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# Probing the compositional link between terrestrial planets and their stars with EPRV observations

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Wilson et al. 2022.  
A pair of sub-Neptunes transiting the bright K-dwarf TOI-1064 characterized with CHEOPS. (MNRAS, 511, 1043).

## Motivation

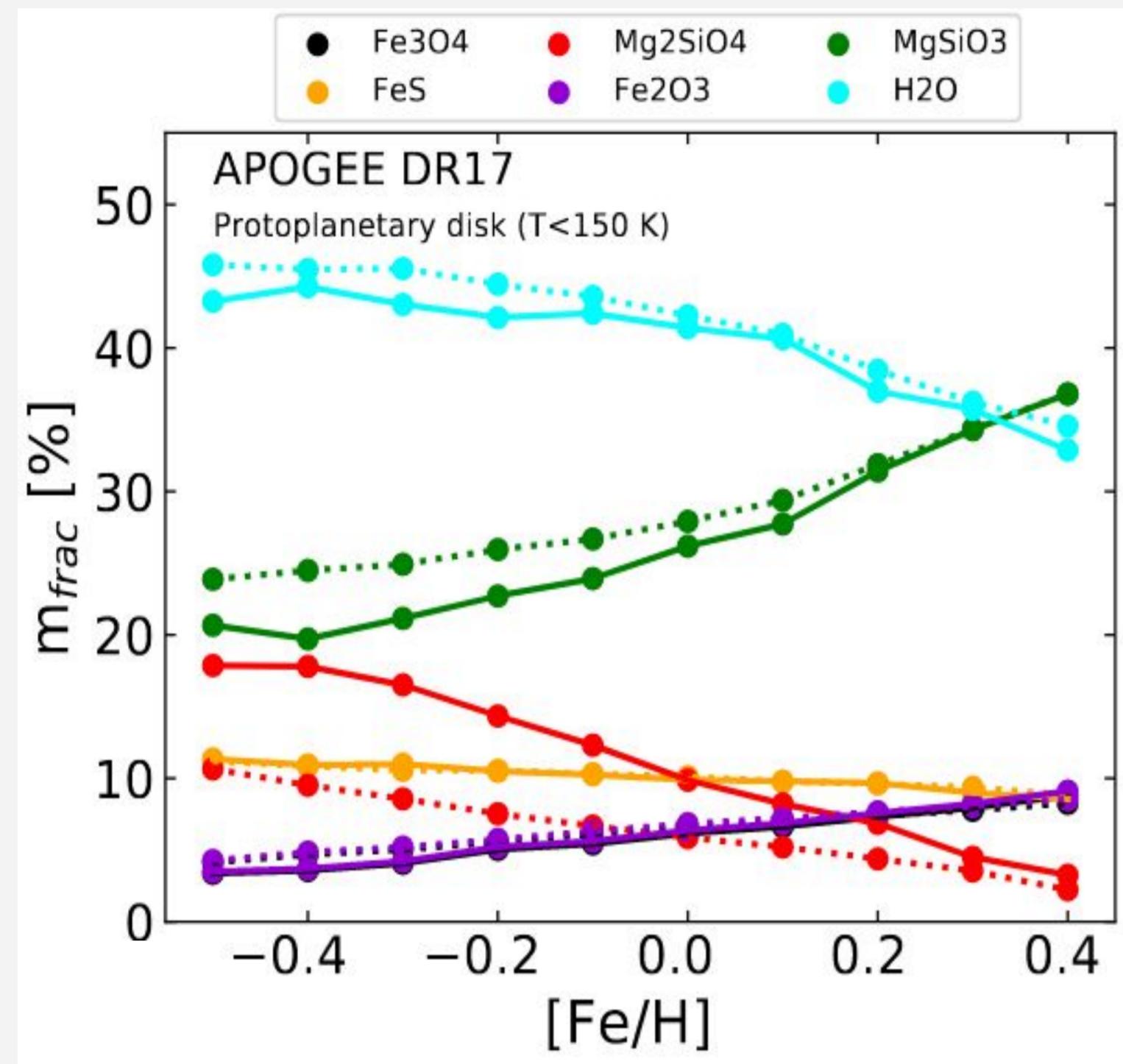


Fig. 1: Stellar metallicity v disk molecular fraction[1]

- Protoplanetary disk molecular fraction is predicted to vary with stellar metallicity[1,2].
- These abundances are not thought to change considerably during planet formation[3].
- Stellar refractory abundances can be proxies for planet building blocks[4,5,6,7,8] that may lead to a diversity in the interiors and atmospheres of planets orbiting metal-diverse stars[9].

