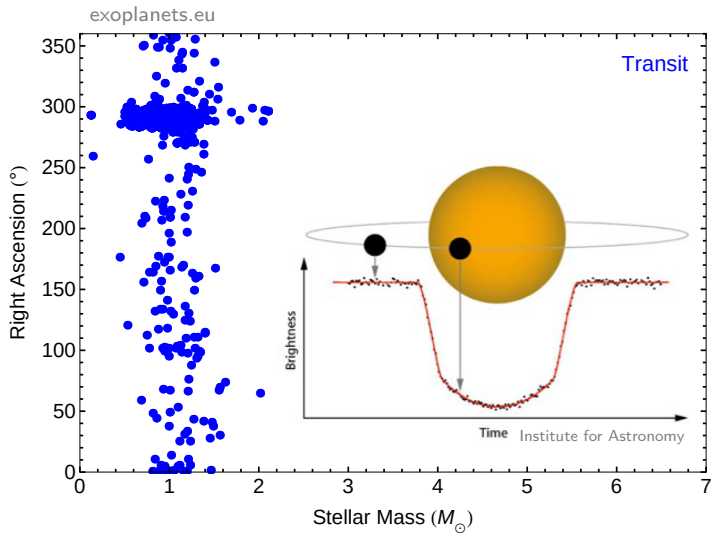


Barber et al. 2014, in prep.

