Off-Polar Hint: Hottest-Star Sub-Saturn Obliquity

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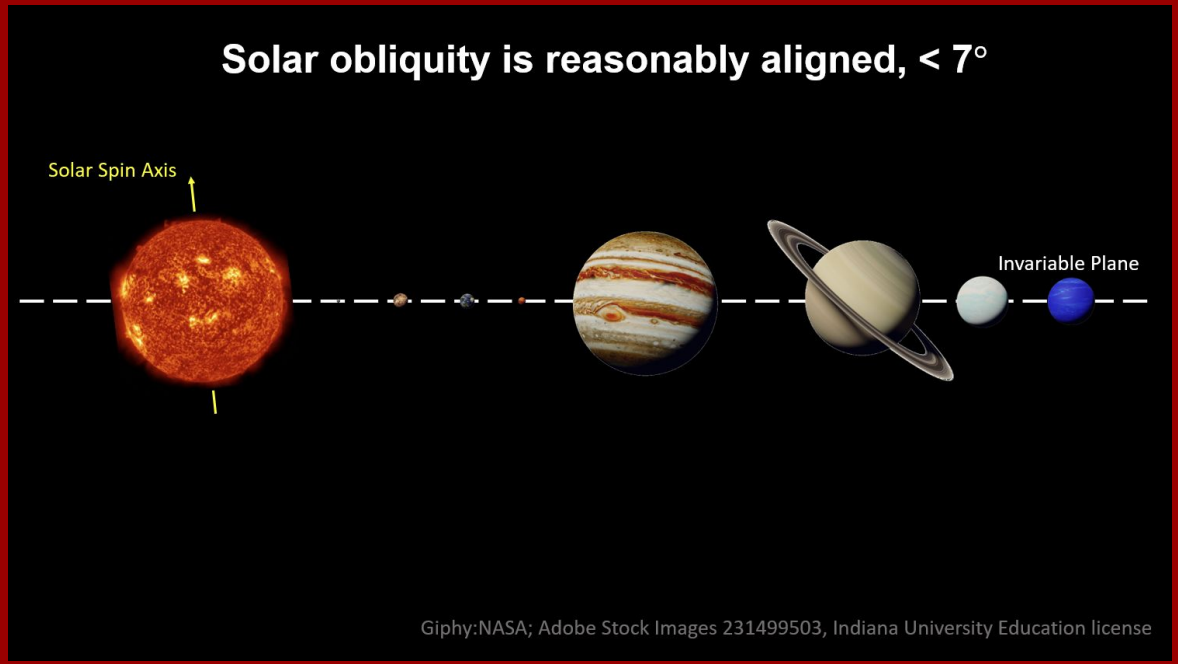
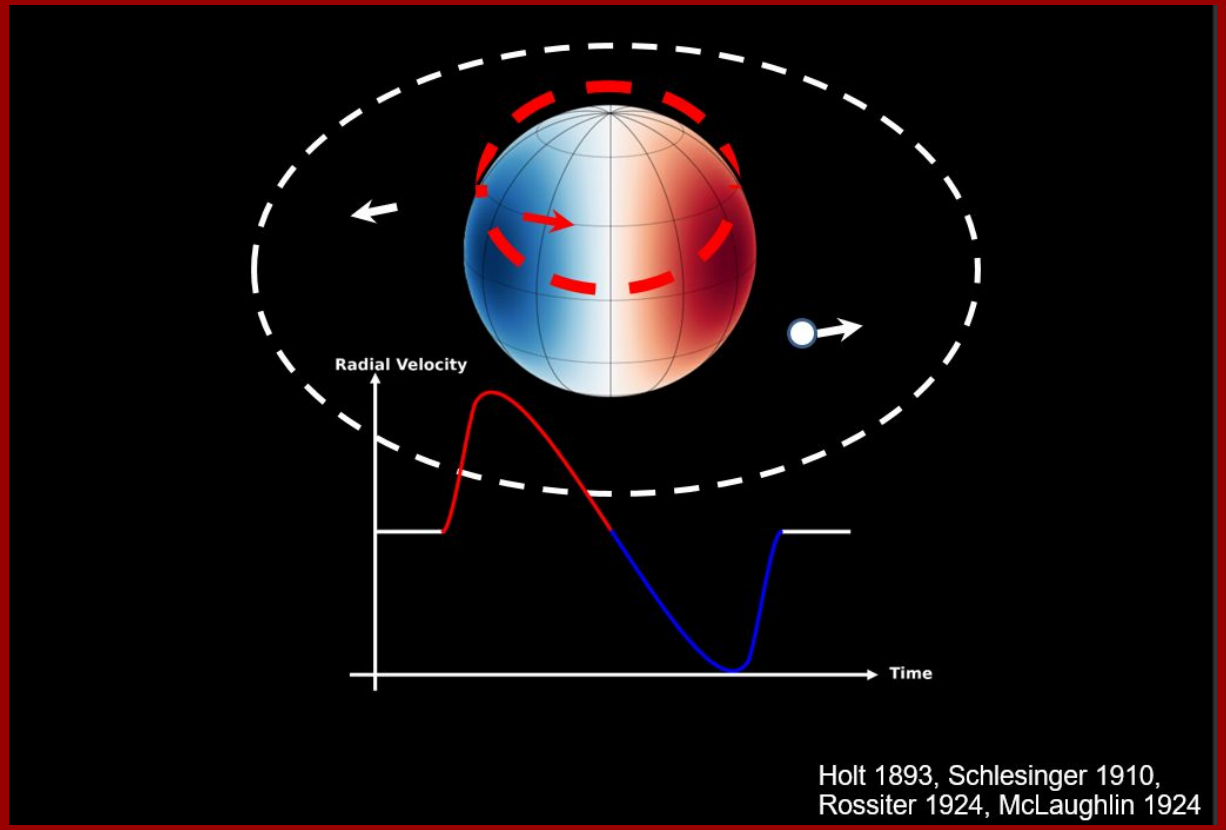
Solar System Alignment



