
What are the Ultimate Fates of Hot Jupiters?

Samuel Yee

51 Pegasi b Fellow

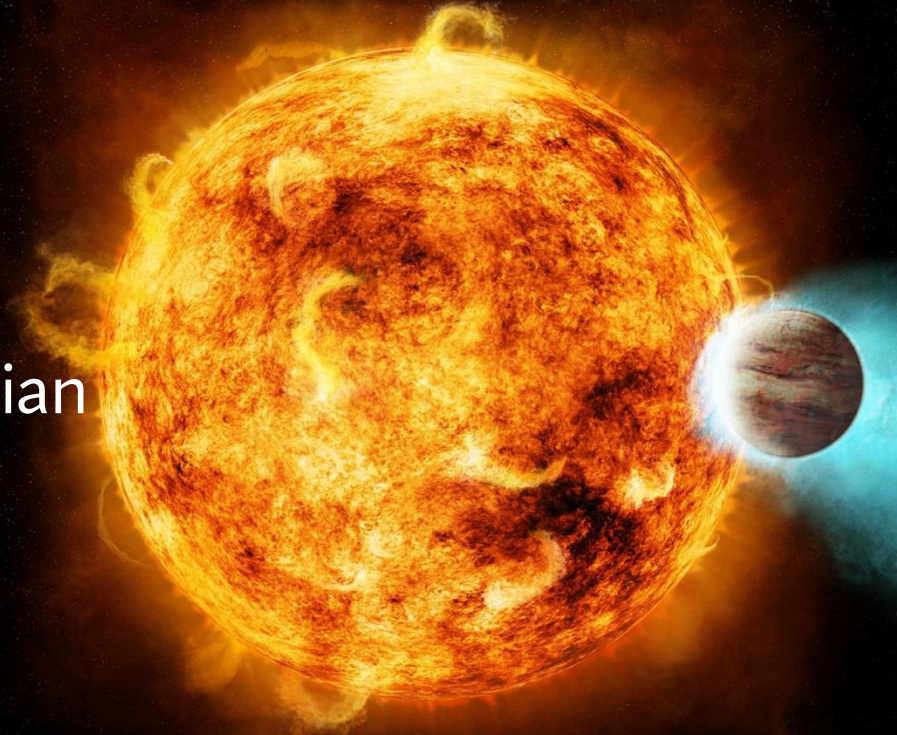
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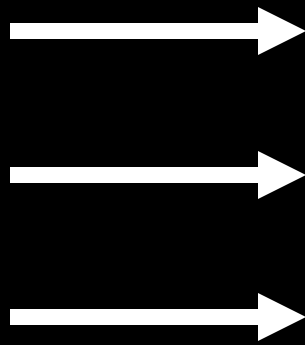
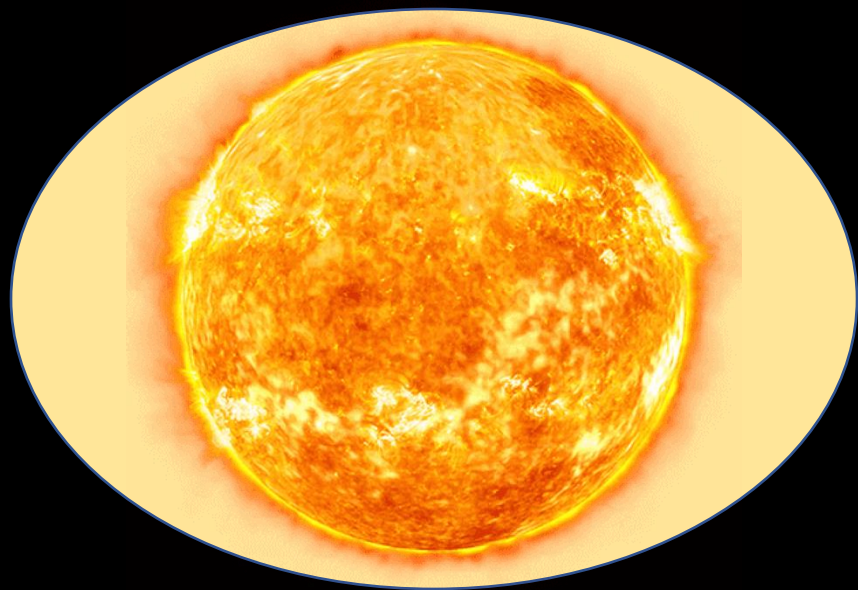
Collaborators:

Josh Winn, Joel Hartman

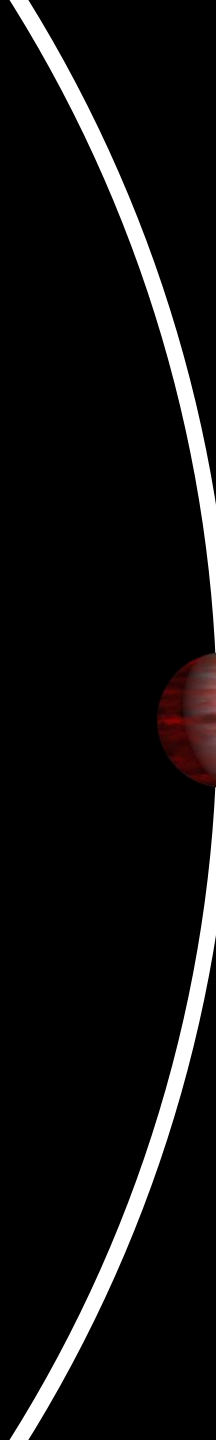
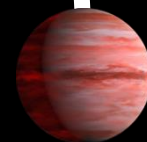
Dave Charbonneau, Jason Eastman

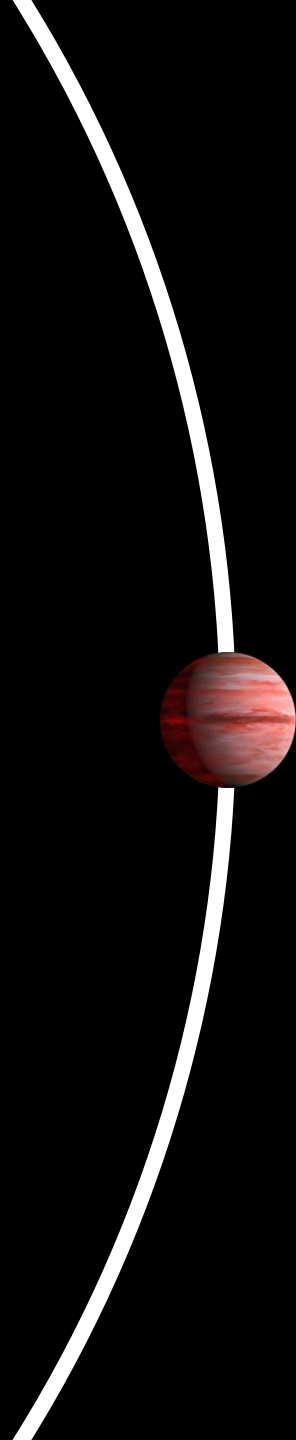
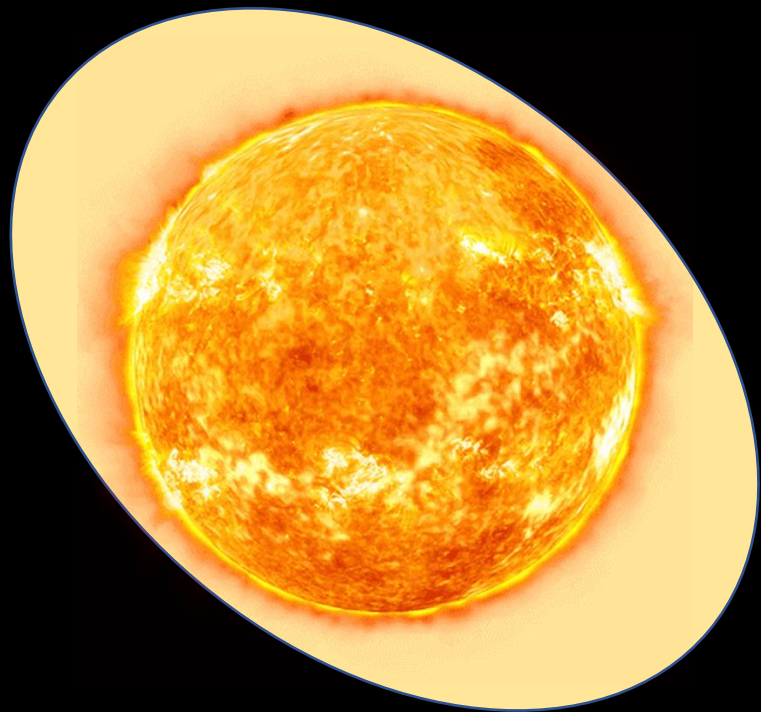
TESS Team, TESS Follow-up Community

