

# “Broadband UV from GALEX does not trace Star-Planet Interaction”



## A statistical search for Star-Planet Interaction in the Ultraviolet using GALEX

### Introduction

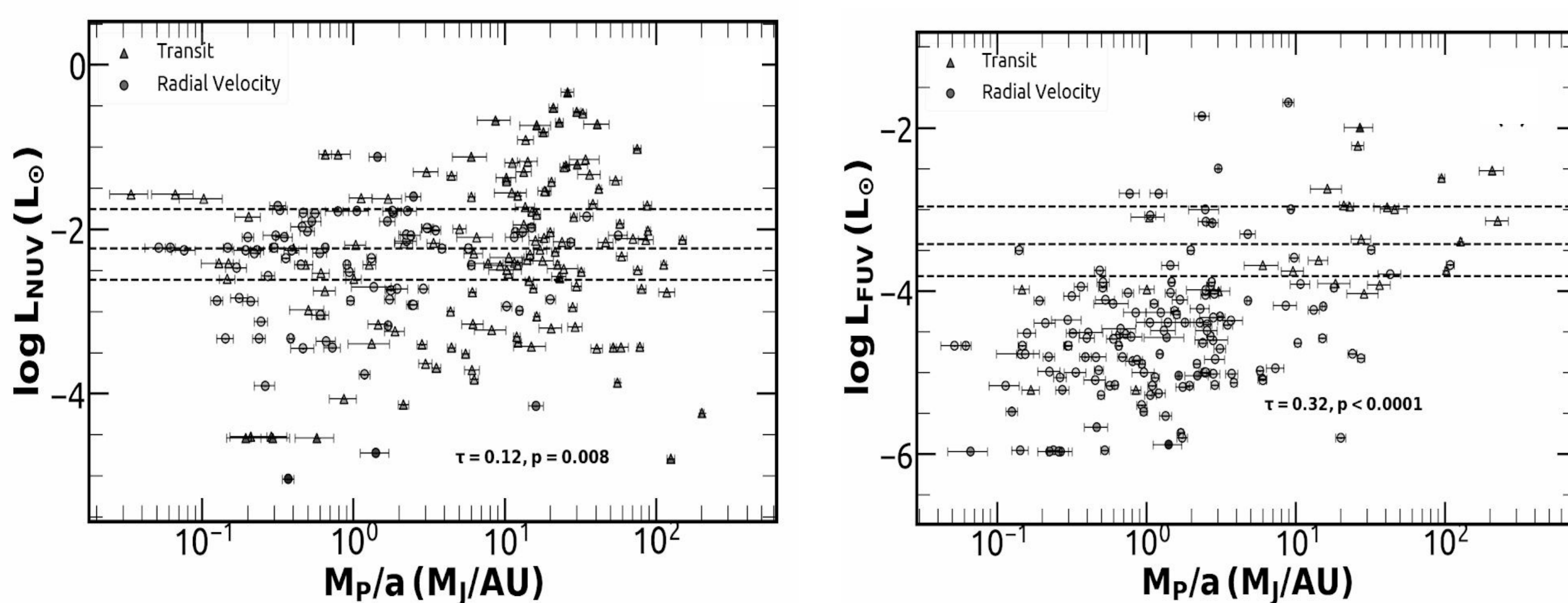
- Close in planets can interact with the stellar magnetic or stellar wind
- This can lead to an enhancement of stellar chromospheric activity or radio emission from either the star or planet
- Several studies have shown strong modulation in the Ca II H & K lines (chromospheric activity indicators) due to the planets motion.
- These studies have however only targeted individual systems and only a handful of statistical studies on SPI have been carried out.

### Sample

- Our initial sample consisted of 3885 exoplanet around 2900 host stars.
- We queried the Gaia eDR2 catalog to retrieve the stellar properties and distance
- We crossmatched our sample with the GALEX data release GR6/7
- We further filtered out sources with an extraction or artifact flag > 0
- Our final sample consists of 215 NUV detected host stars with 178 planets and 166 FUV detected host stars with 123 planets with their planet mass  $M_p$  measured with  $3\sigma$  or better significance