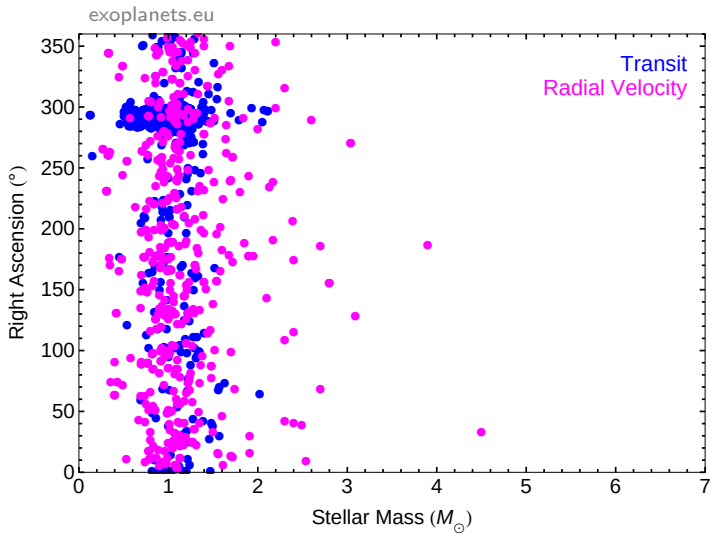
Main Sequence Planet Detection



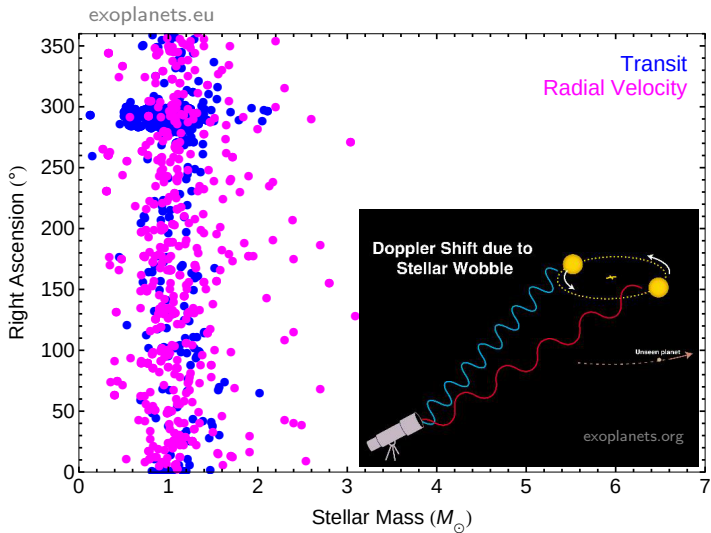
Main Sequence Planet Detection



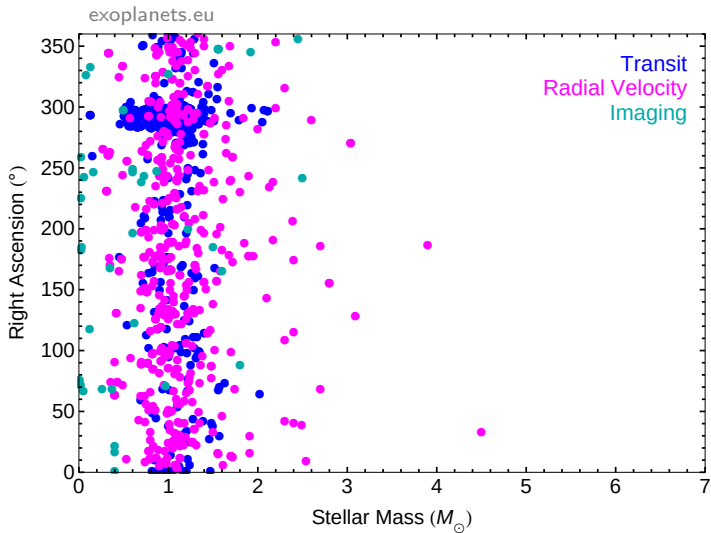
Main Sequence Planet Detection



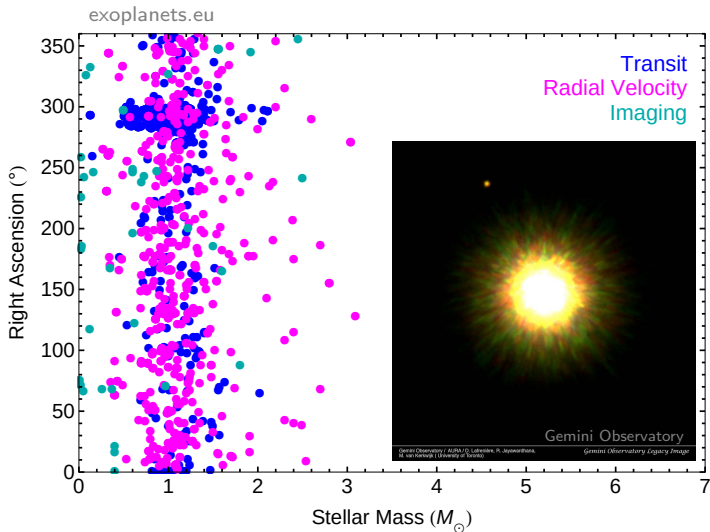
Main Sequence Planet Detection



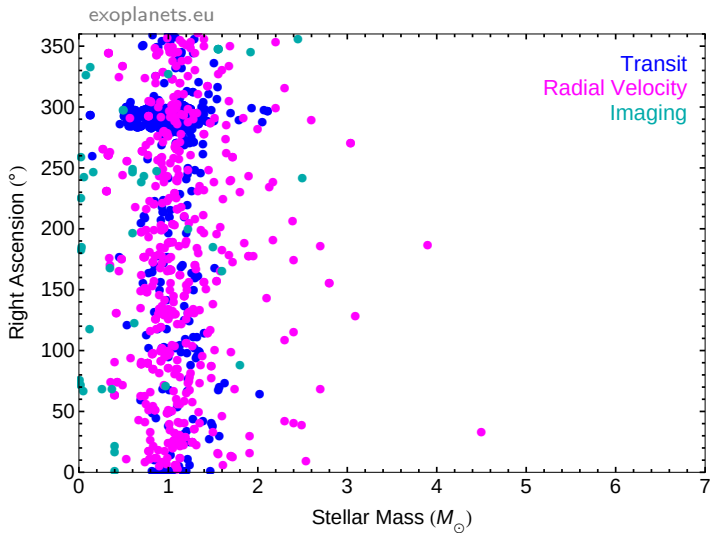
Main Sequence Planet Detection