What about exoplanets?

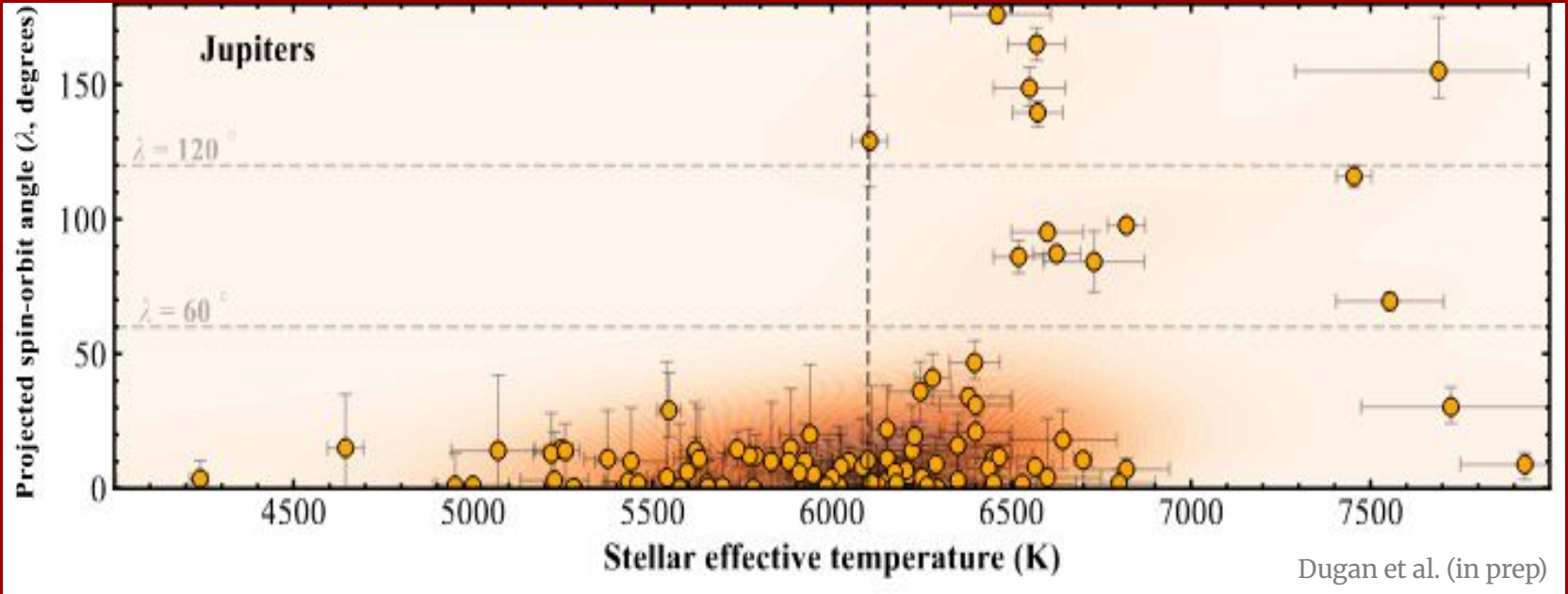
Rossiter-McLaughlin Effect



Jupiters T_{eff}-λ Relation

Aligned around cool stars

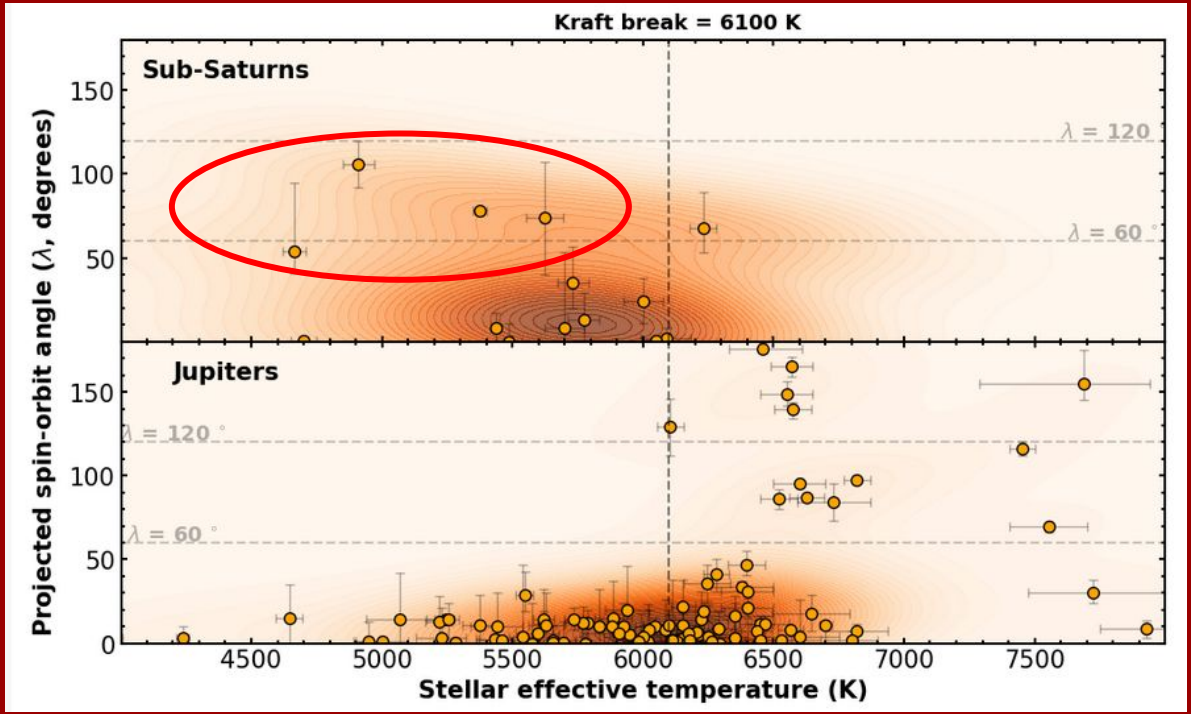
Misaligned around hot stars



Dugan et al. (in prep)

What about Sub-Saturns?