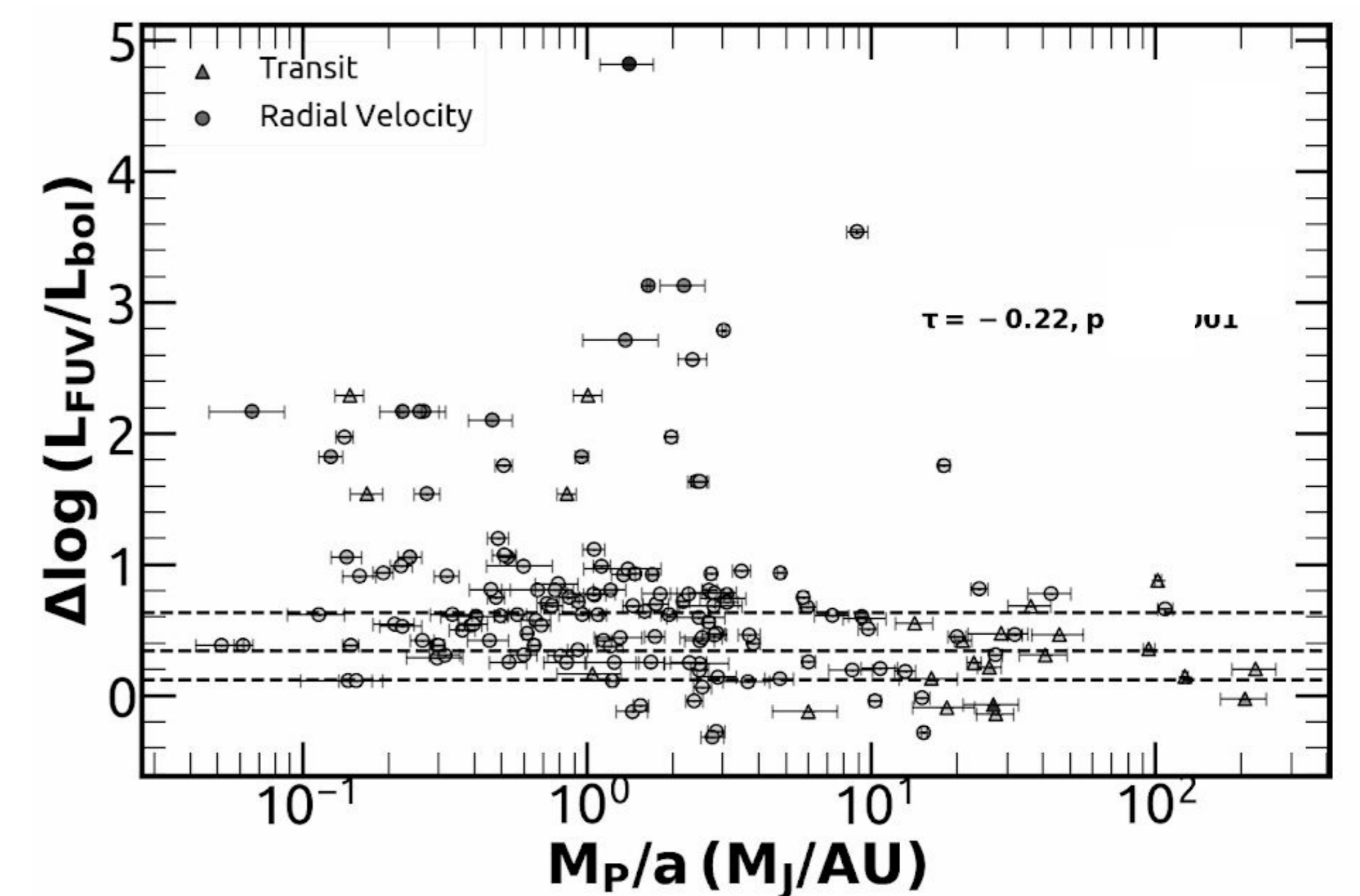