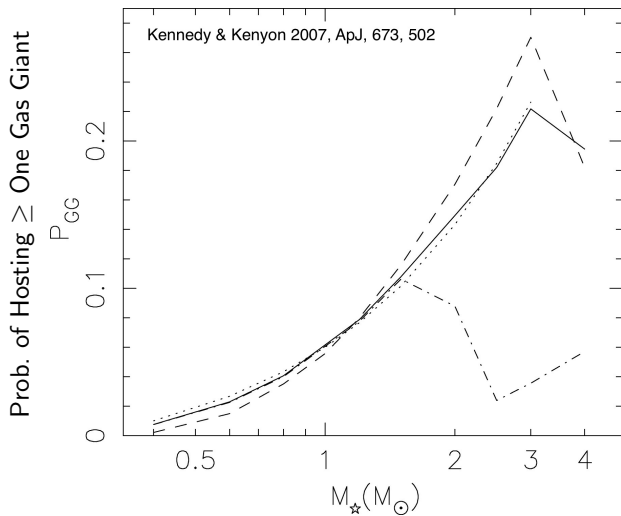
Main Sequence Planet Detection



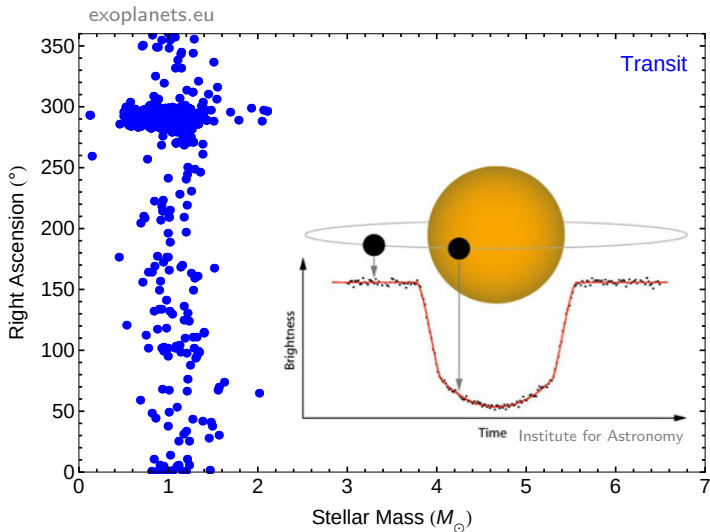
Strong Cutoff Above $3M_{\odot}$



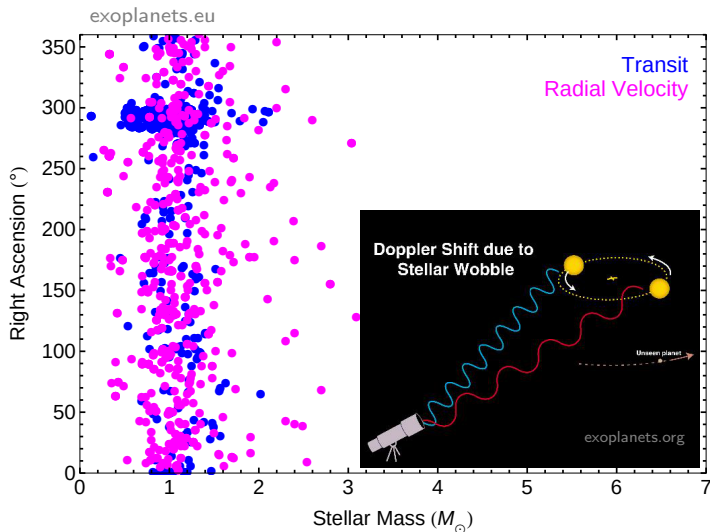
Expect Planet Frequency to Increase with Stellar Mass



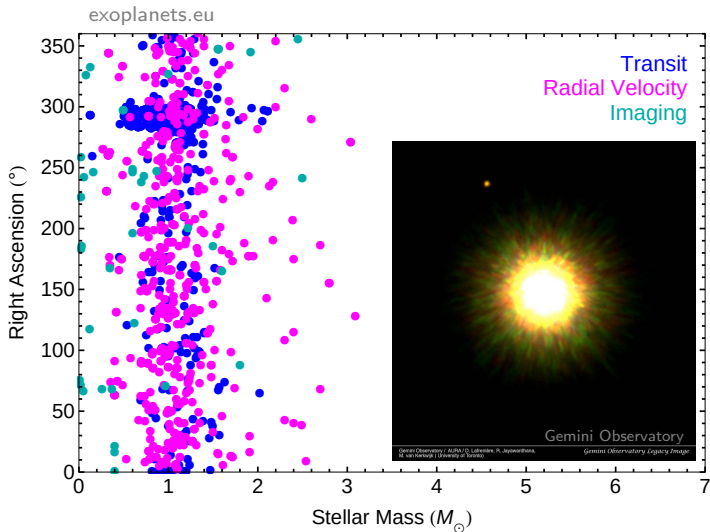
Transit Depth Shrinks with Increasing Stellar Mass