## EPRV study:

We are testing predictions by obtaining the masses of small planets around metal-diverse stars

## TOI-1064[10]

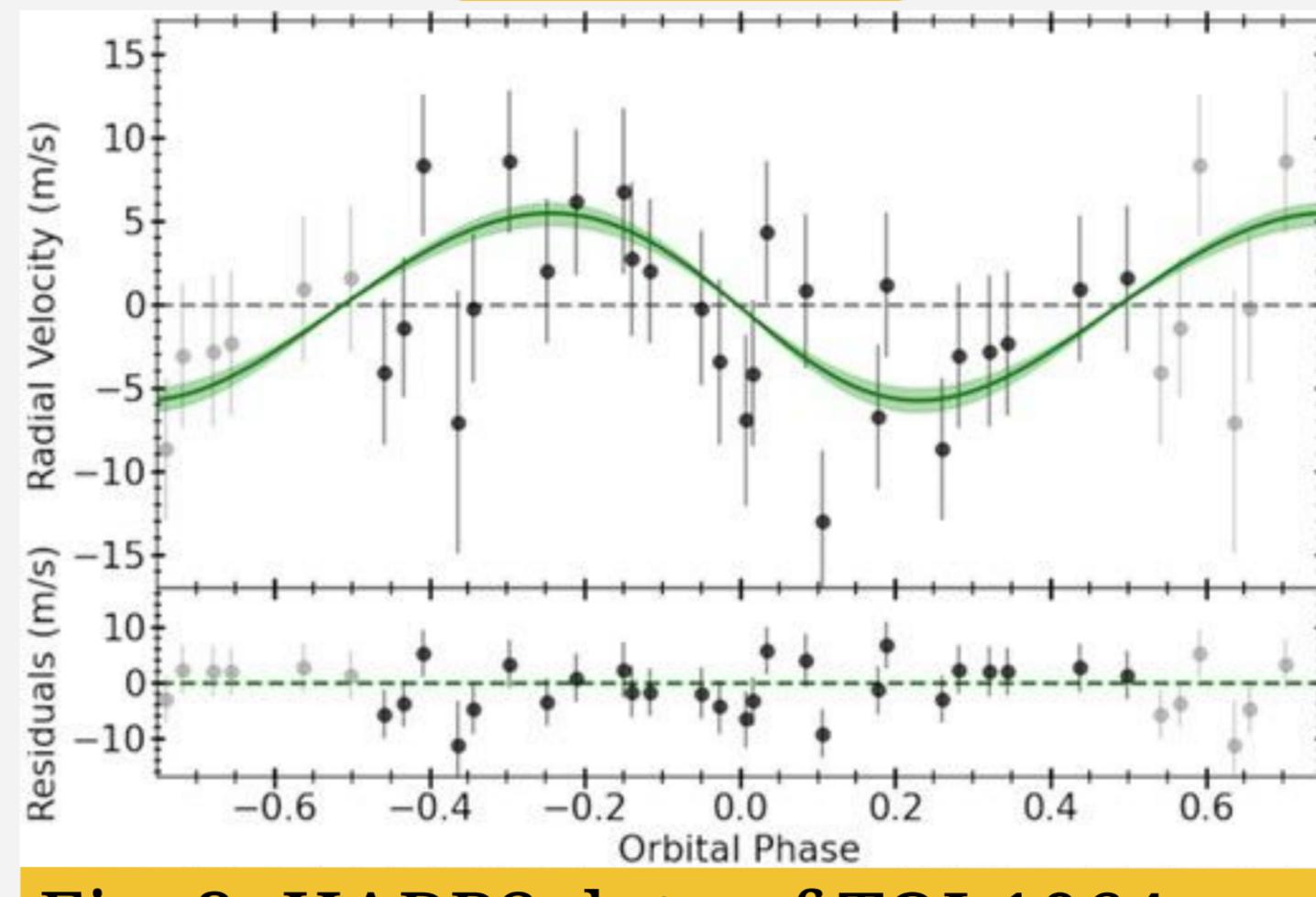


Fig. 2: HARPS data of TOI-1064 c

## TOI-561[11]

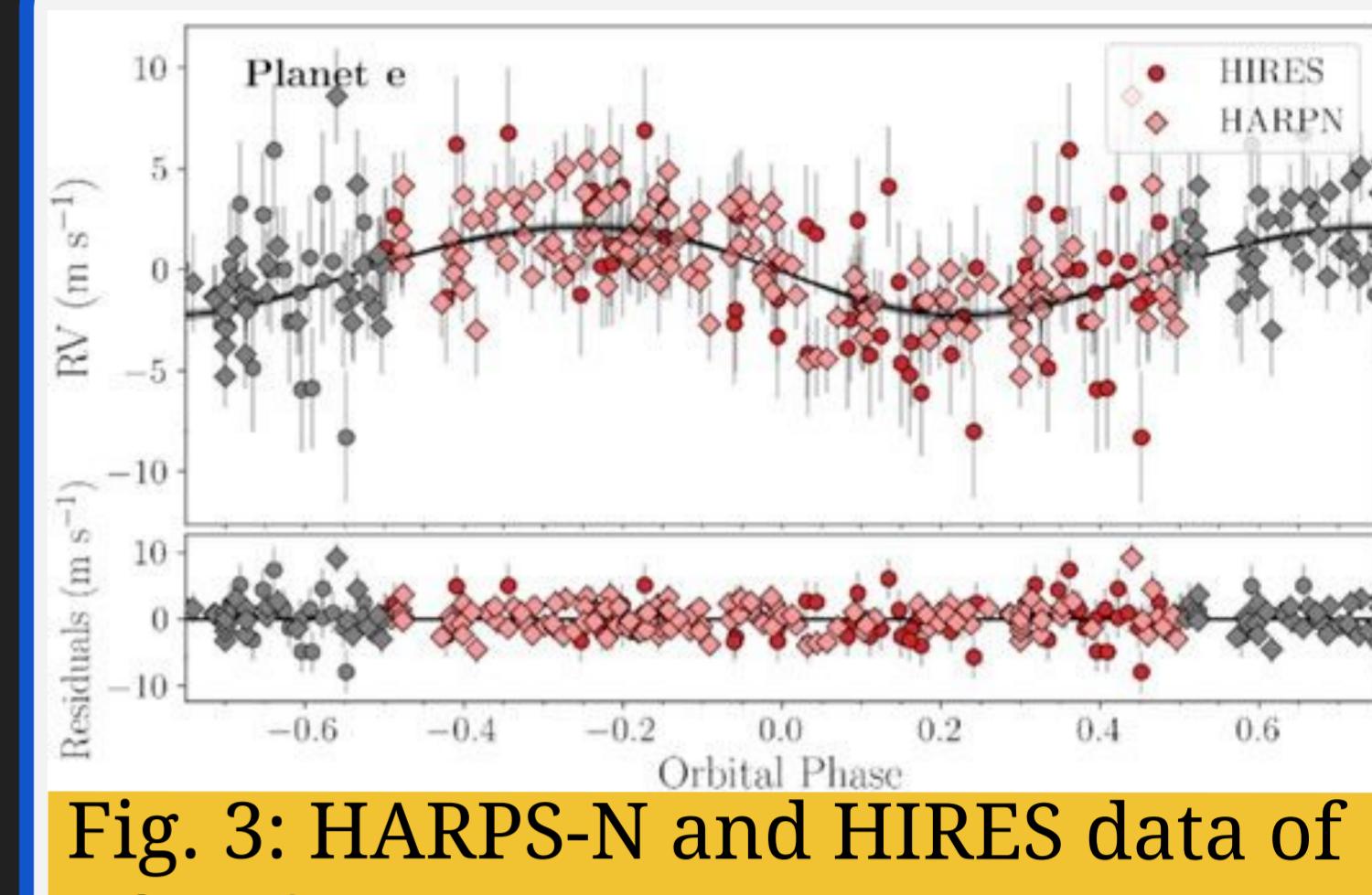


