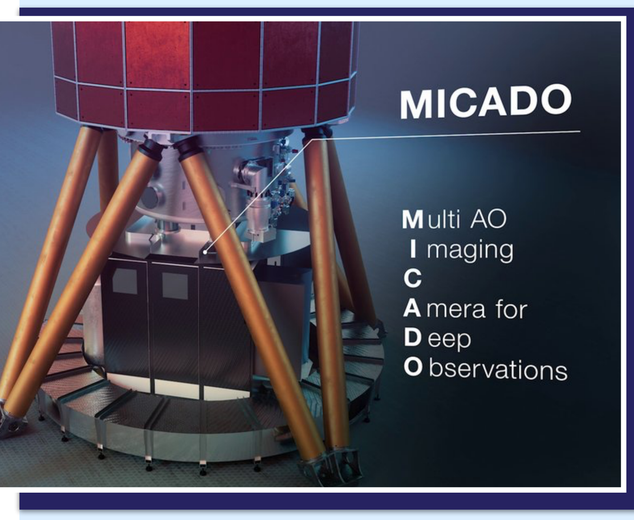
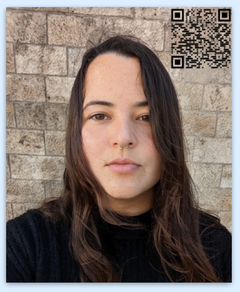
ELT/MICADO spectroscopic mode for exoplanet characterization



- First generation ELT instrument
- General purpose wide field imager
- Sensitivity comparable to JWST with 6x higher angular resolution
- Synergetic with other instruments like HARMONI, METIS and ANDES
- Slit spectrograph in HK band simultaneously

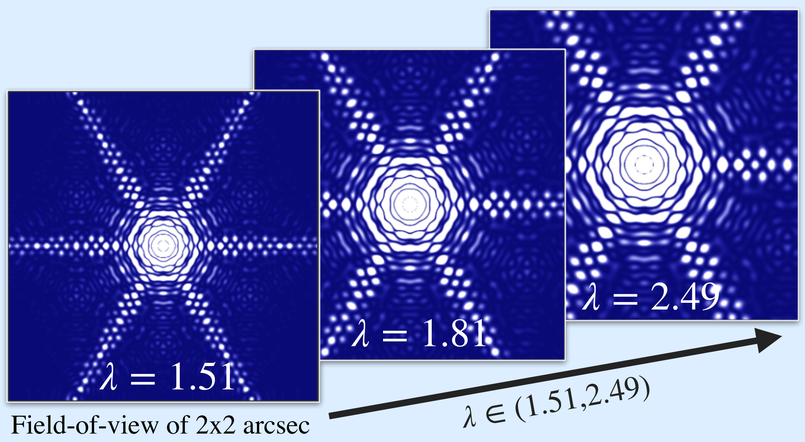
Paulina Palma-Bifani
Pierre Baudoz
Elsa Huby
Gaël Chauvin