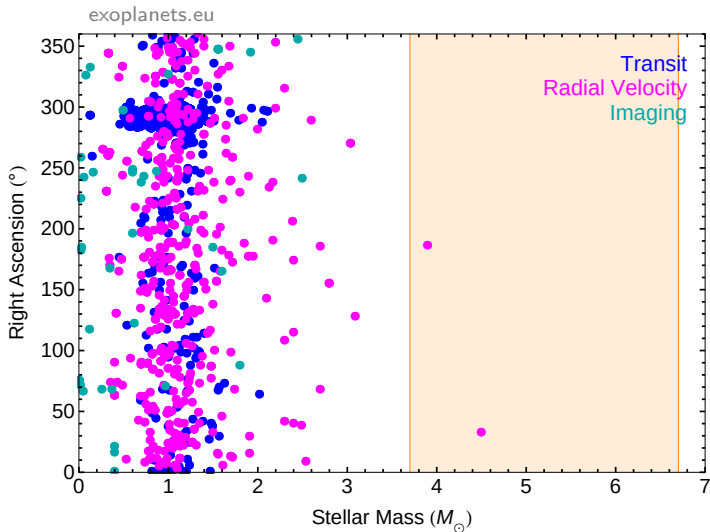
RV Amplitude Shrinks with Increasing Stellar Mass



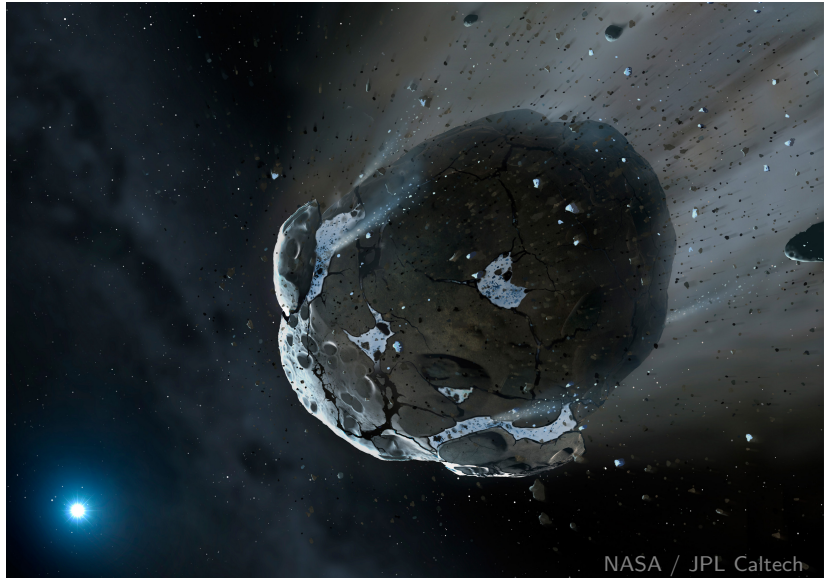
Brightness Contrast Increases with Increasing Stellar Mass