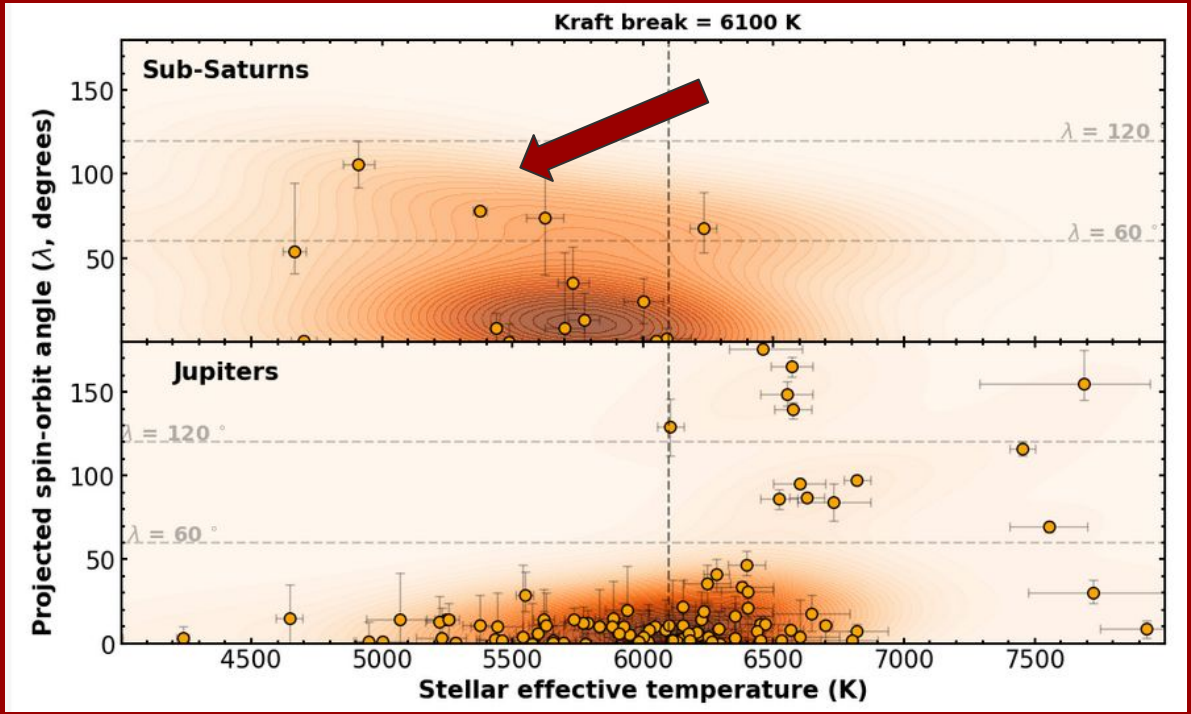
Sub-Saturn Results



- Sub-Saturns can be misaligned around cool stars

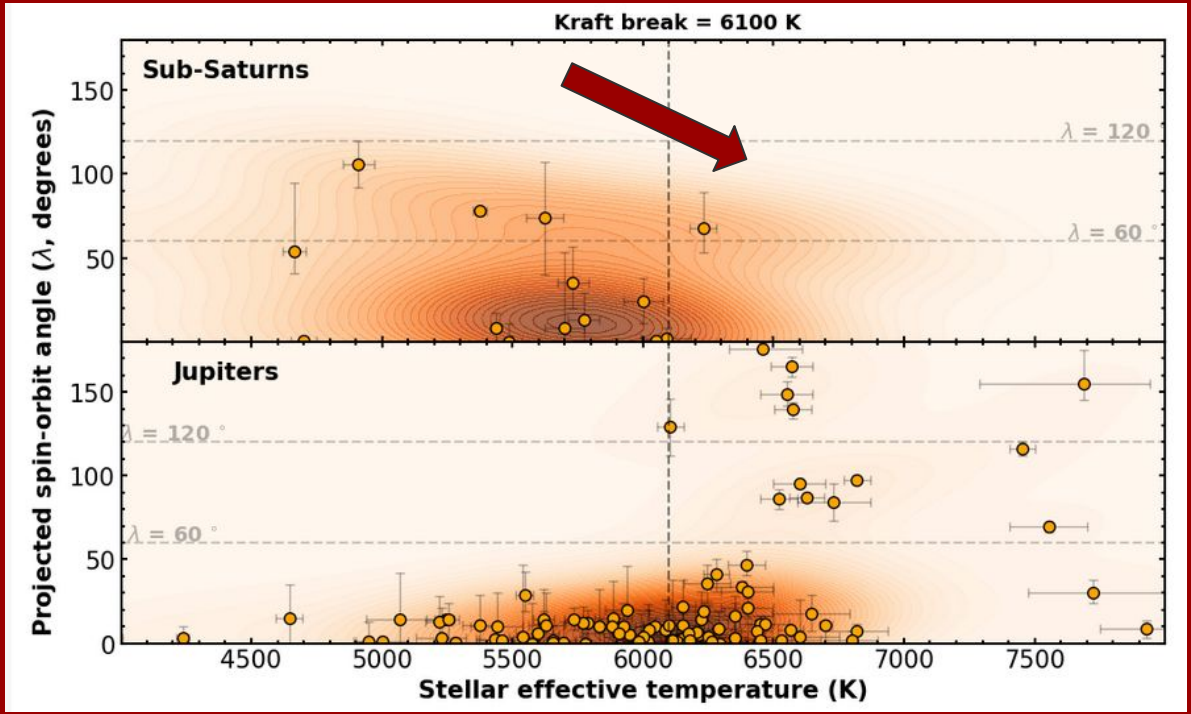
Sanchis-Ojeda & Winn 2011
Albrecht et al. 2022