Fig. 3: HARPS-N and HIRES data of TOI-561 e

## TOI-836[12]

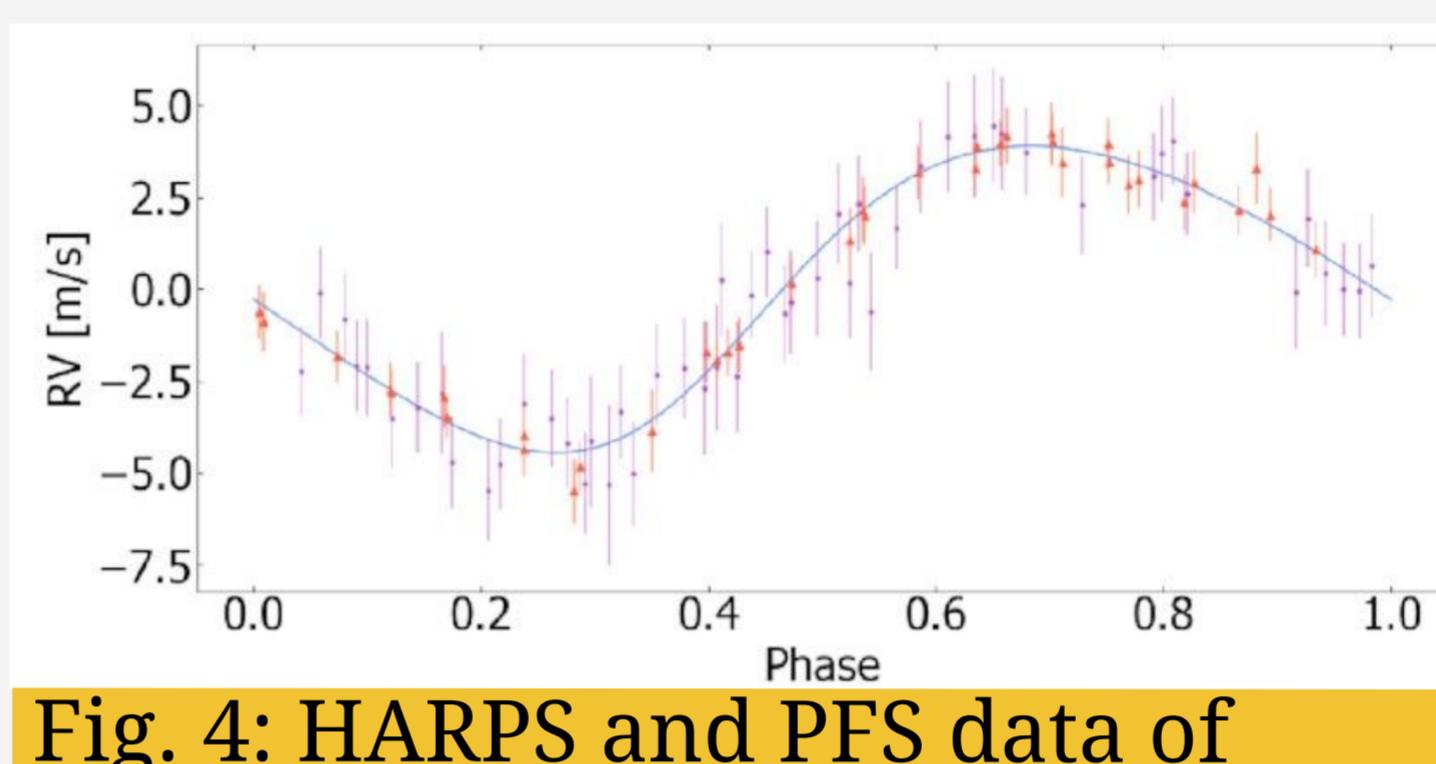


Fig. 4: HARPS and PFS data of TOI-836 c