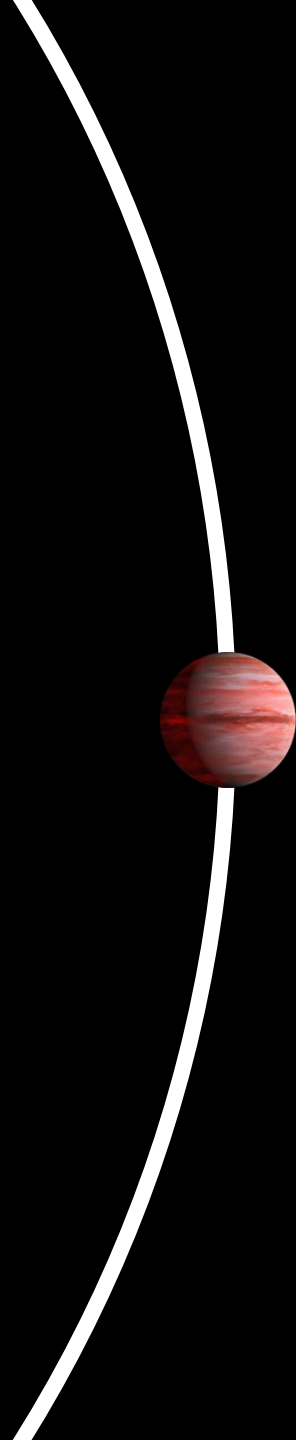
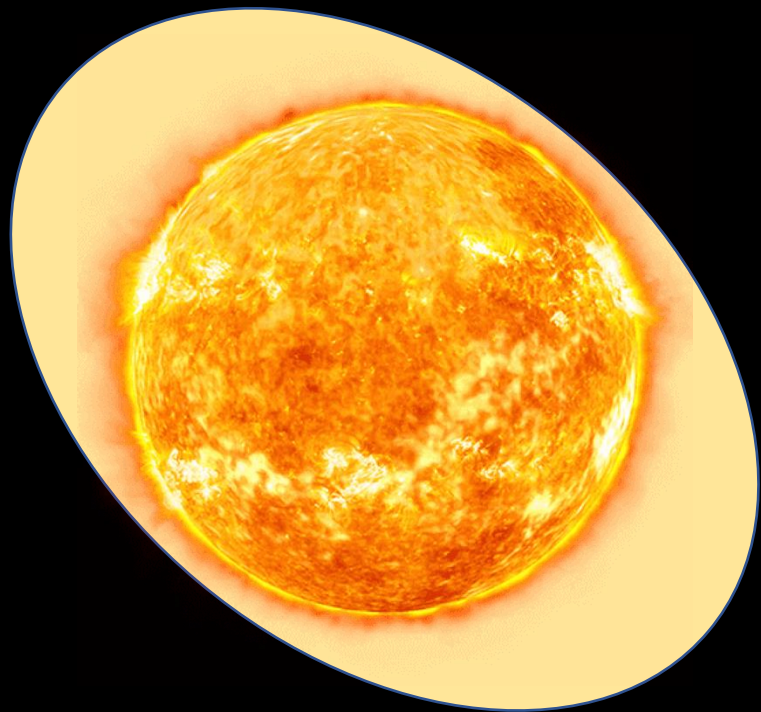