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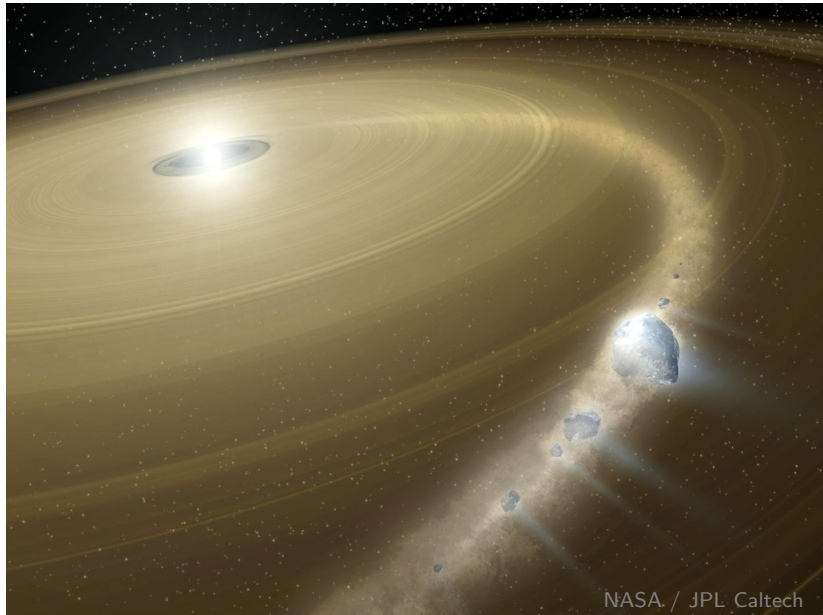
White Dwarfs with Dust = Remnant Planetary Systems



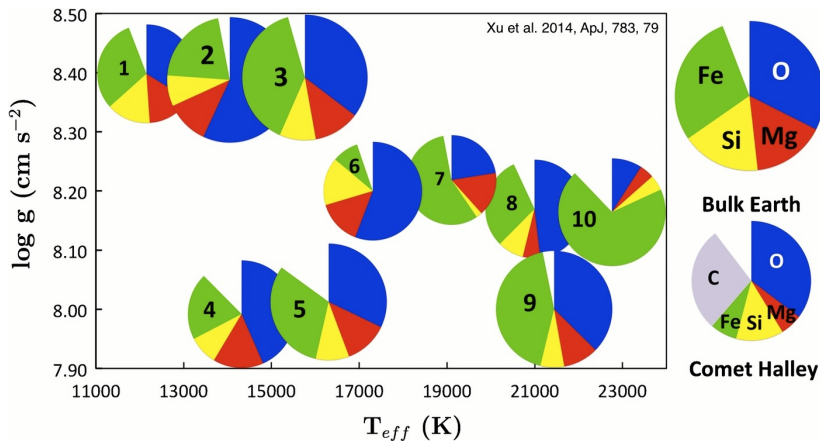
White Dwarfs with Dust = Remnant Planetary Systems



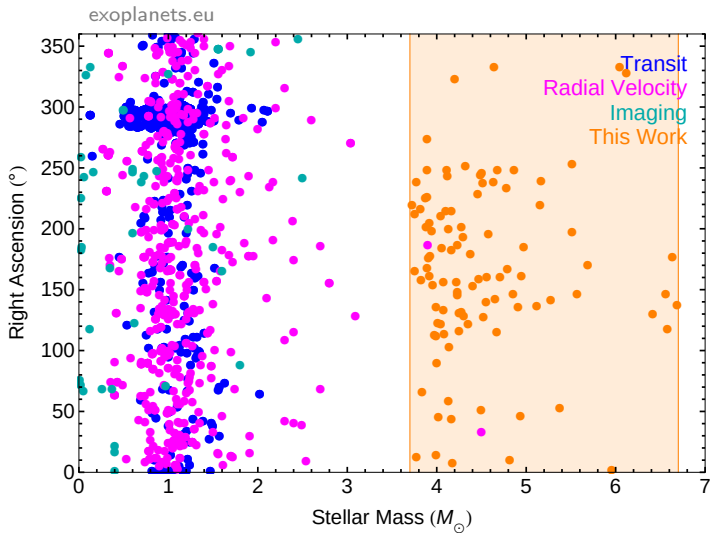
White Dwarfs with Dust = Remnant Planetary Systems