## v<sup>2</sup> Lupi[13]

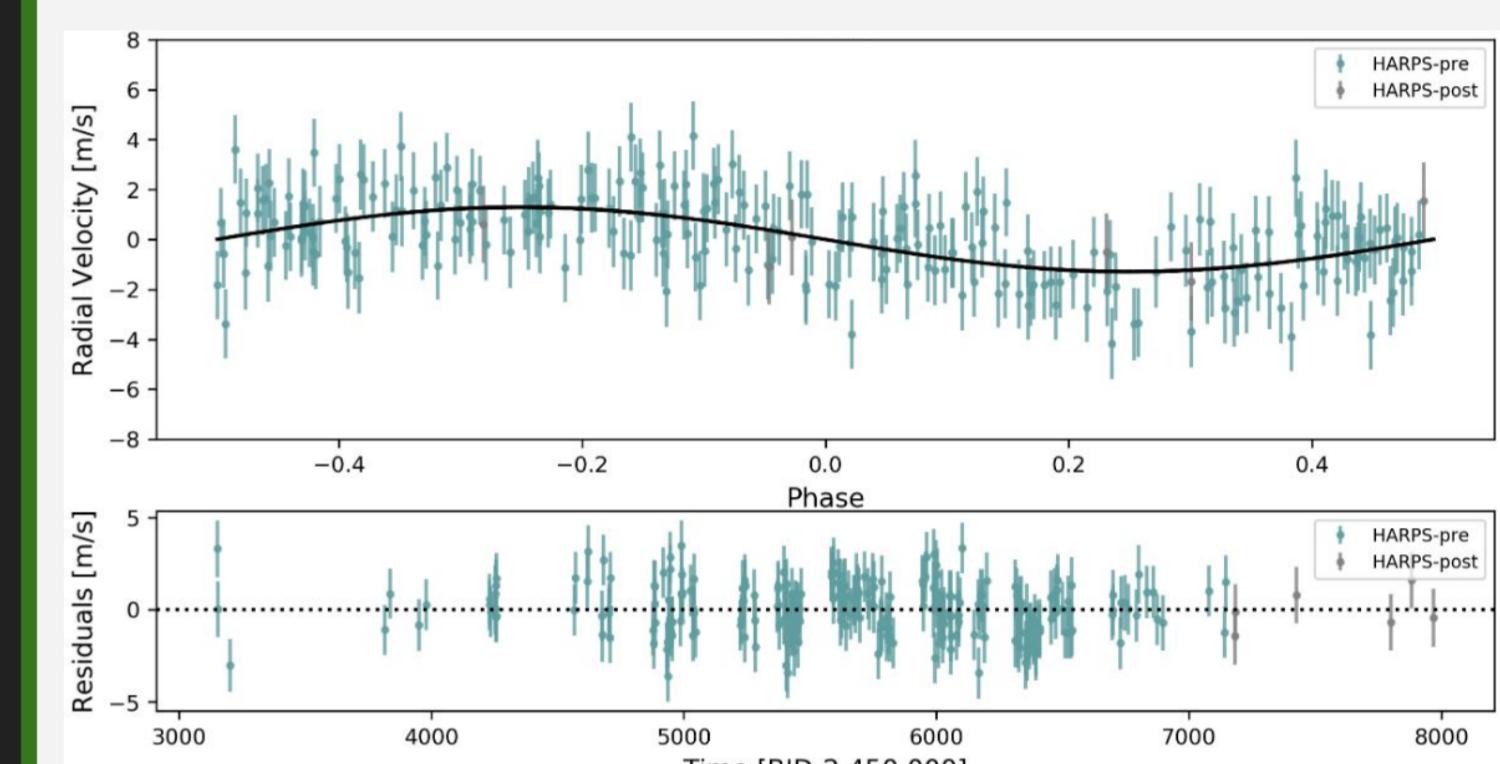
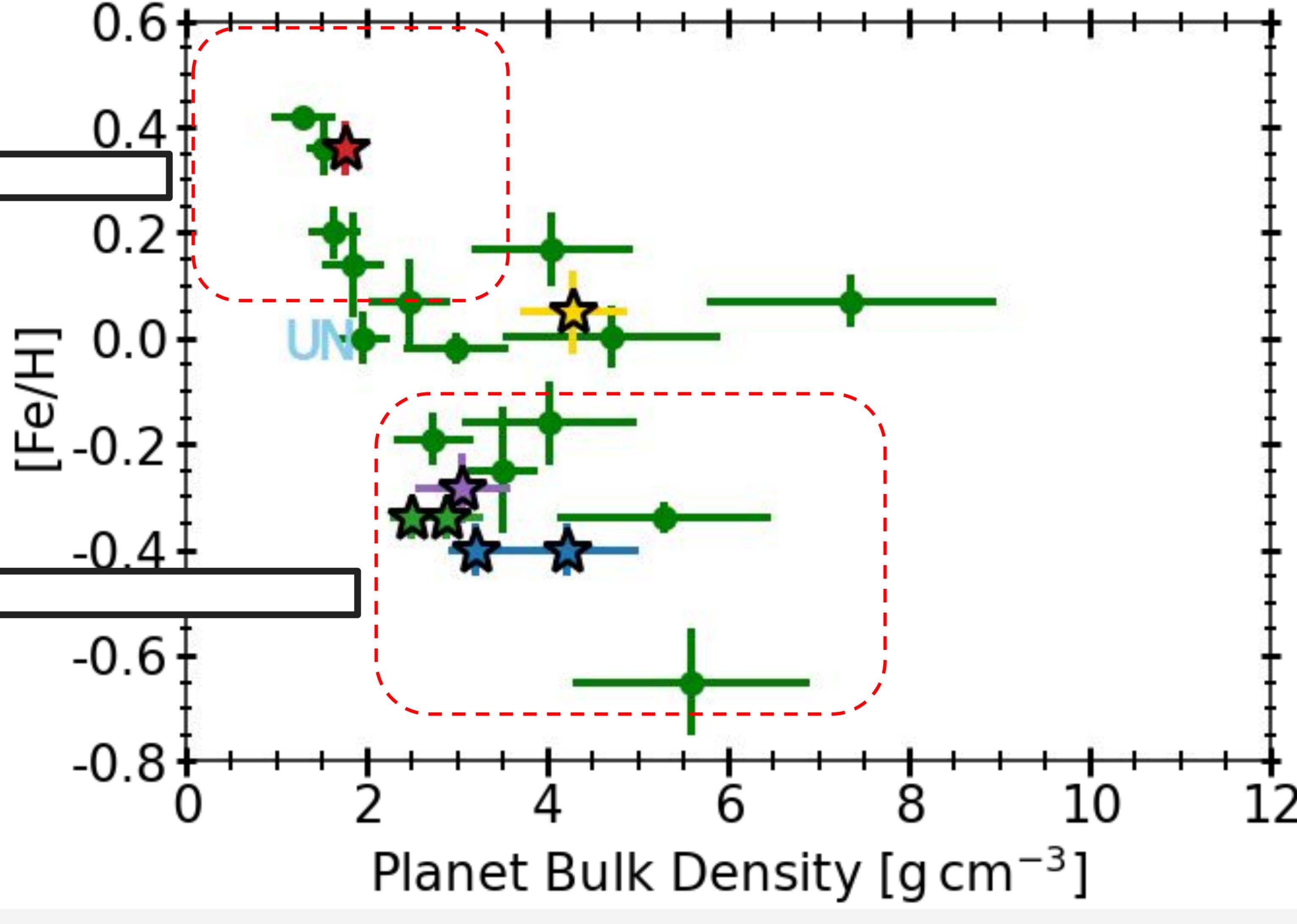


Fig. 5: HARPS data of v<sup>2</sup> Lupi d

Fig. 6: Planet bulk density v stellar metallicity ([Fe/H]) adapted from [10] with newly characterised planets[11,12,13,14].