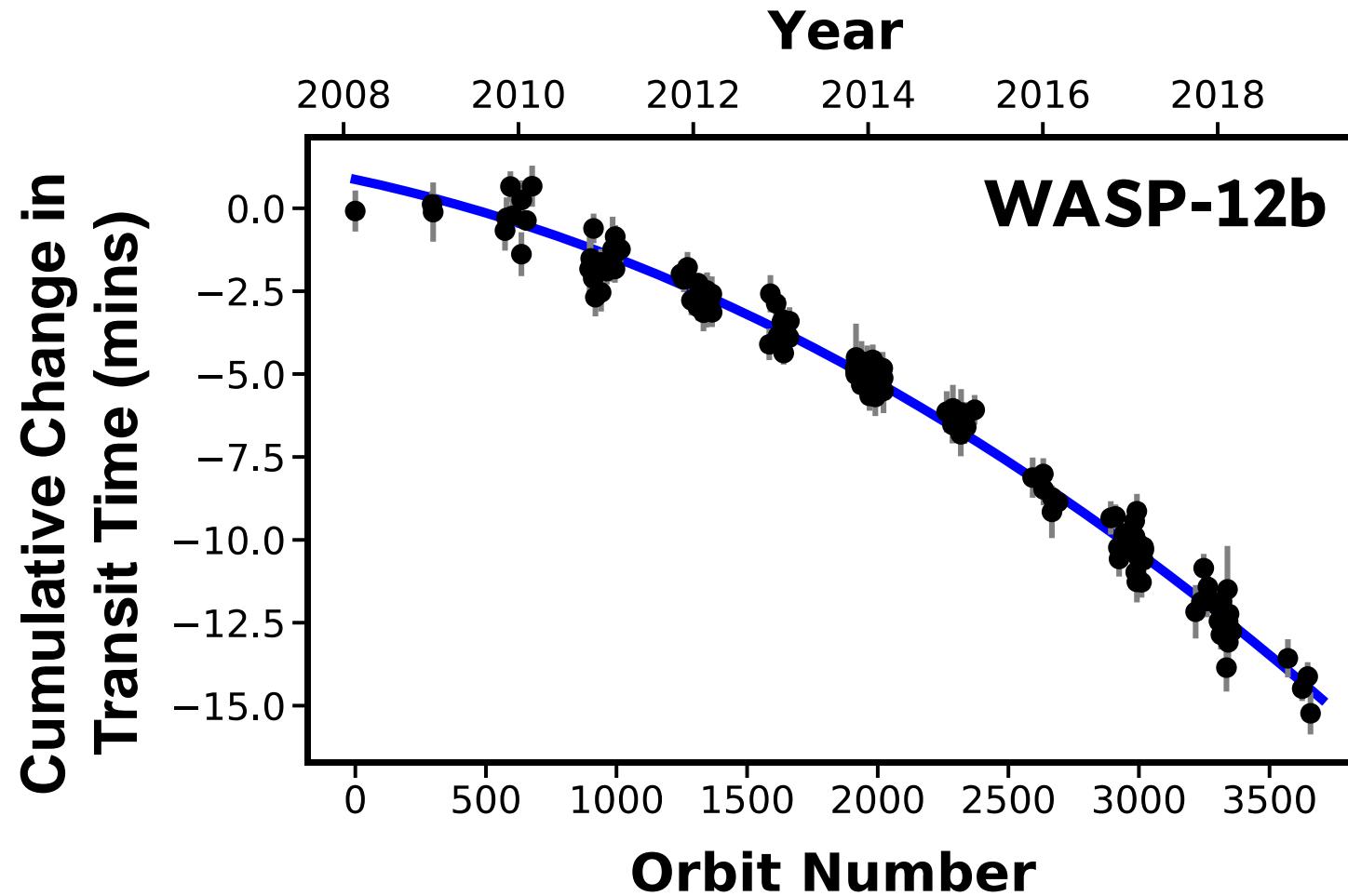
Planet's
Gravity



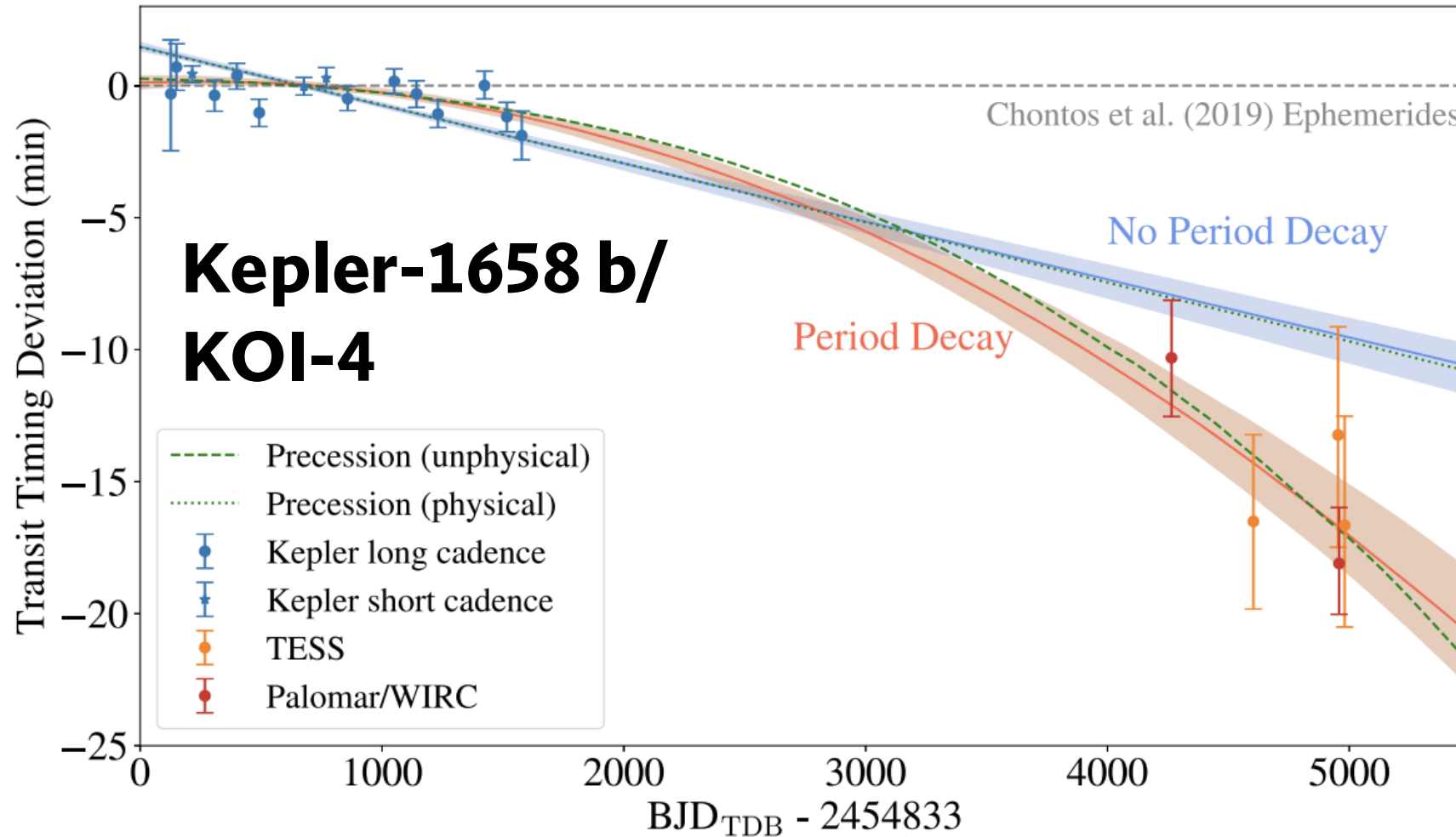




Orbital decay of hot Jupiters



Orbital decay of hot Jupiters



Hot Jupiters orbit young stars

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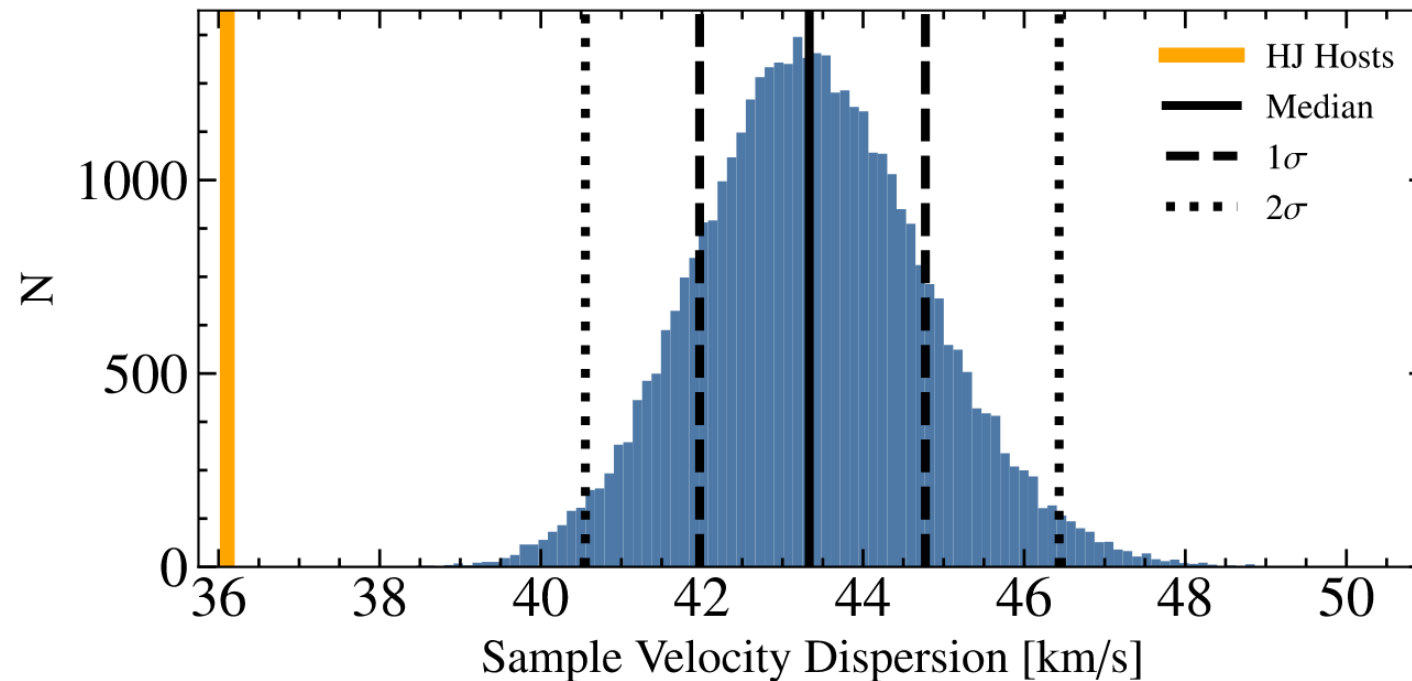
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Hot Jupiters Are Destroyed by Tides While Their Host Stars Are on the Main Sequence

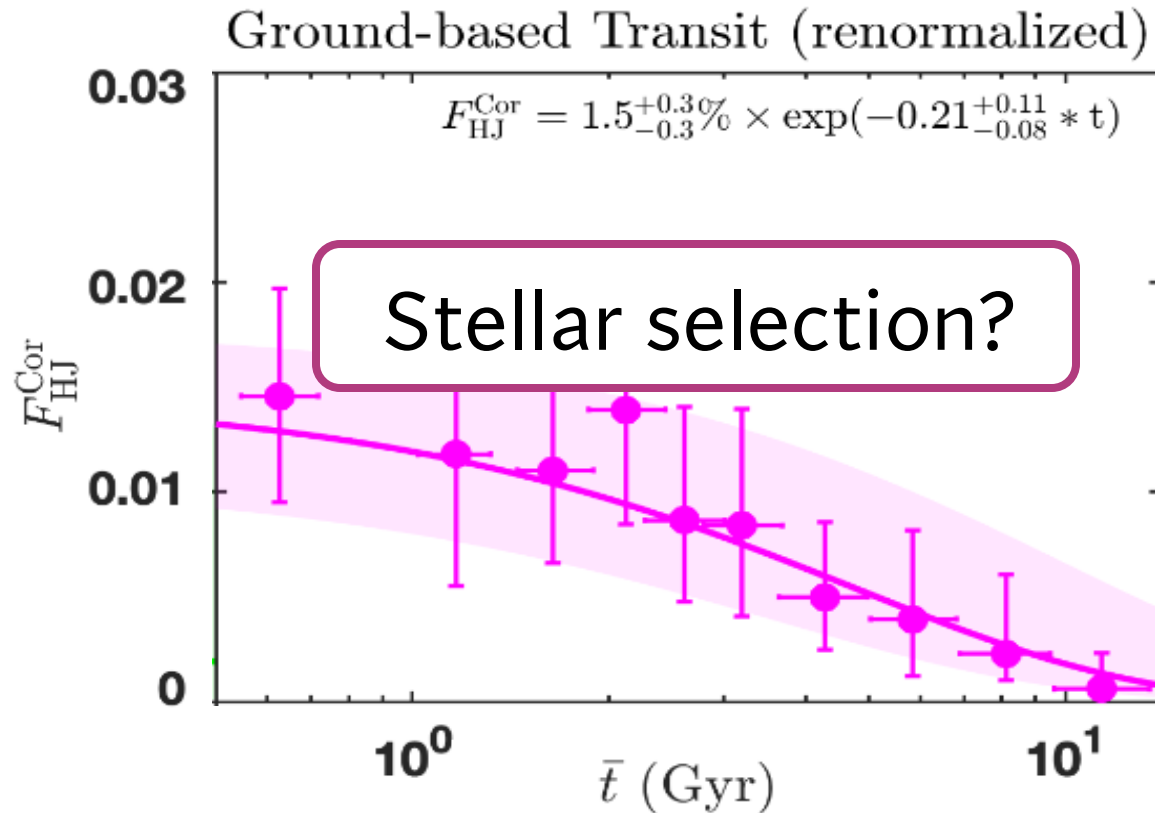
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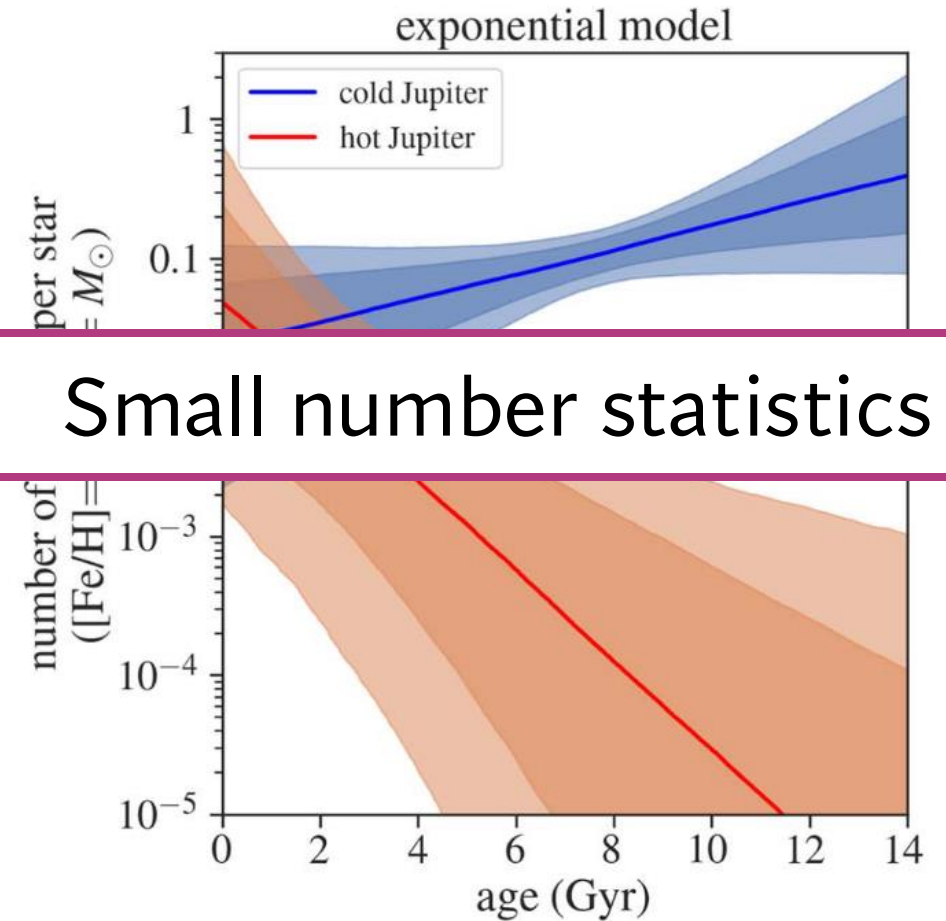
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Hot Jupiters orbit young stars

