



Rocky exoplanet science with ground-based ELTs

Dimitri Mawet, November 2022

An illustration from a top-down perspective showing a person with dark hair and a red face sitting at a desk. The person is wearing a white long-sleeved shirt and is holding a white computer mouse with their right hand. On the desk in front of them is a red keyboard. To the left of the person is a laptop with a blue screen and keyboard. There are three mugs on the desk: a blue one, a red one, and a dark blue one. The desk is a light brown color, and the background is a dark blue-grey. The text "It's going to be hard" is written in white, sans-serif font across the center of the image.

It's going to be hard

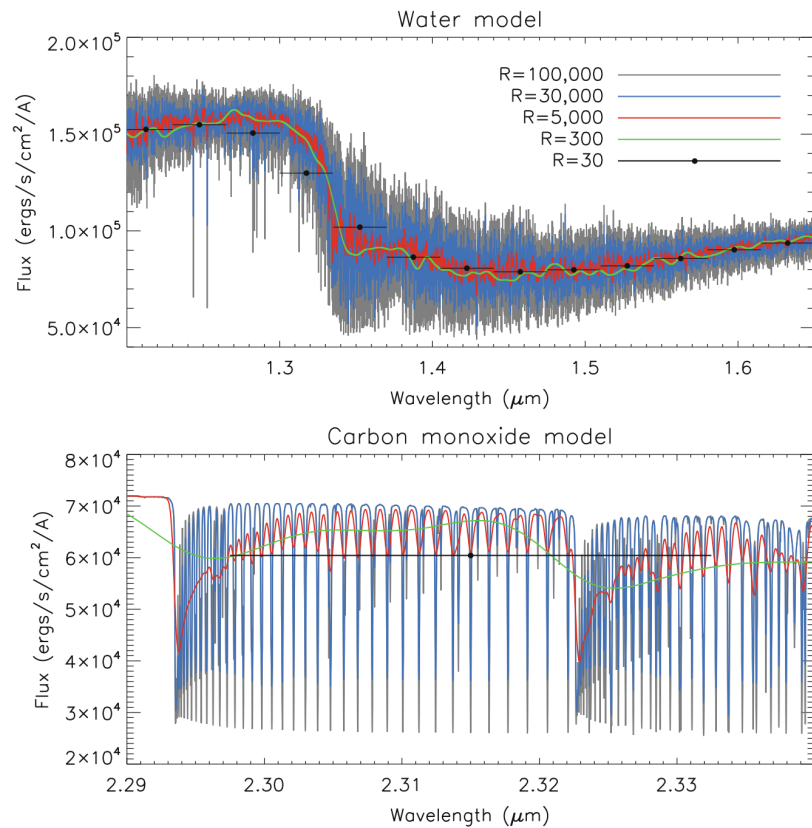
Three main thrusts

Transit/close-in planet high-resolution spectroscopy in the optical/NIR