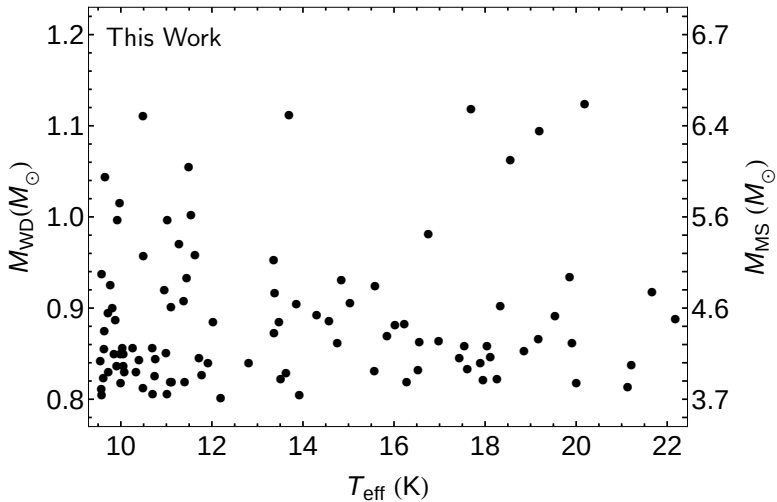
White Dwarfs with Dust = Remnant Planetary Systems