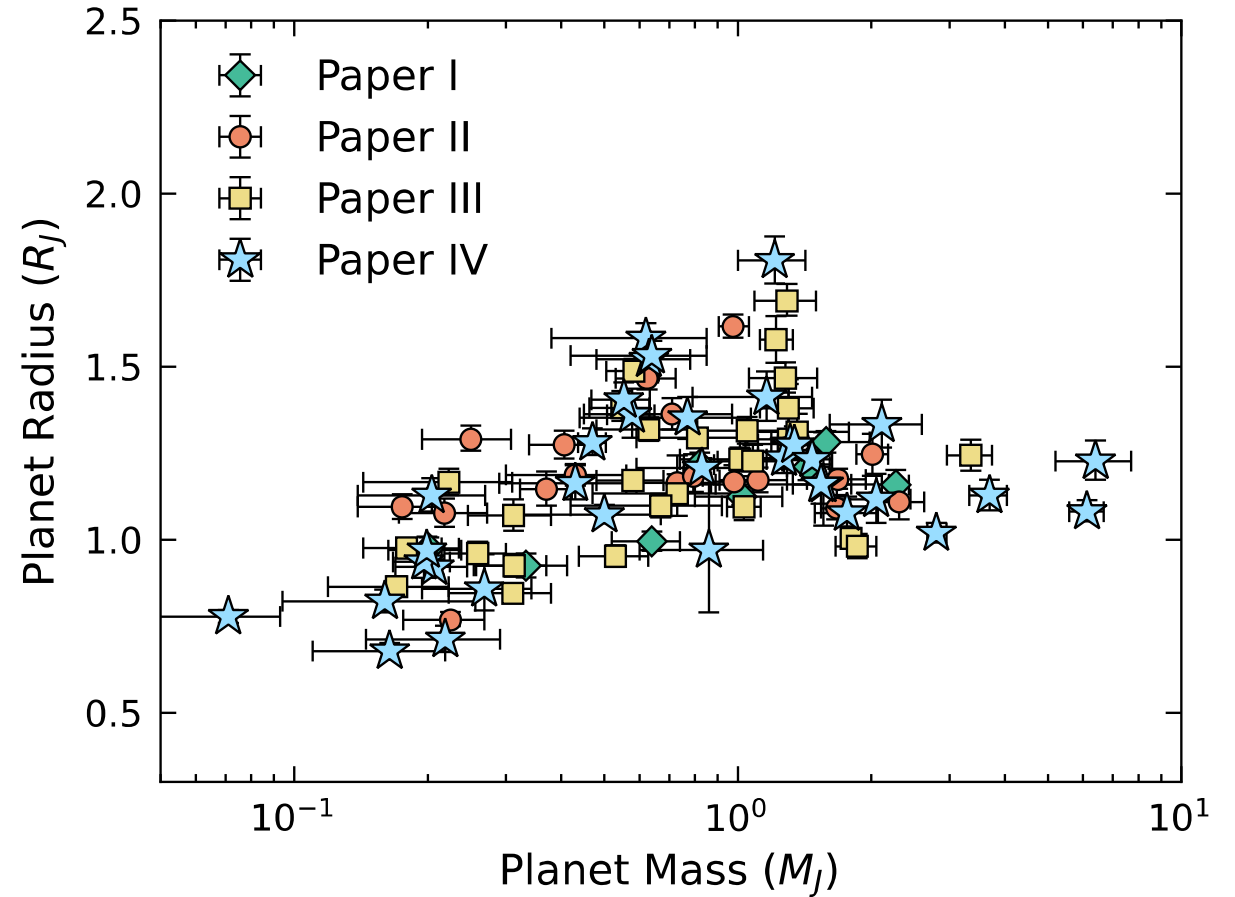
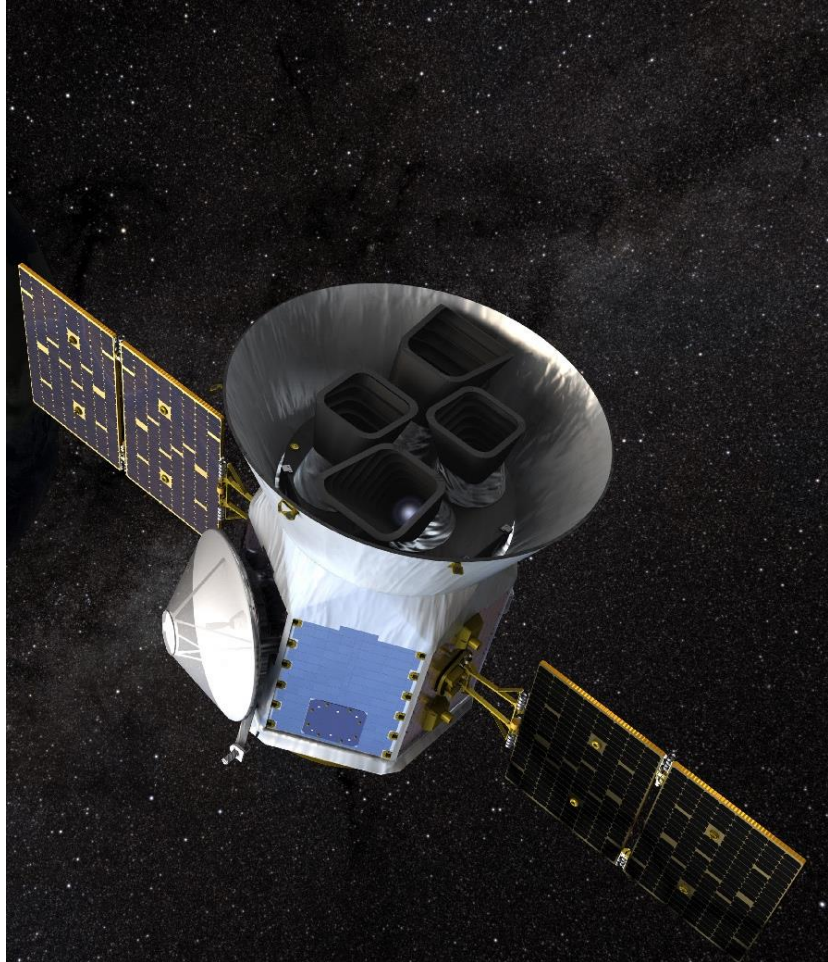


Chen et al. (2023)