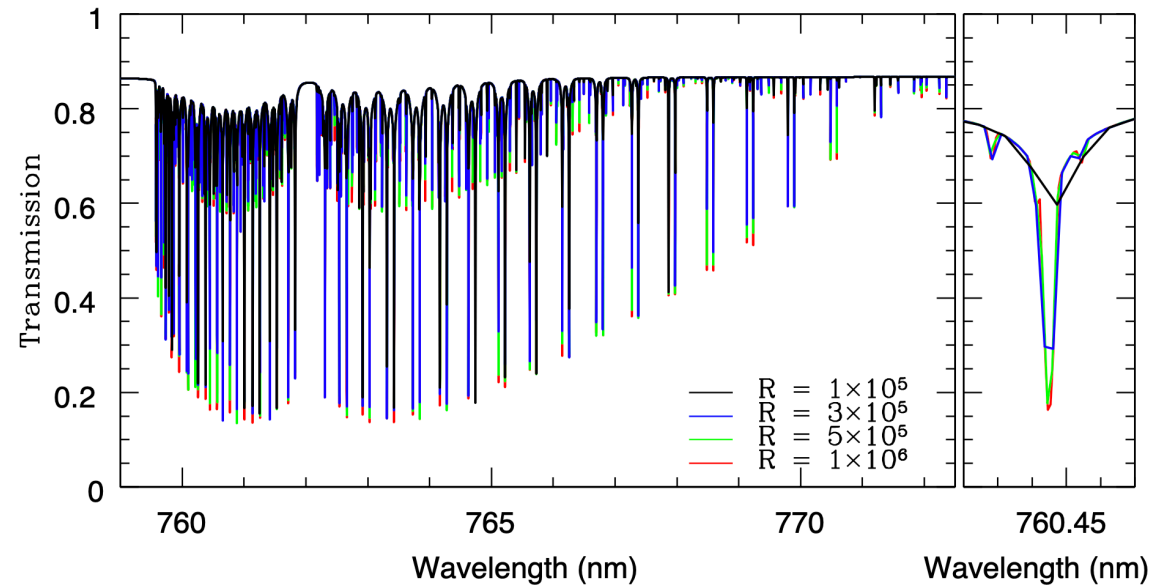
Direct imaging in thermal IR

Direct imaging in reflected light

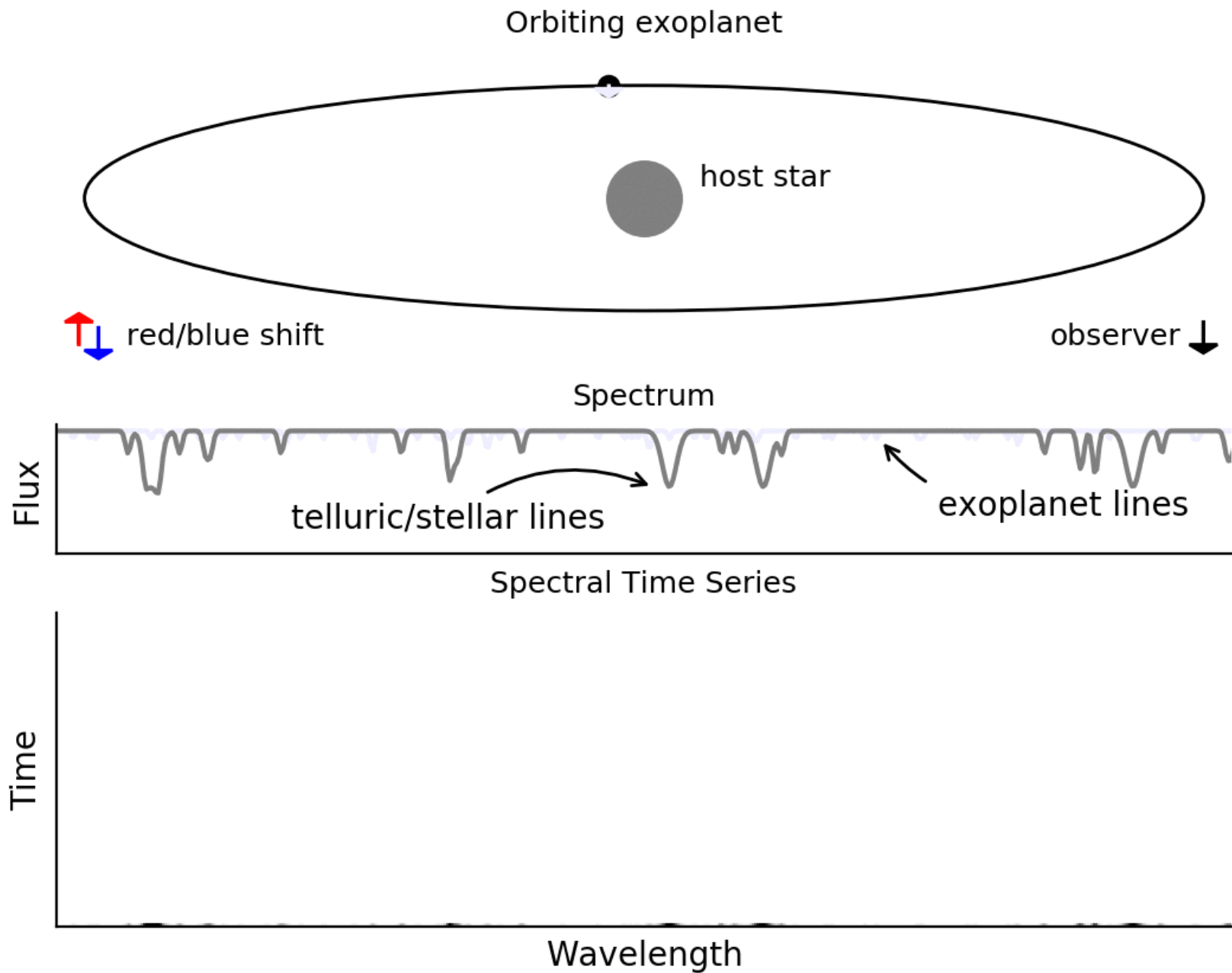
High-resolution transit spectroscopy



Birkby 2018

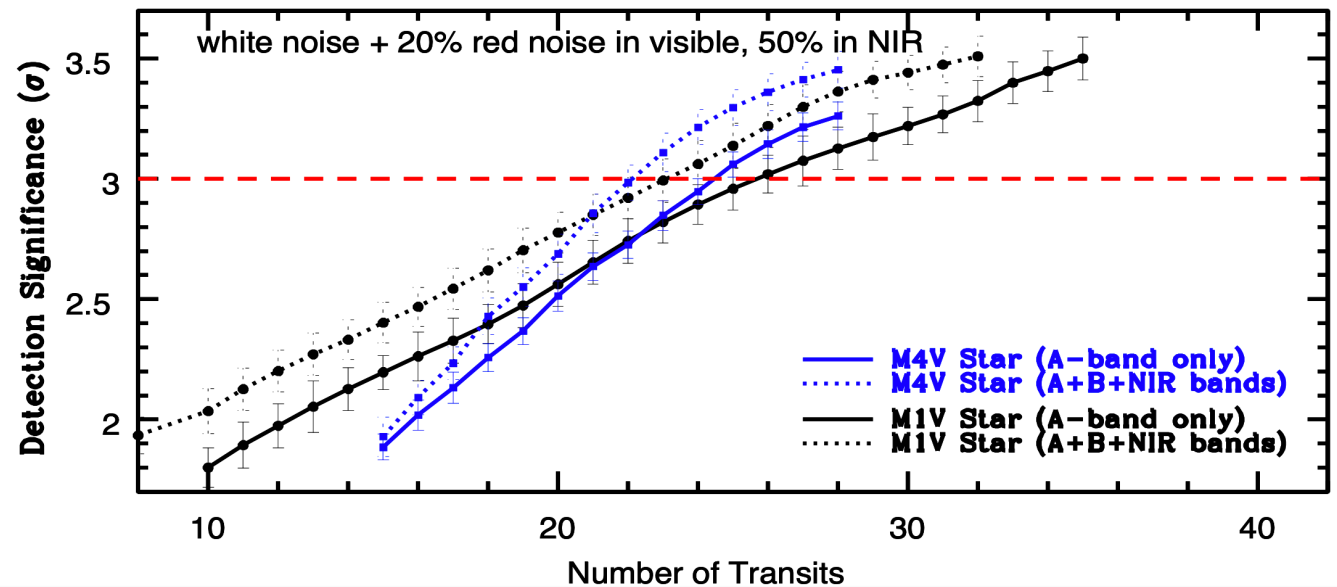
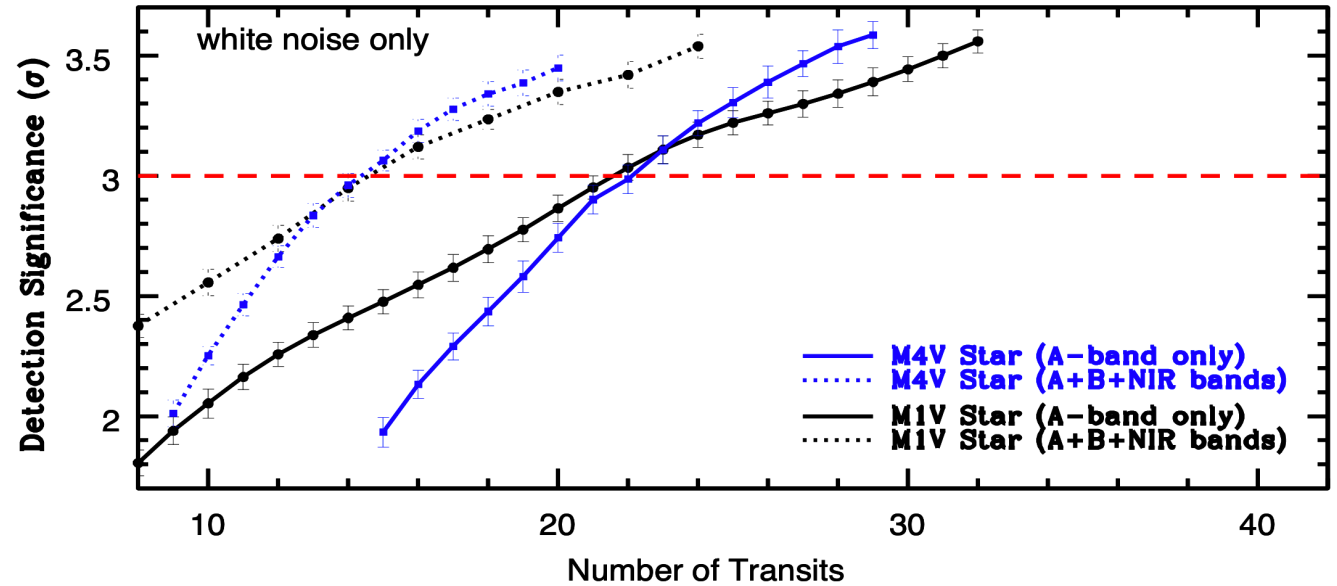