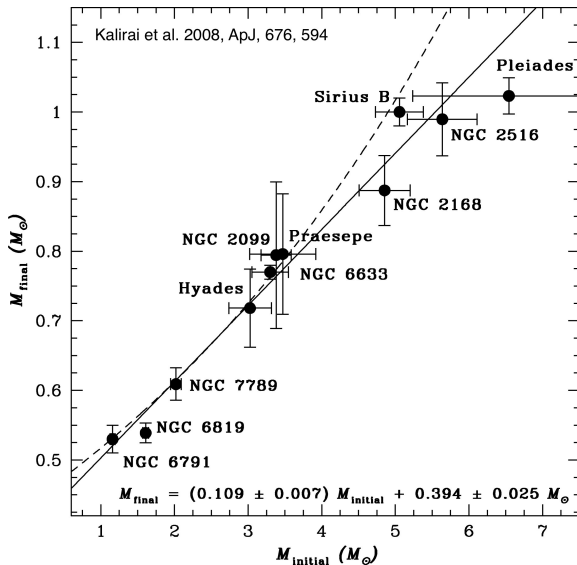
Massive White Dwarf Sample



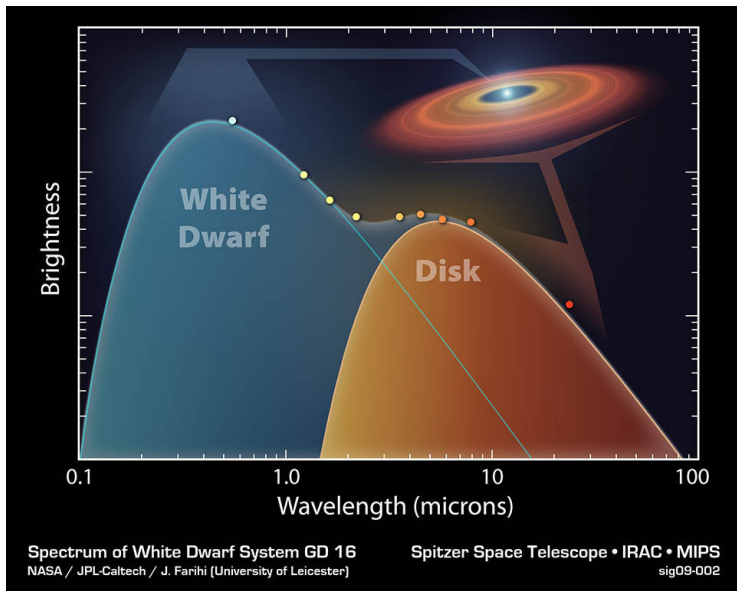
Massive White Dwarf Sample



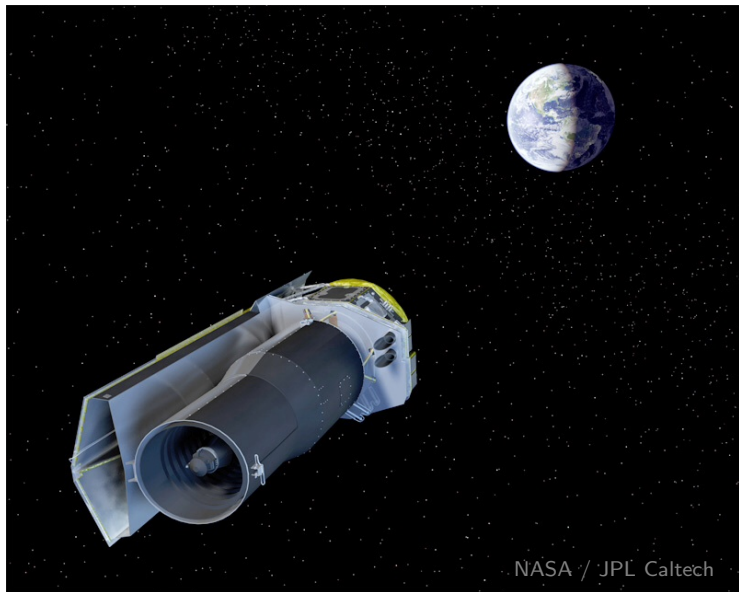
Initial-Final Mass Relation: Main Sequence $\leftrightarrow$ White Dwarf



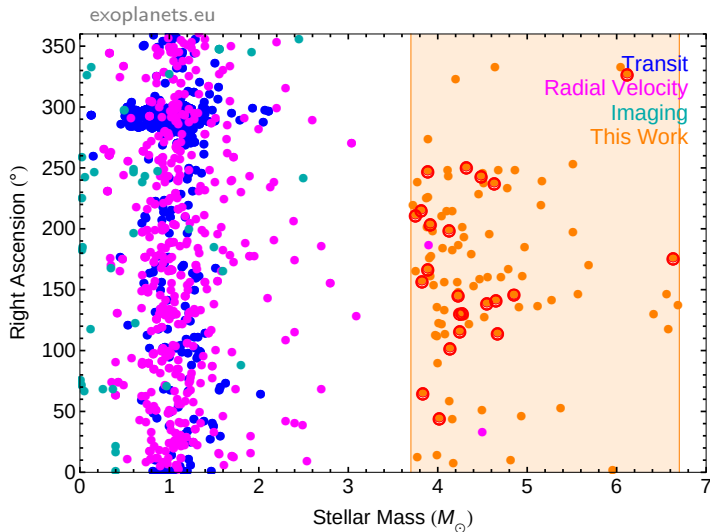
Dusty White Dwarf Detection – Infrared Excess



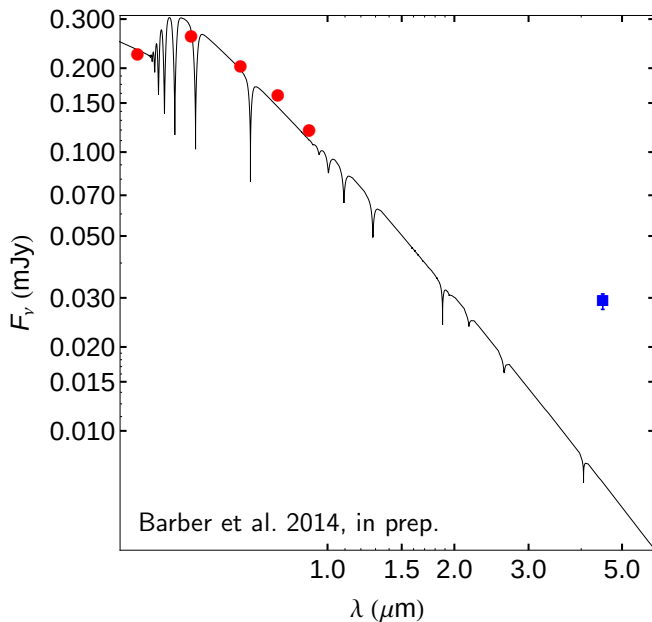
SPITZER Space Telescope — Mid-Infrared Photometry