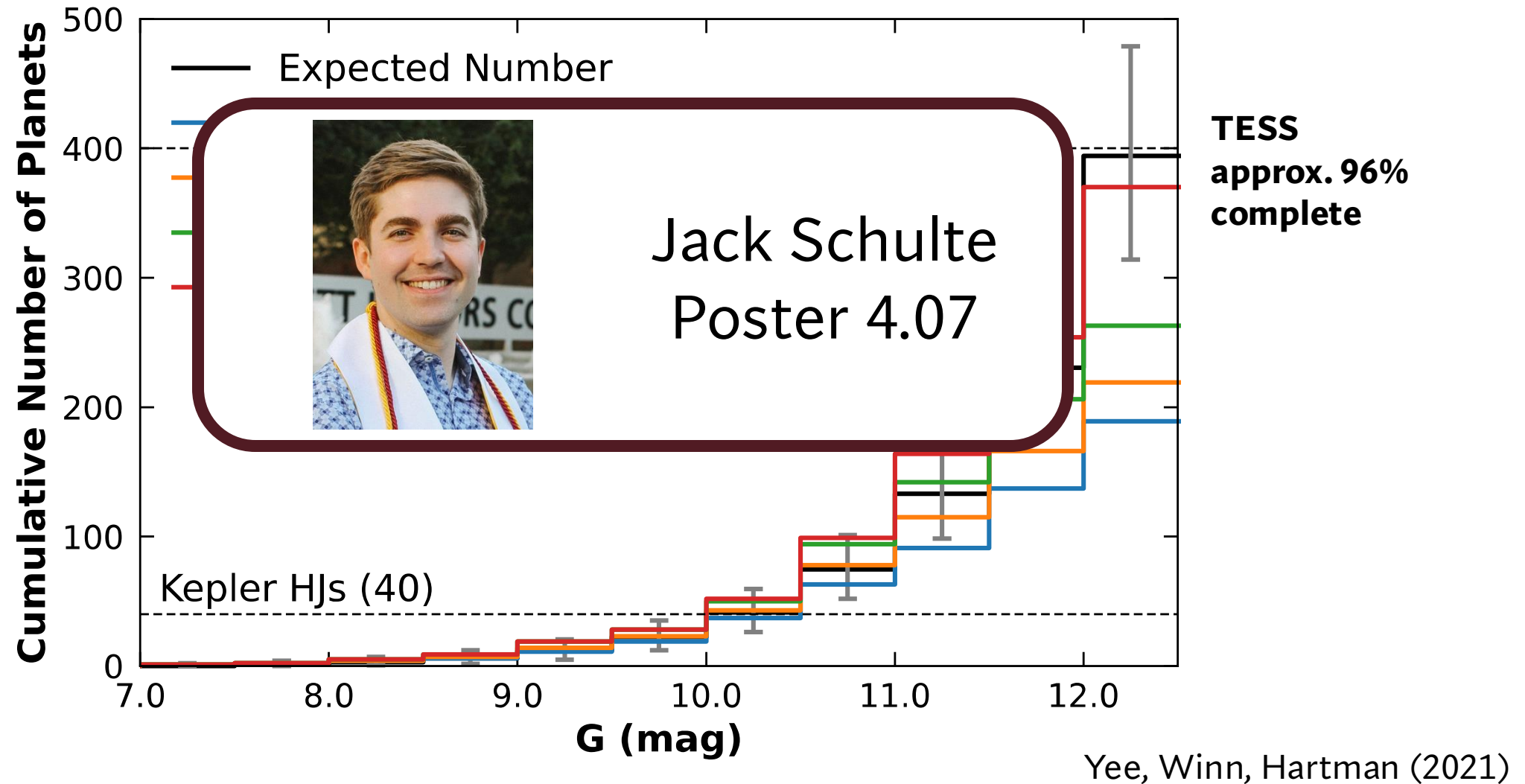


Miyazaki & Masuda (2023)

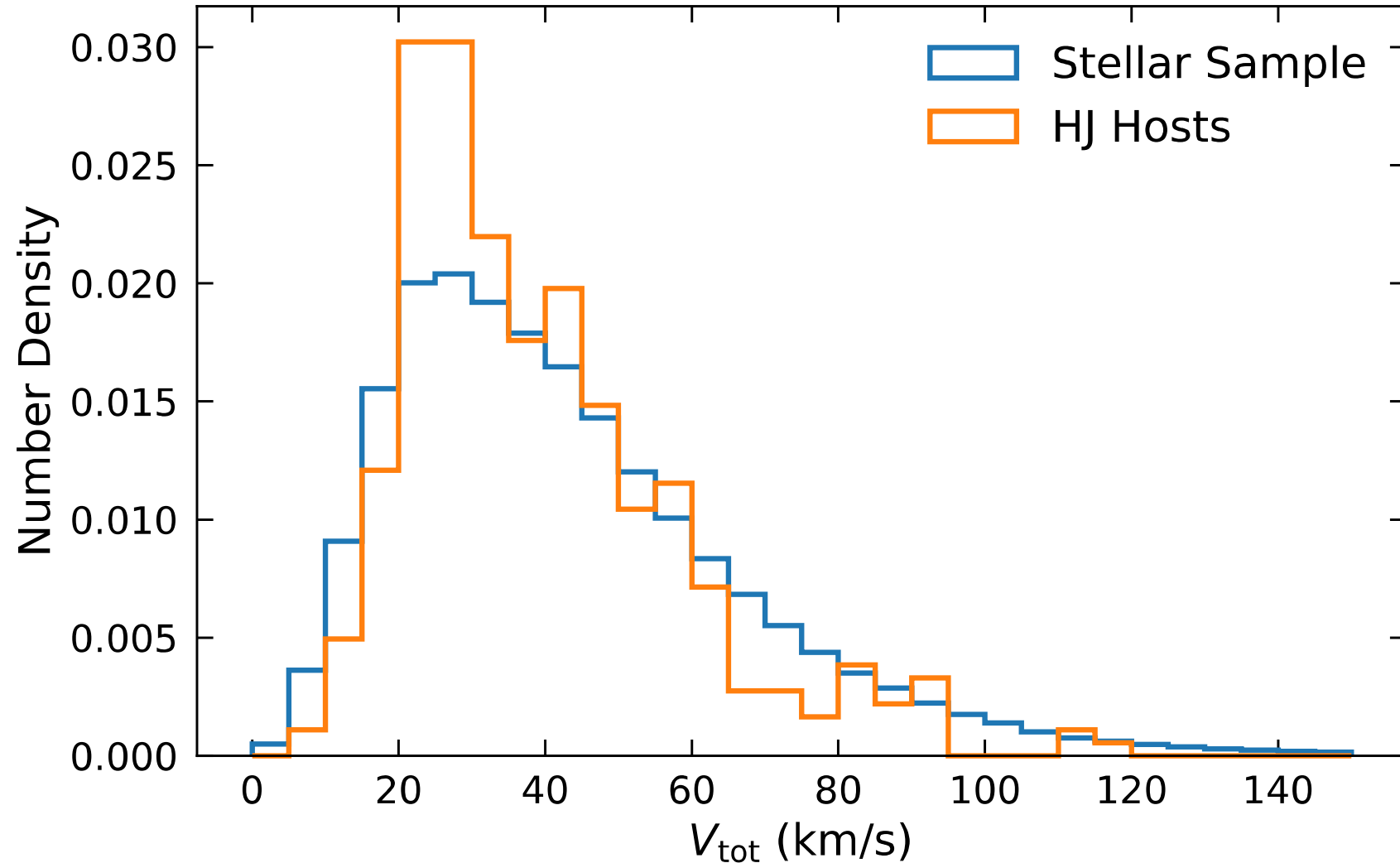
The TESS Grand Unified HJ Survey - Creating a statistical sample of HJs



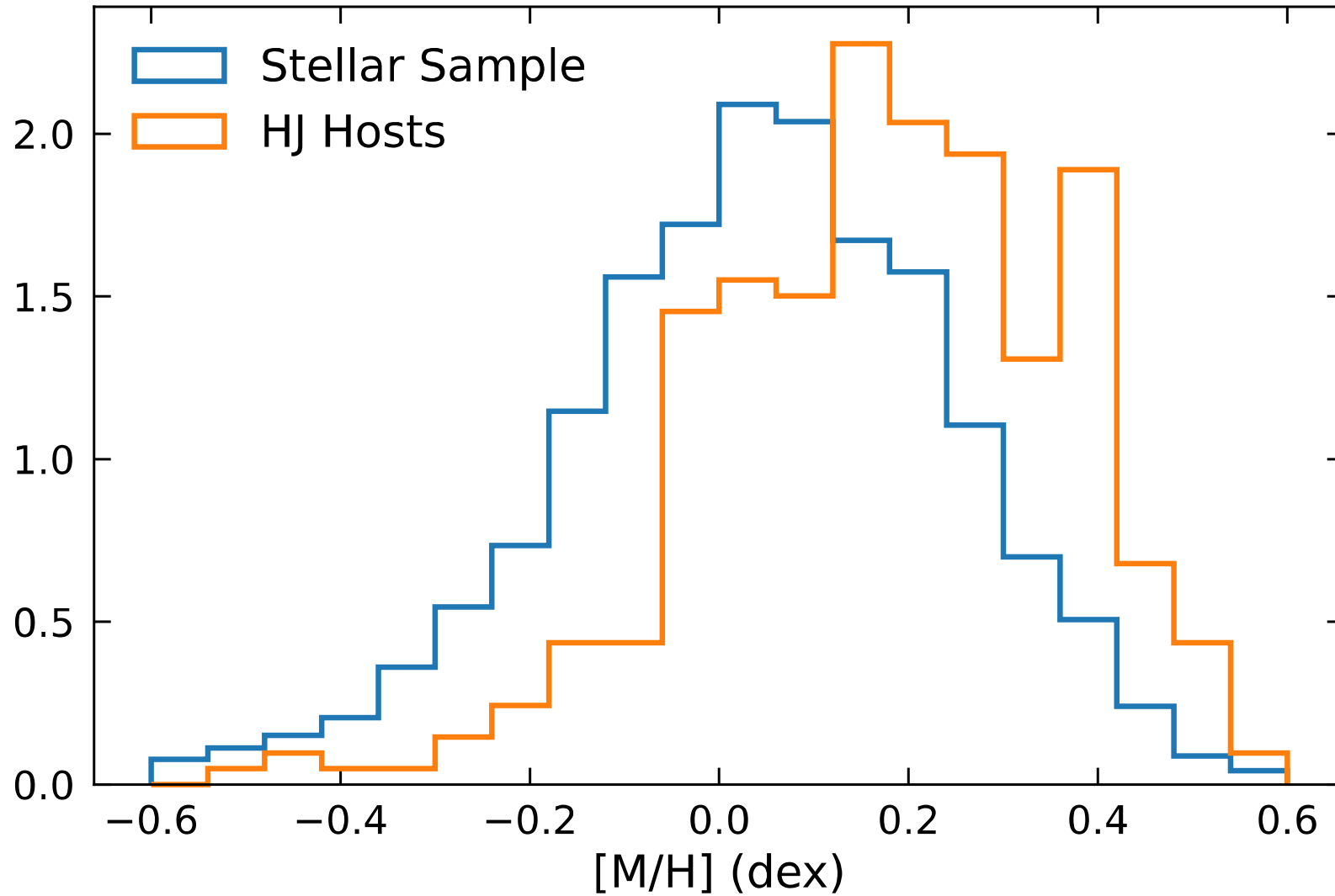
The TESS Grand Unified HJ Survey - Creating a statistical sample of HJs