Sub-Saturn Results



- Sub-Saturns can be misaligned around cool stars
- Sub-Saturns found on polar orbits

Extend to Hotter Stars

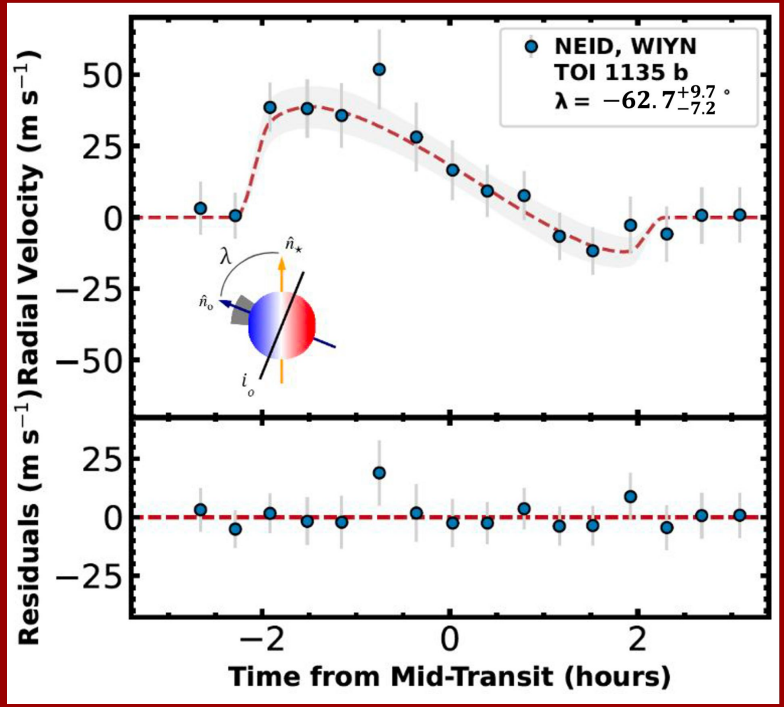


- Sub-Saturns can be misaligned around cool stars
- Sub-Saturns found on polar orbits