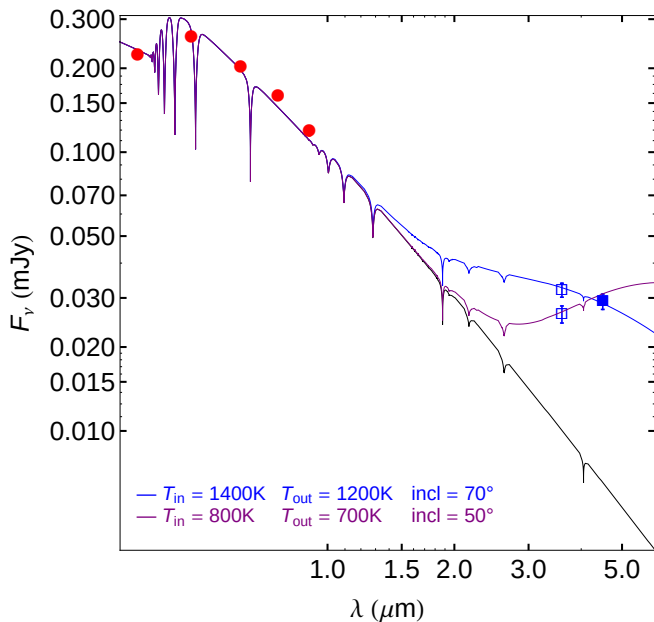
SPITZER Cycle 9 – 23 White Dwarfs with $4.5\mu\text{m}$ Excesses



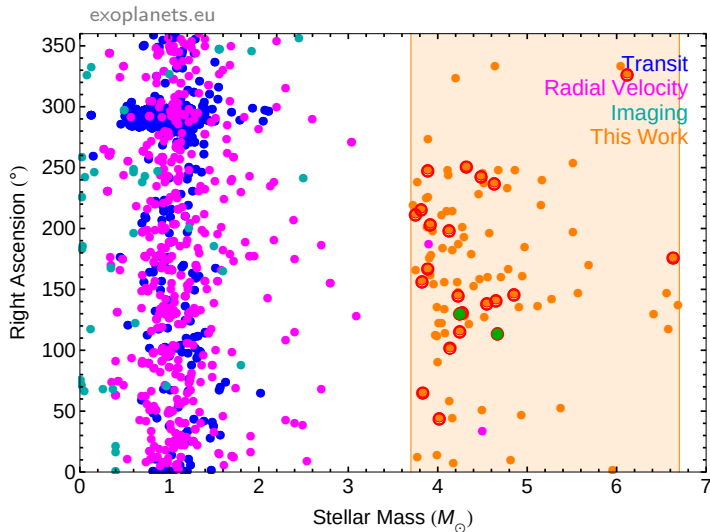
SPITZER Cycle 9 – 23 White Dwarfs with $4.5\mu\text{m}$ Excesses



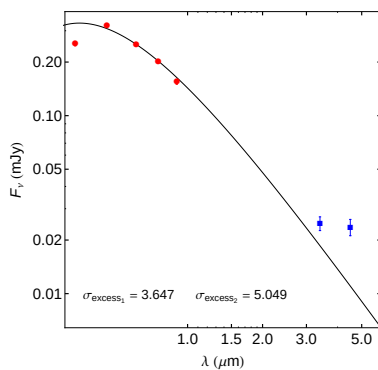
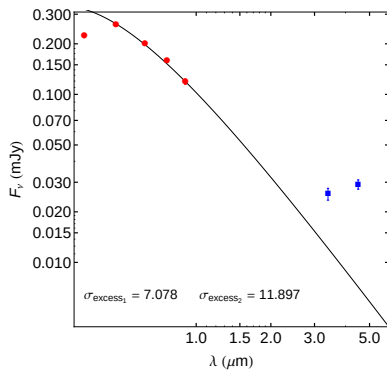
SPITZER 3.6 μm Photometry to Constrain Disk Models



SPITZER Cycle 10 – 2 White Dwarfs with $3.6\mu m$ Excesses (so far)



SPITZER Cycle 10 – 2 White Dwarfs with $3.6\mu\text{m}$ Excesses (so far)



Barber et al. 2014, in prep.

Future Work

- ▶ Analyze Remaining SPITZER $3.6\mu m$ Photometry
- ▶ Obtain Near-IR Photometry – Further Constrain Disk Models
- ▶ Place First Constraint on Frequency of Planets Around Massive Stars!