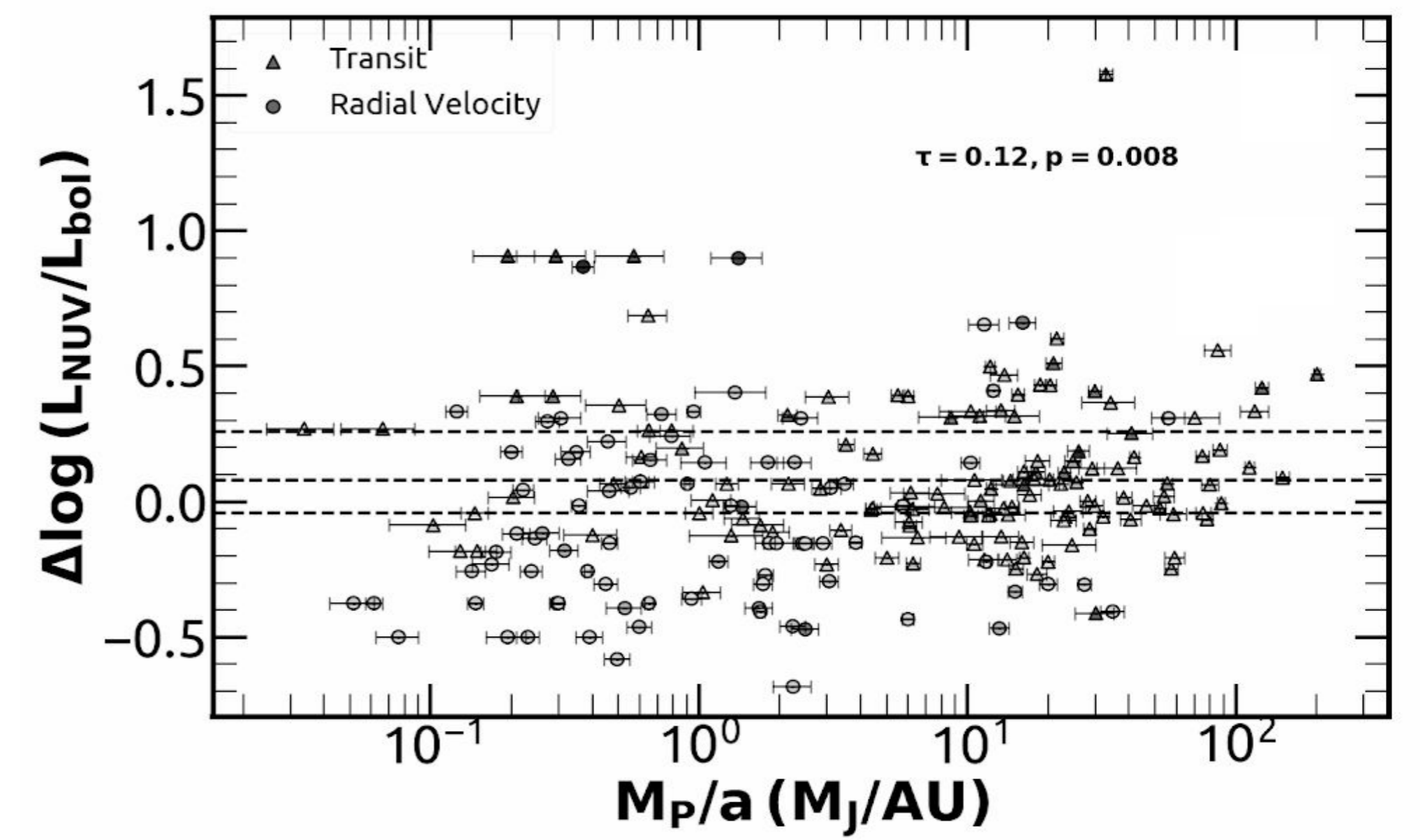
### Results