Lopez-Morales+ 2019



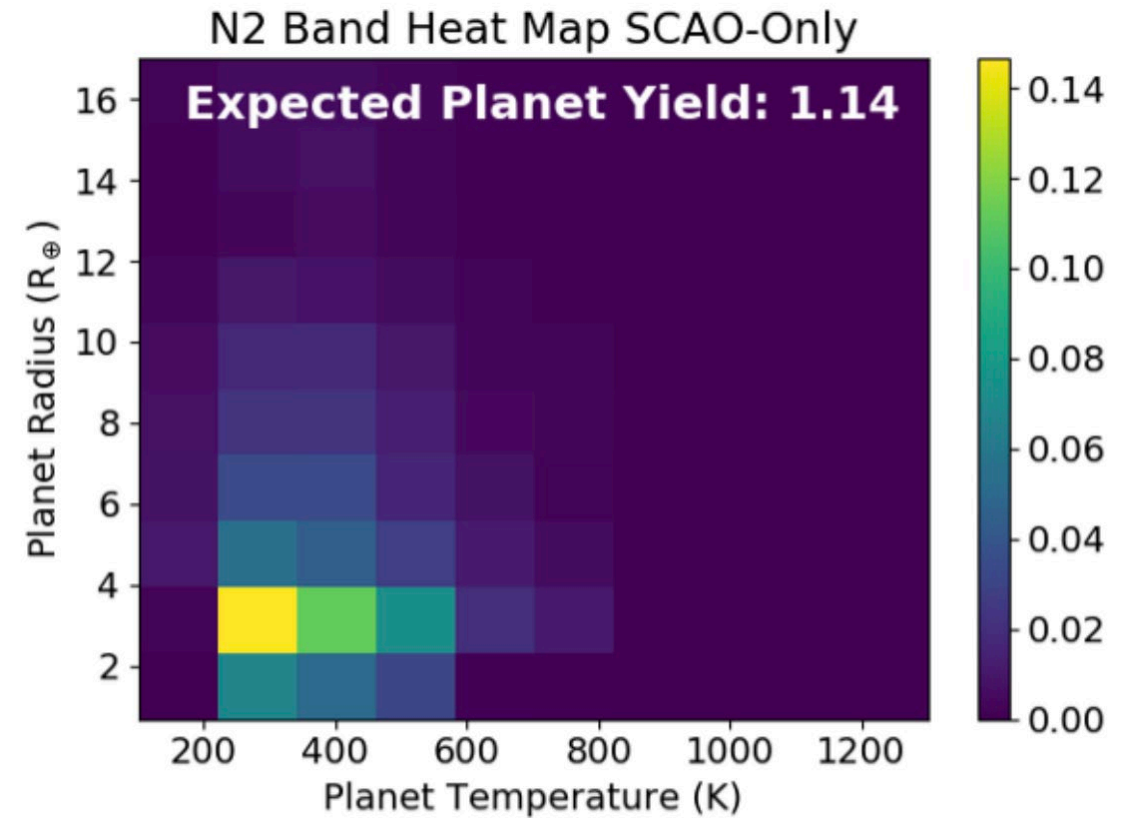
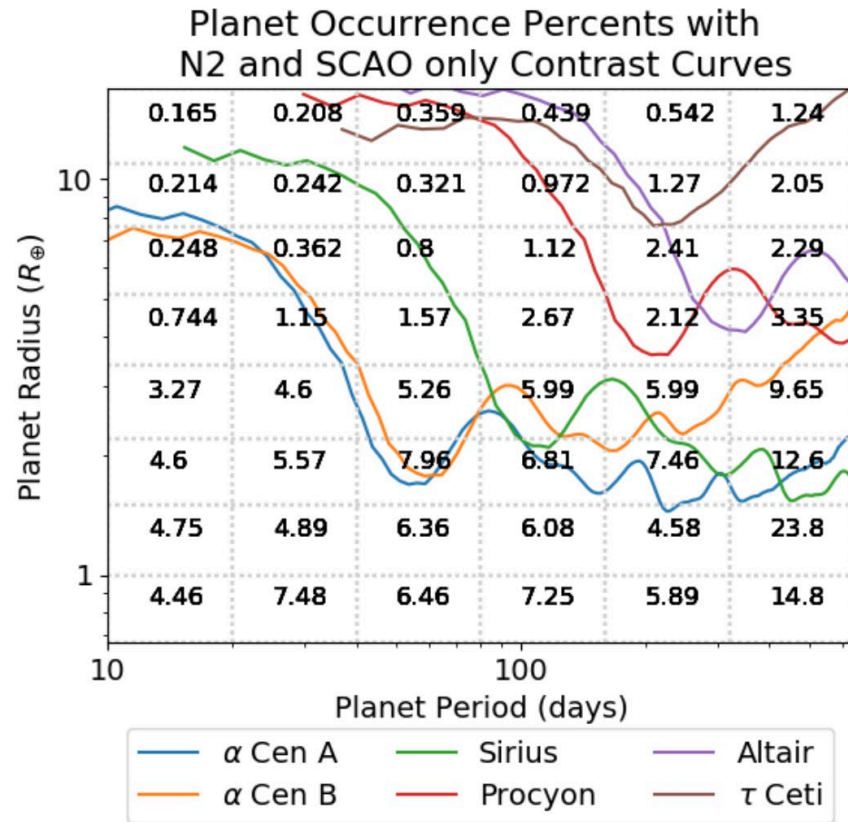
Detection of Oxygen at ultra-high R (>>100,000)