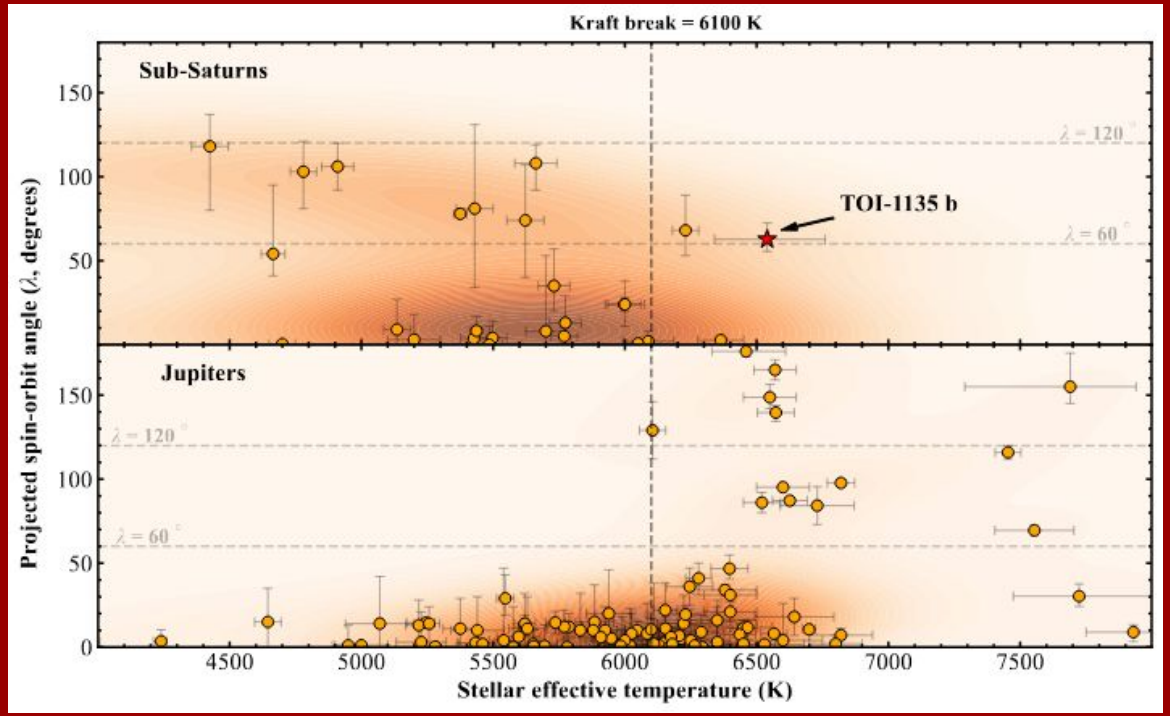
Hottest Sub-Saturn RM Measurement

TOI-1135

- Hot star
- Puffy, Saturn-Mass planet
- Close-in orbit
- ***Near***-polar obliquity

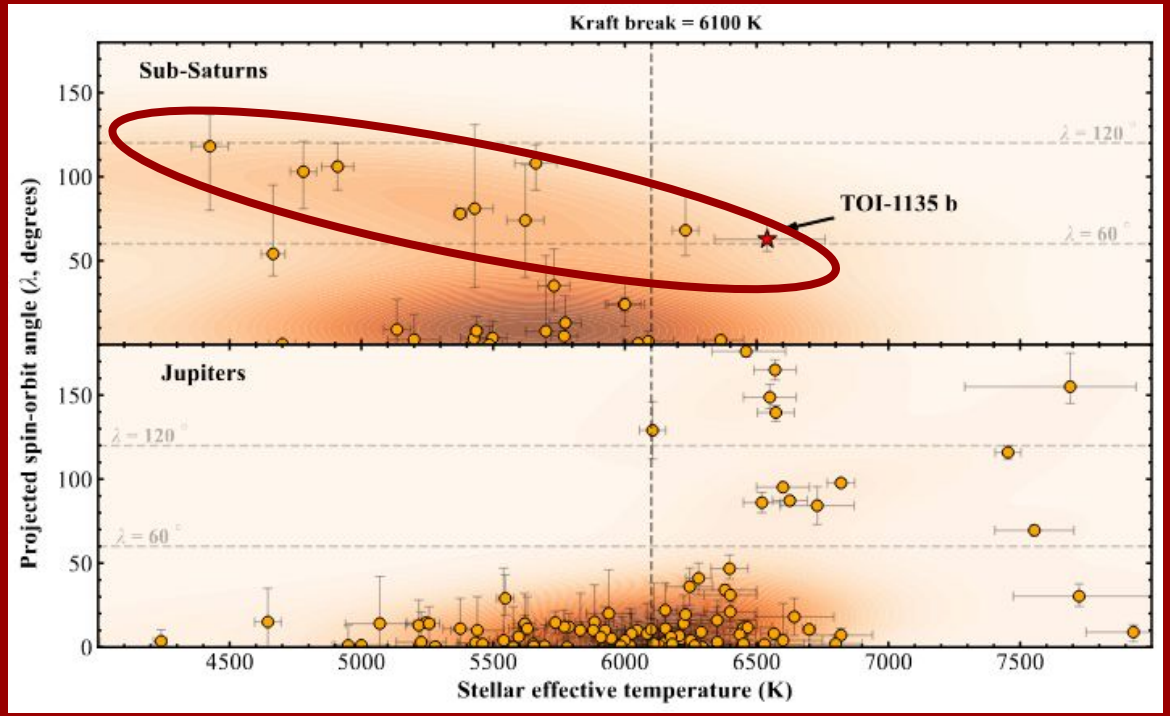


Potential T_{eff}-λ Correlation



- Sub-Saturns found on polar orbits around cooler stars
- Possible off-polar orbit around hotter stars

Potential T_{eff}-λ Correlation



- Sub-Saturns found on polar orbits around cooler stars
- Possible off-polar orbit around hotter stars

Summary

- TOI-1135 is the ***hottest*** star with RM measurements of a sub-Saturn
- Sub-Saturns ***can*** be misaligned around cool stars
- Generally, Sub-Saturns are on ***polar*** orbits
- Sub-Saturns around hotter stars are ***off-polar***

THANK YOU!