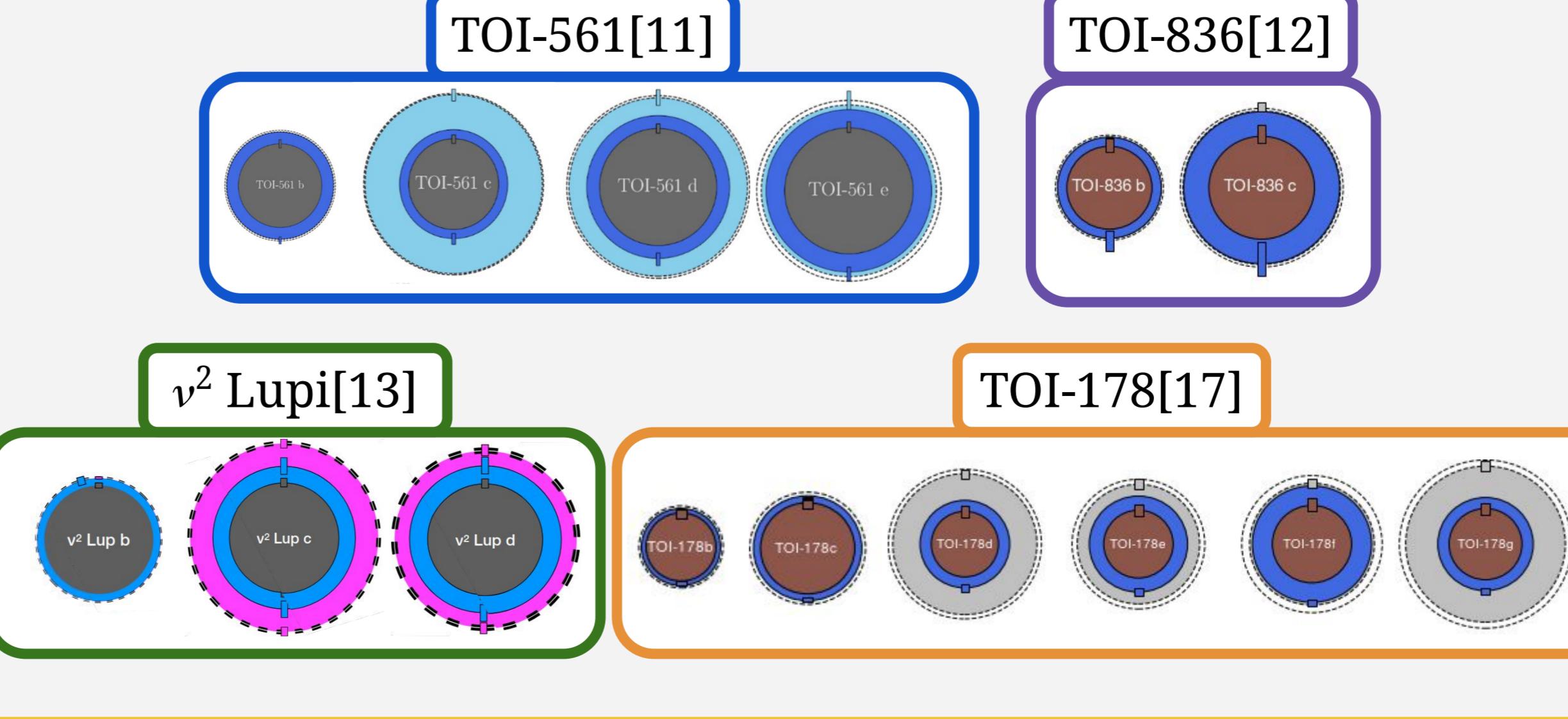
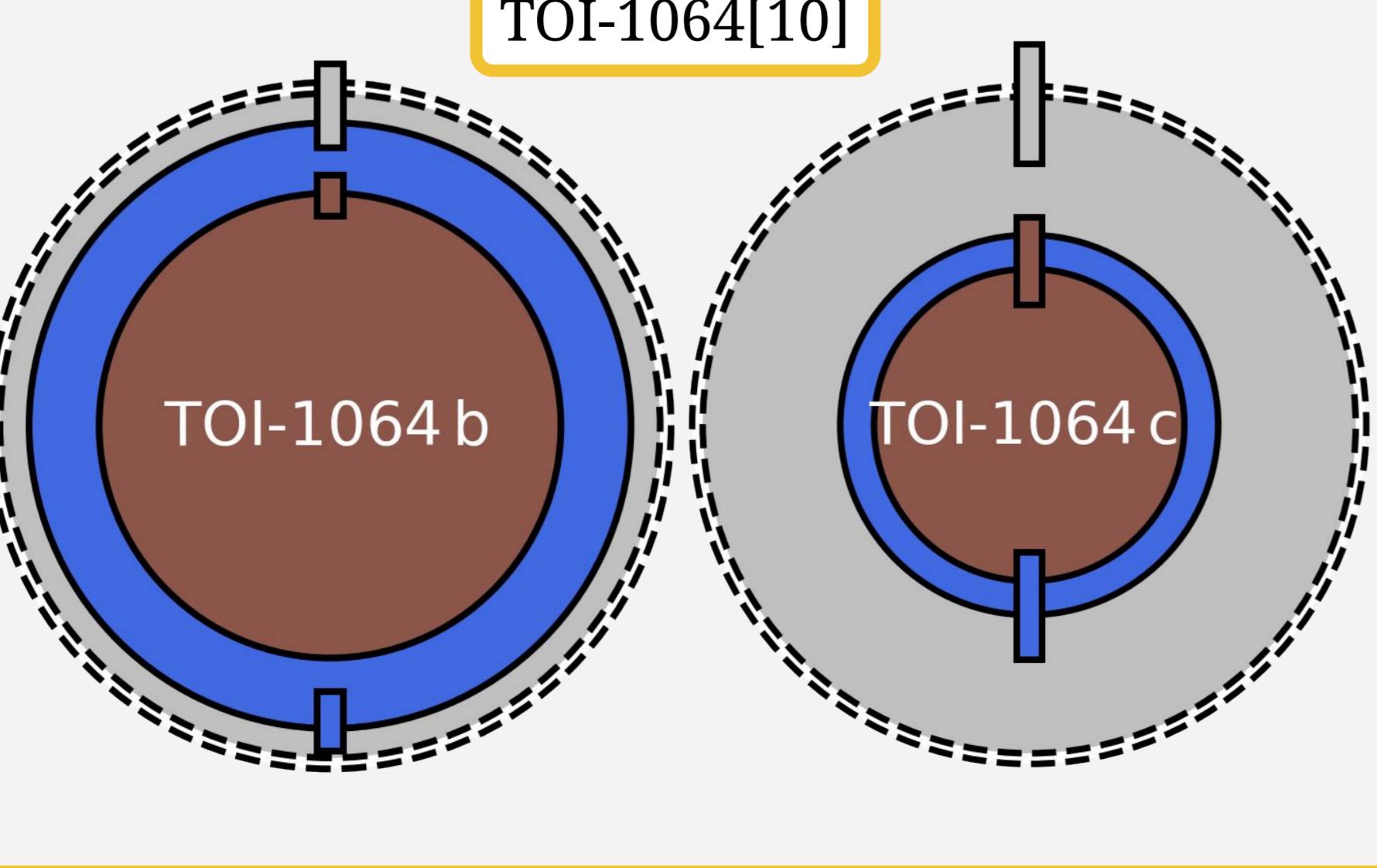


Planet composition trend:  
We have used precise masses to unveil a new metallicity demographic trend[10]

- This trend could be due to planet core properties[15] or atmosphere conditions[16] that influence planet formation and evolution, and are thus imprinted on the observed densities.
- To test model predictions and understand the cause of the metallicity trend, we conducted internal structure analyses on these planets using a four-layer differentiated model[17,18,19,20,21].

## Studying interiors:

We are probing this trend by determining planetary internal structures



Watch this space!

Ongoing HARPS-N GTO observations to further characterise the masses of small planets around metal-diverse stars!