Lopez-Morales+2019



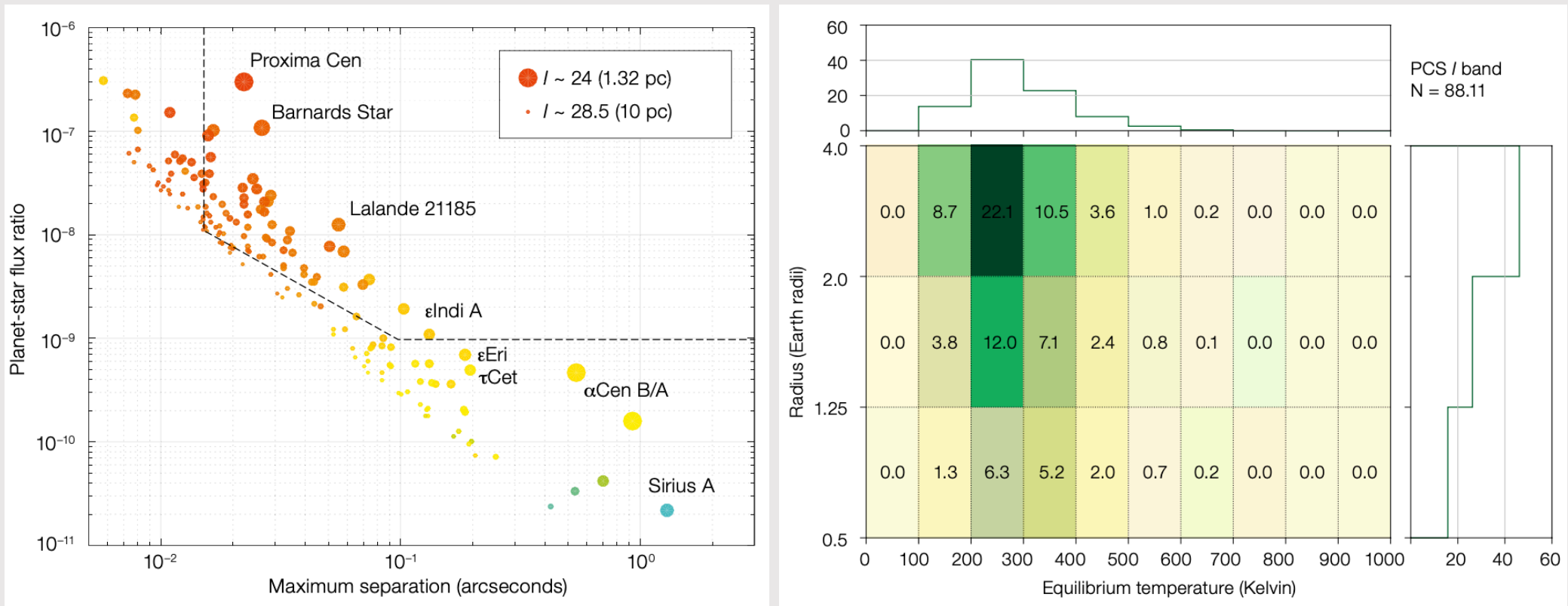
G-type stars thermal IR HCI: ELT-METIS

Quanz et al. 2015, Bowens et al. 2021



M-type stars reflected light HCI – ELT-PCS

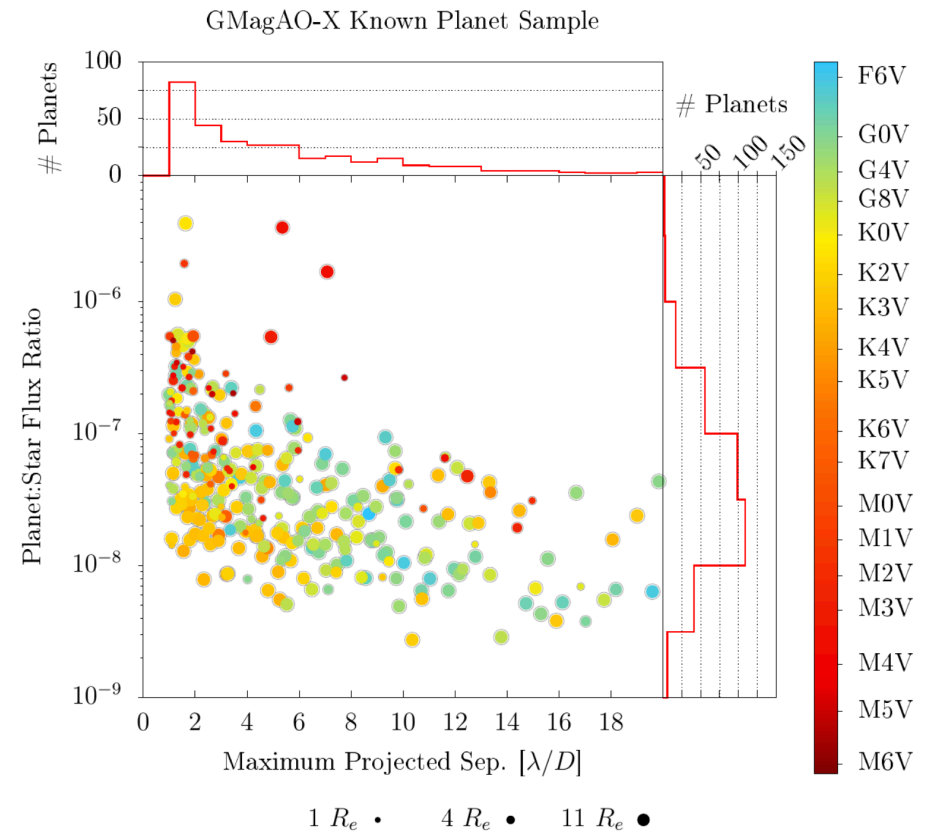