- We used  $M_p/a$  (planet mass / semi major axis) as a proxy for the magnetic field strength of the planet.



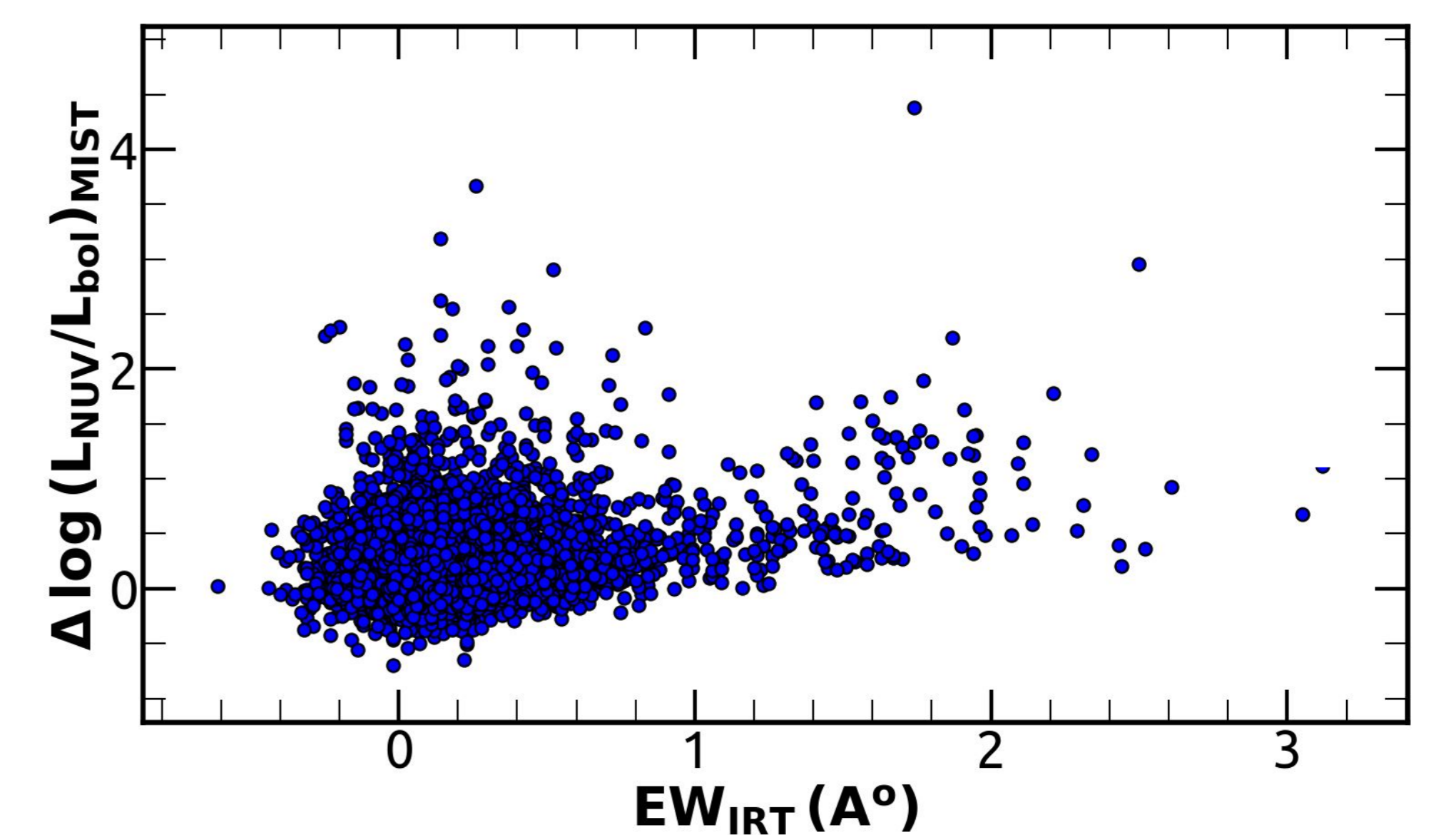
Variation of  $L_{NUV}$  and  $L_{FUV}$  of the host stars as a function of  $M_p/a$

- No strong evidence for enhanced (or excess) NUV or FUV flux
- However both  $L_{NUV}$  and  $L_{FUV}$  are function of the  $T_{eff}$  of the host star
- We using an empirical relation (based on field stars) removed the  $T_{eff}$  dependance from  $L_{NUV}$  and  $L_{FUV}$
- The quantities  $\Delta \log (L_{NUV}/L_{bol})$  &  $\Delta \log (L_{FUV}/L_{bol})$  are independent of  $T_{eff}$



Variation of  $\Delta \log (L_{NUV}/L_{bol})$  &  $\Delta \log (L_{FUV}/L_{bol})$  of the host stars as a function of  $M_p/a$

- After correcting for  $T_{eff}$  dependency no correlation between UV flux and  $M_p/a$
- We further studied a sample of active stars from RAVE survey



Variation of  $\Delta \log (L_{NUV}/L_{bol})$  as a function of EW of Ca IR triplet

- Only in extreme cases, broadband UV correlates with chromospheric activity indicators

### Summary

- We investigated observational signatures of SPI for systems with close-in planets in UV
- We find no strong evidence for SPI in UV.
- Broadband UV only trace high levels of chromospheric activity.

Viswanath, G., Narang, M., Manoj, P., et al. 2020, AJ, 159, 194.