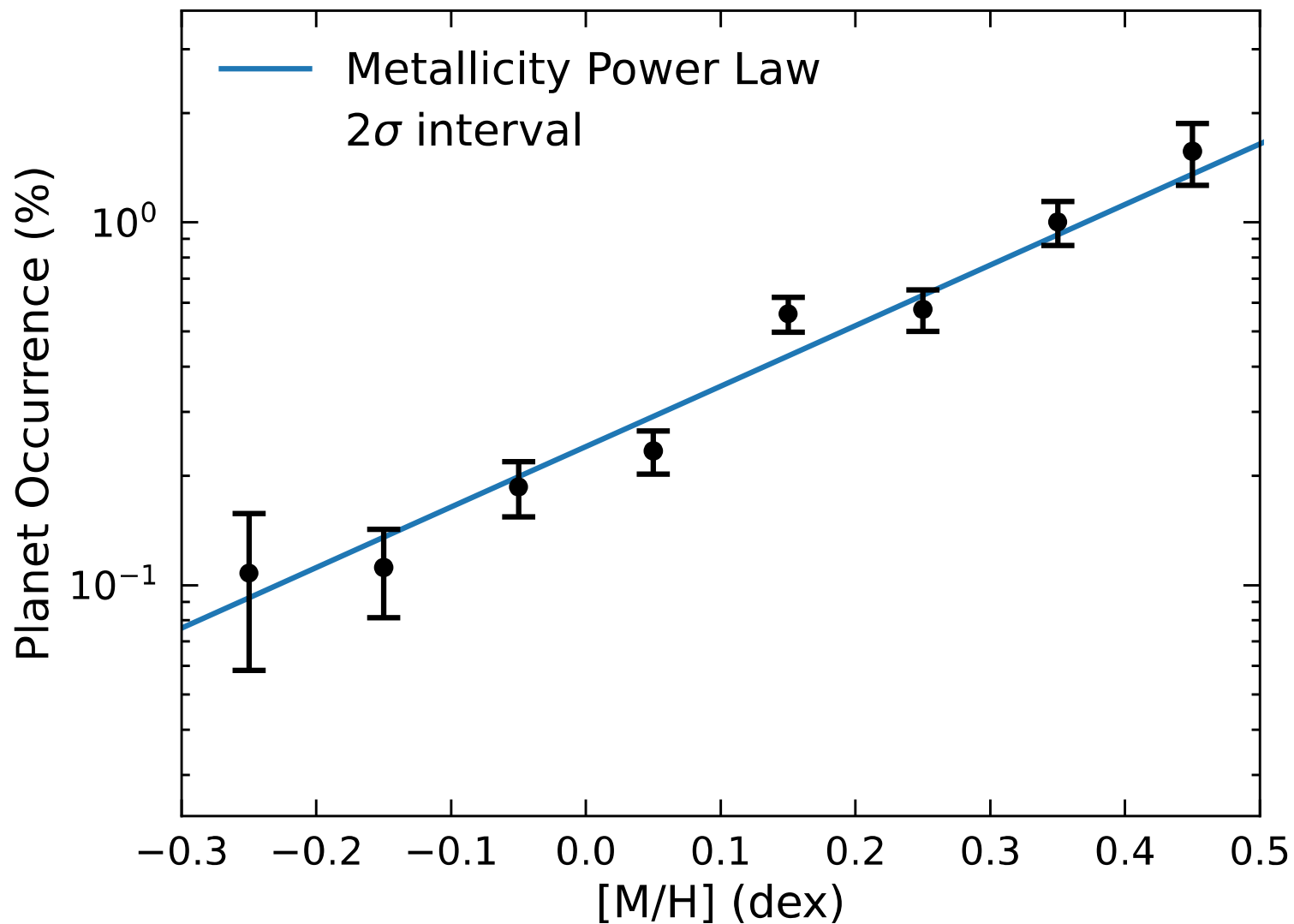
Galactic Velocity Distribution



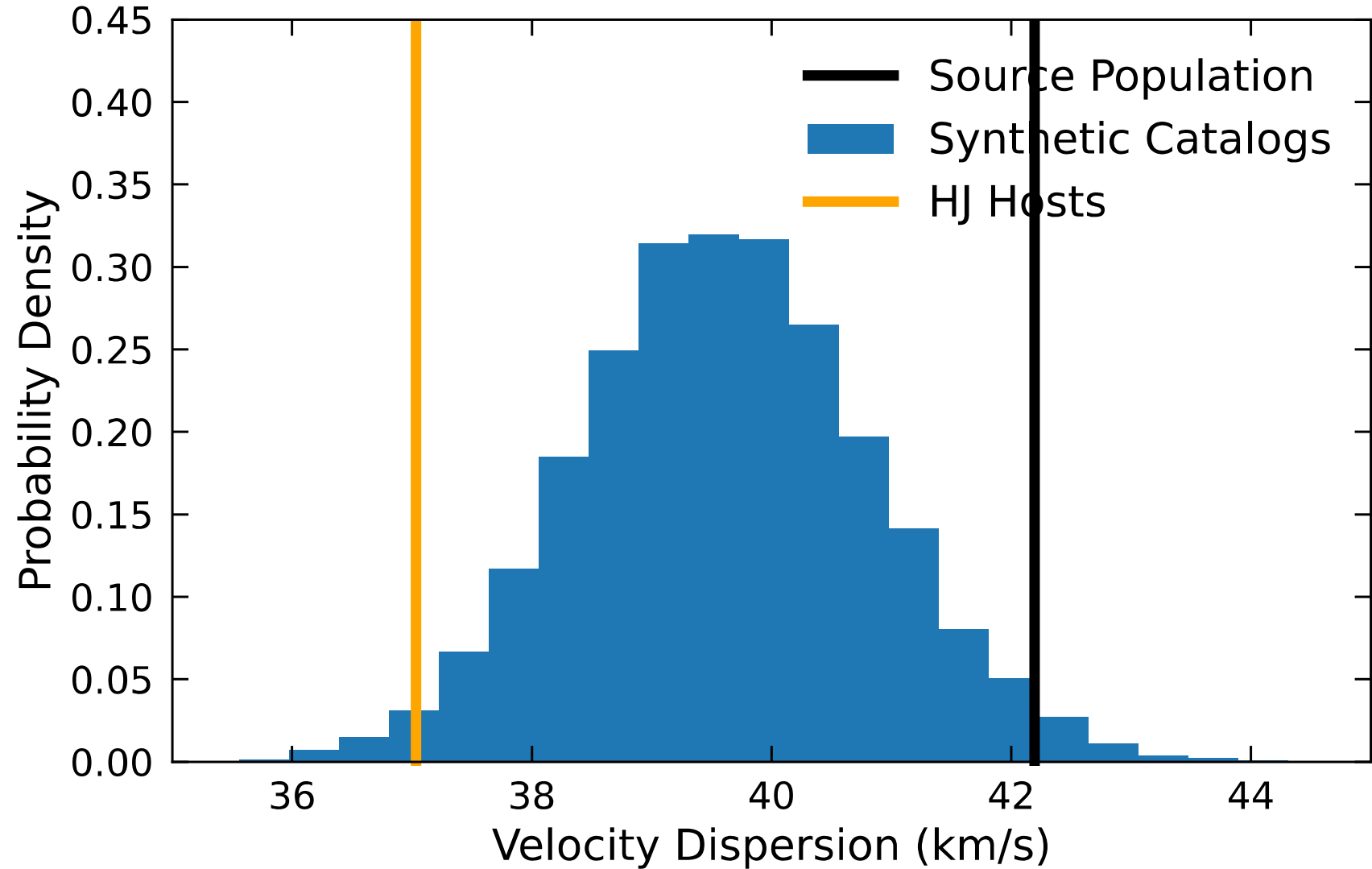
Metallicity Distribution



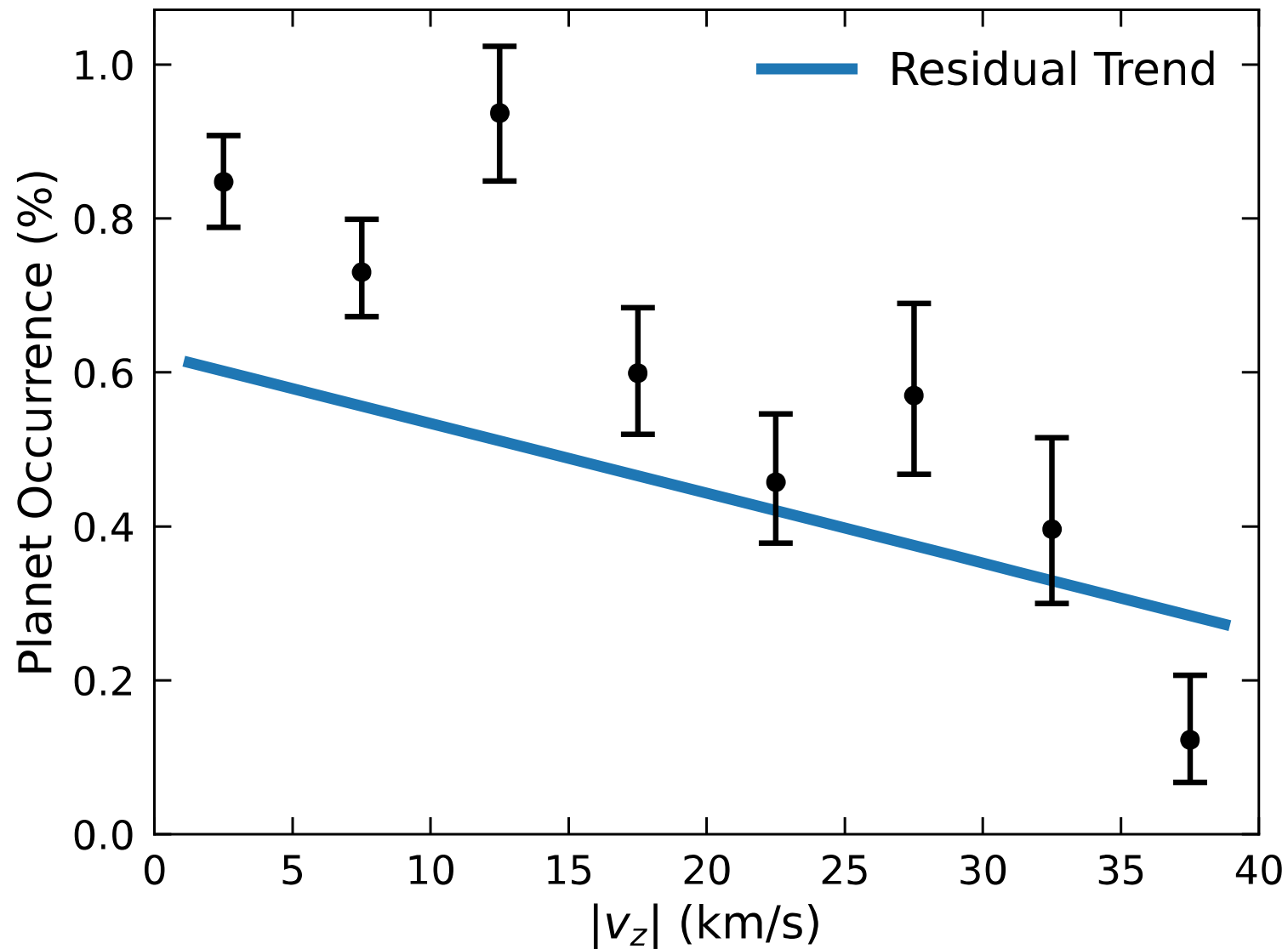
Metallicity Dependence



Correcting for Metallicity



Occurrence Rate