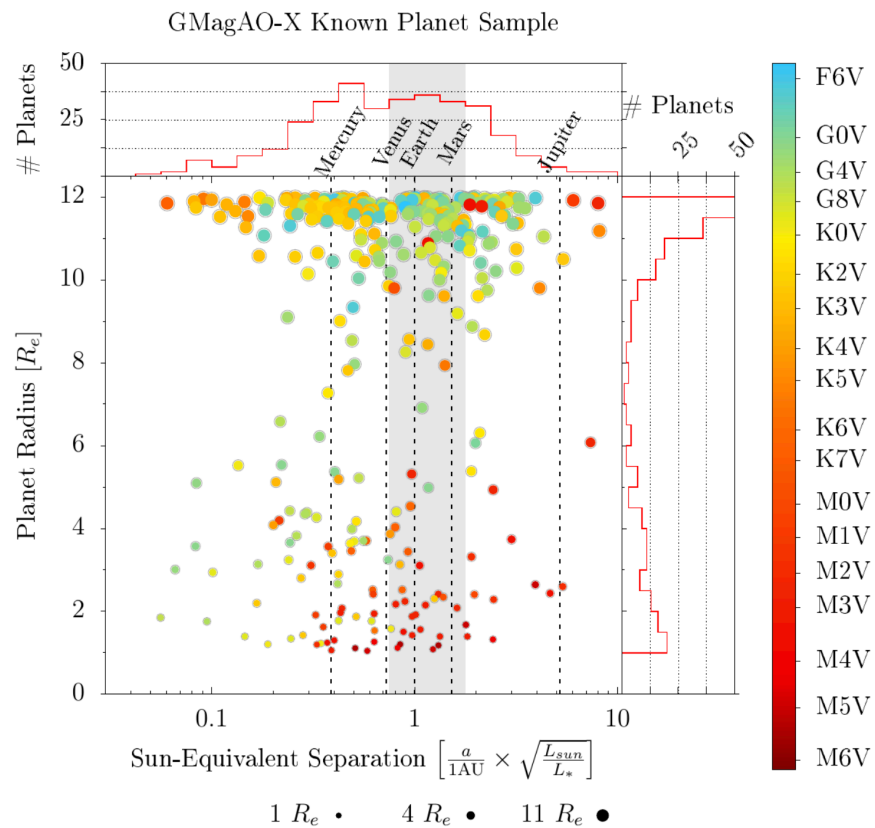
Kasper et al. 2021



Overoptimistic assumptions regarding HDC gains

Reflected light – GMT-GMagAOX, TMT-PSI

Males et al. 2022



Optimistic assumptions about HCI (AO+coronagraph) performance

Best guest phasing