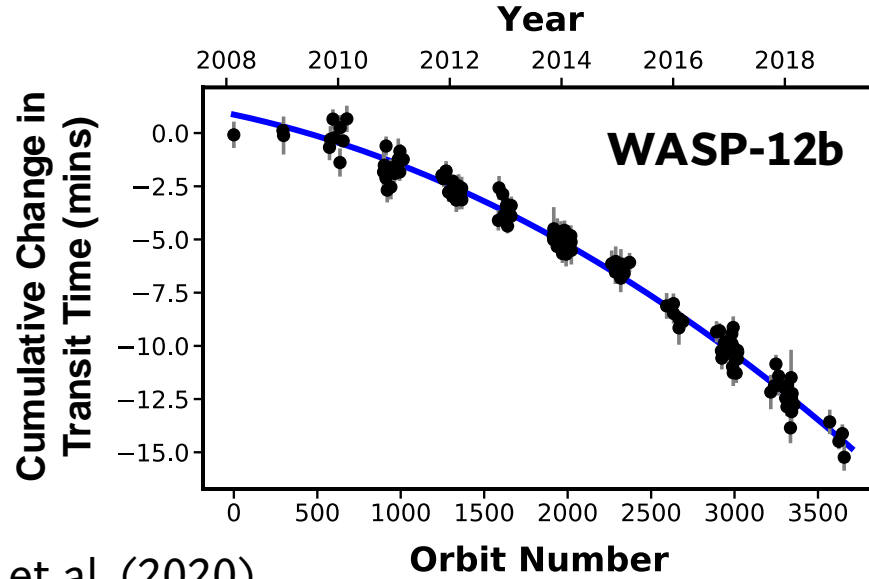


Hot Jupiters orbit kinematically young stars

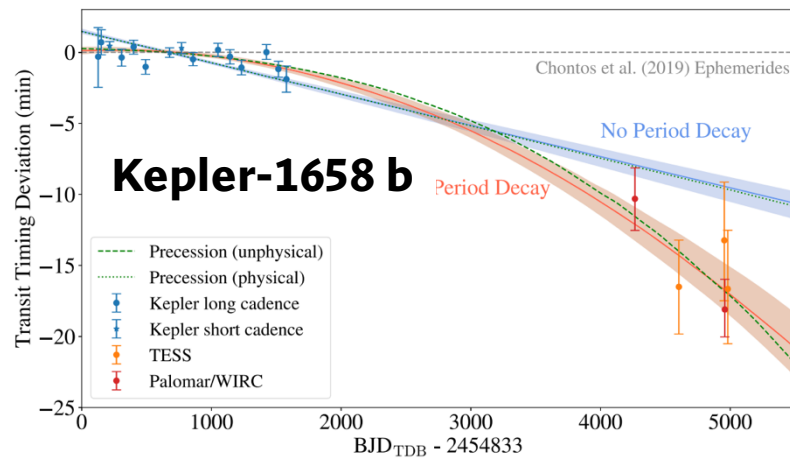
HJs destroyed by
tidal orbital decay

HJ formation was
less efficient in the
past

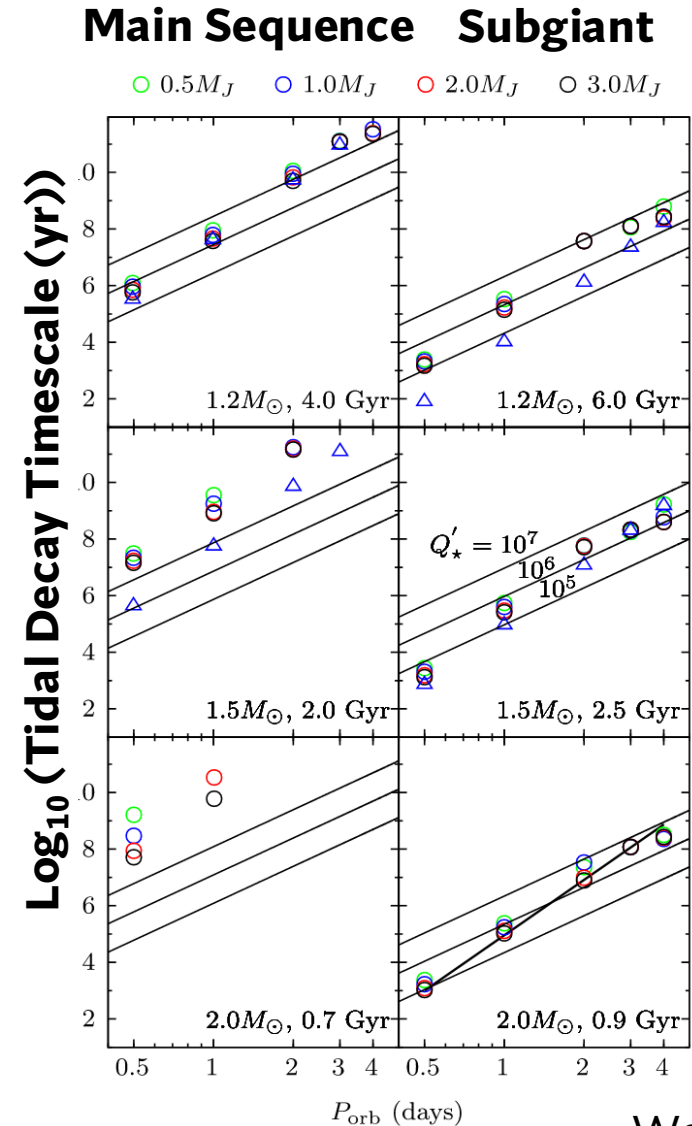
HJs destroyed by orbital decay?



Yee et al. (2020)

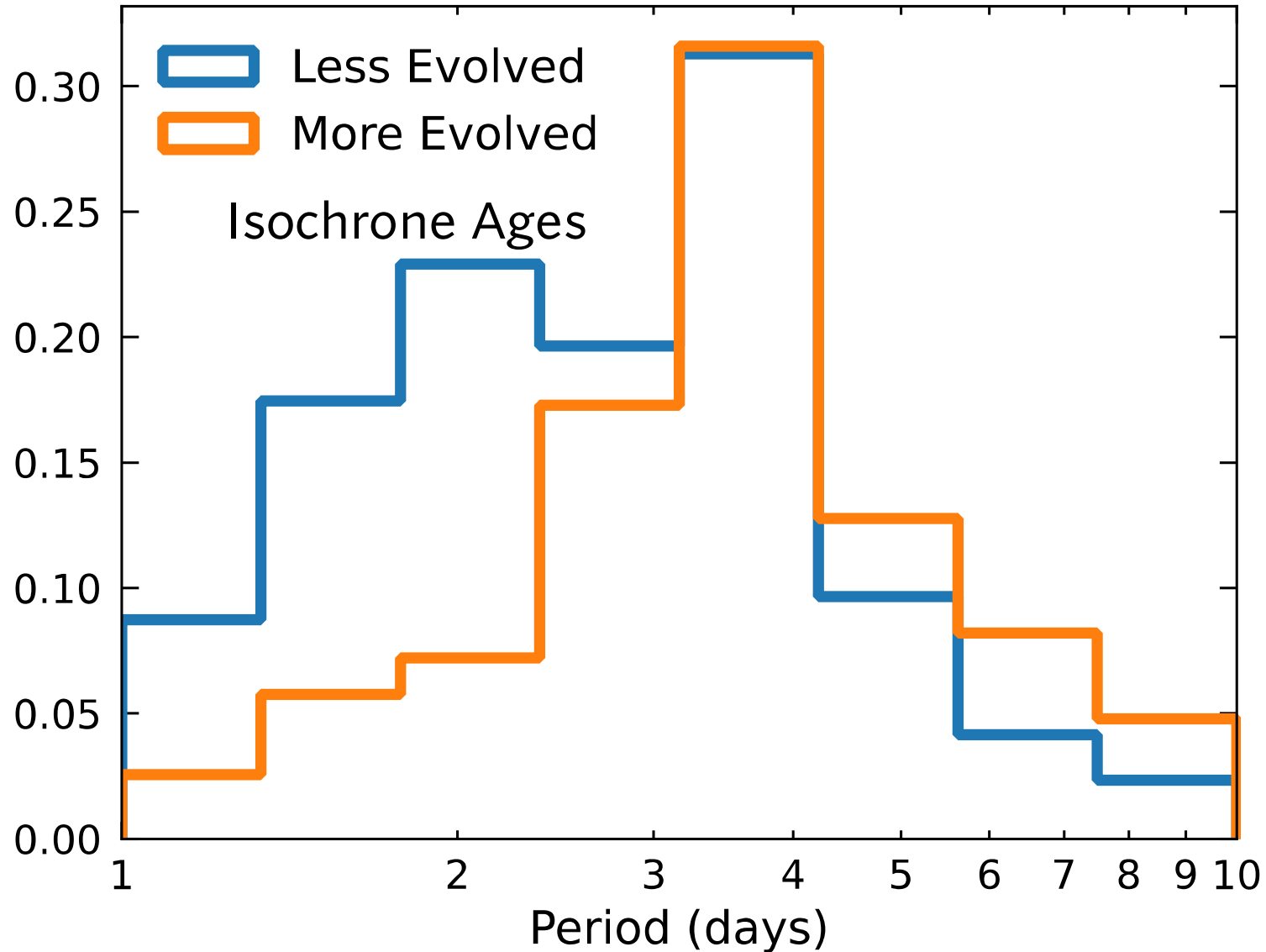


Vissapragada et al. (2022)

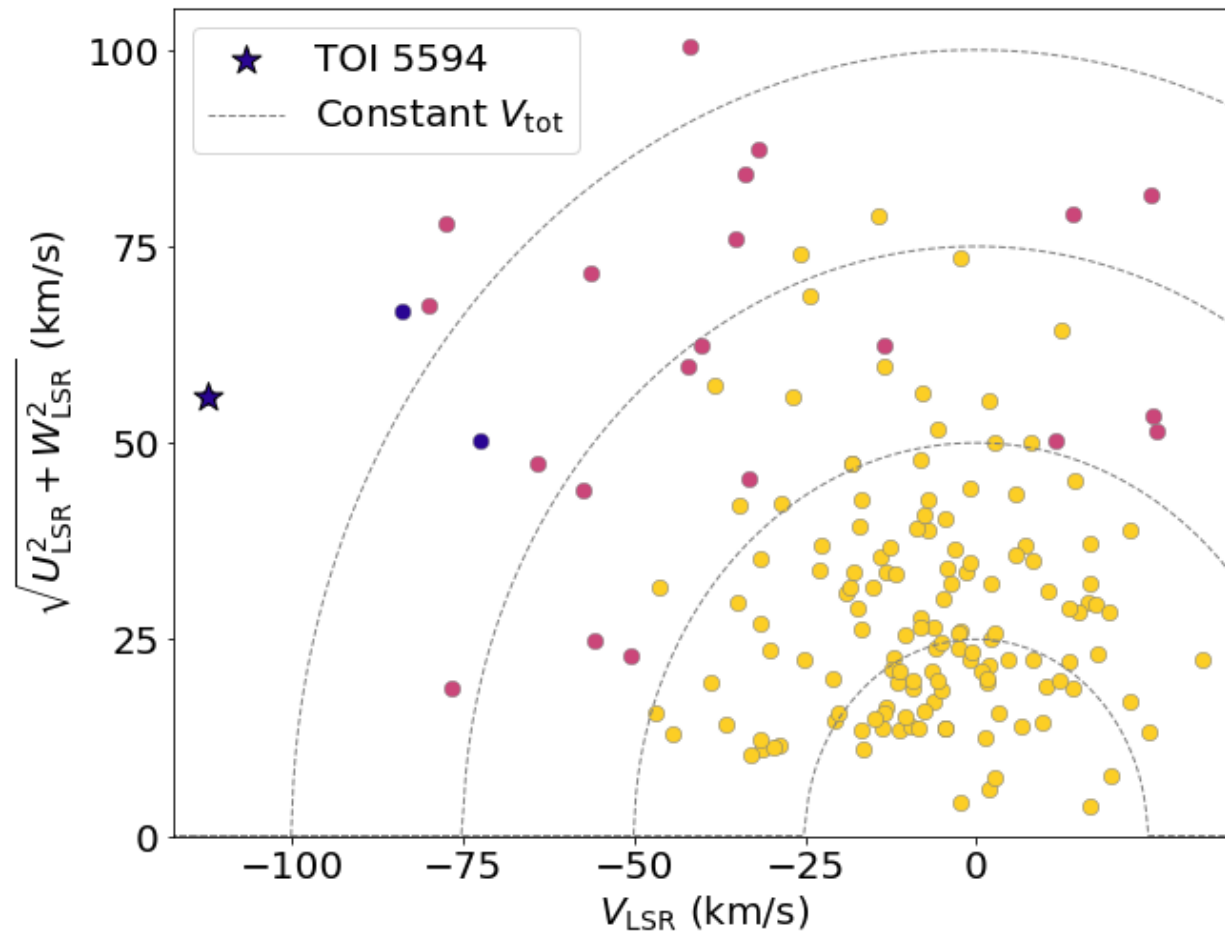


Weinberg et al. (2024)

HJs destroyed by orbital decay?



HJ formation less efficient in the past?



Victoria DiTomasso
Poster 4.11

Conclusions

- We have assembled a magnitude-limited sample of 400 transiting hot Jupiters ($G < 12.5$)
- Hot Jupiters orbit a kinematically young host star population.
- This effect is in addition to their metallicity dependence.
- Hot Jupiters destroyed by orbital decay, or was HJ formation less efficient in the past?