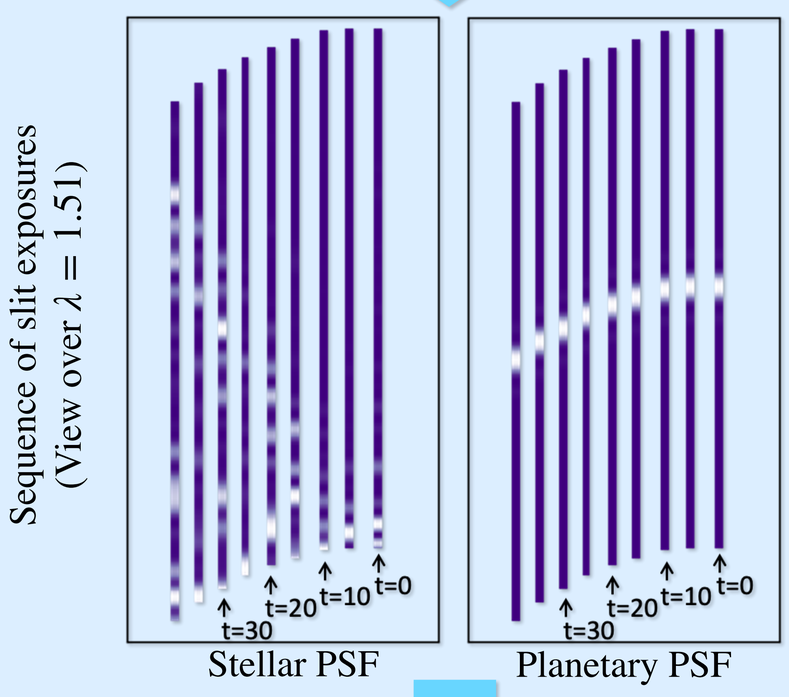


End-to-end simulations

1. Data construction

Realistic ELT PSF simulations with MISTHIC

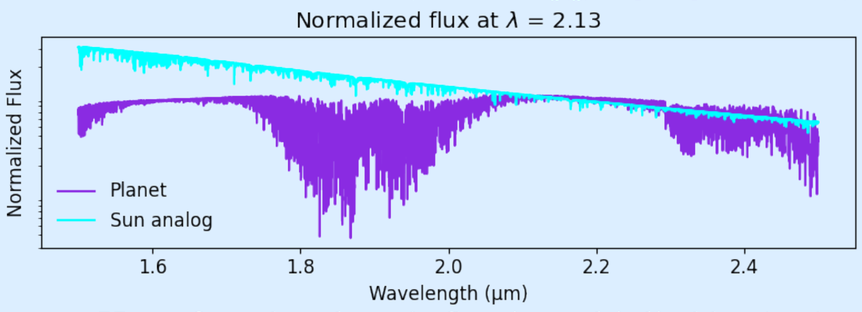




Spectral injection (R=20.000)

A sun analogue from Kurucz (T=7500K, log(g)=4.5, [M/H]=−0.5)

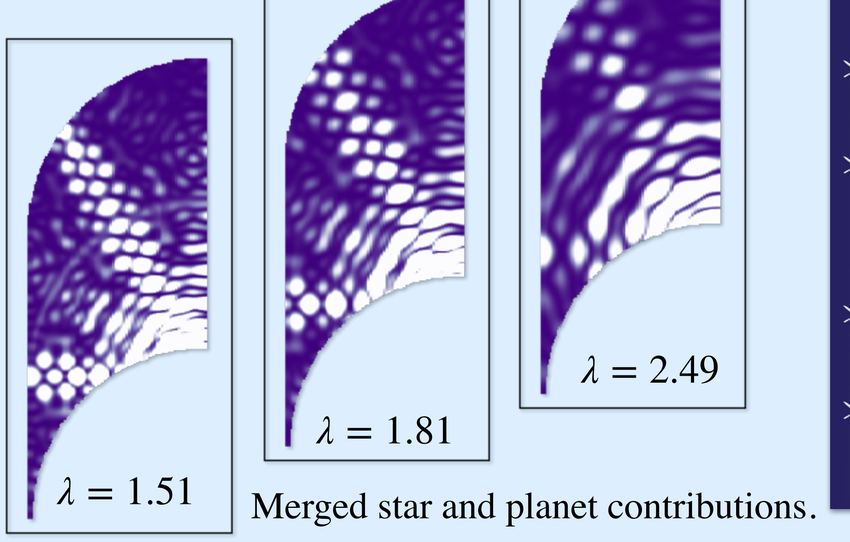
A HR8799e like exoplanet from Exo-REM (T=1100K, log(g)=4, [M/H]=0, C/O=0.55)



Hereafter, the planet's flux is multiplied by 1e-4.

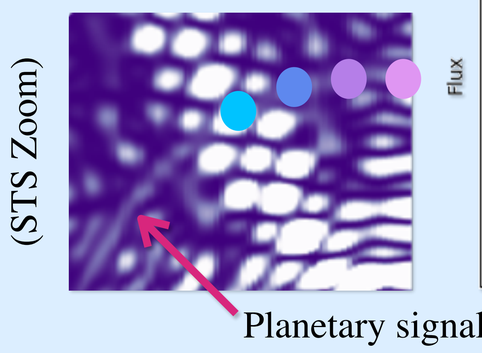
MICADO's data: STS

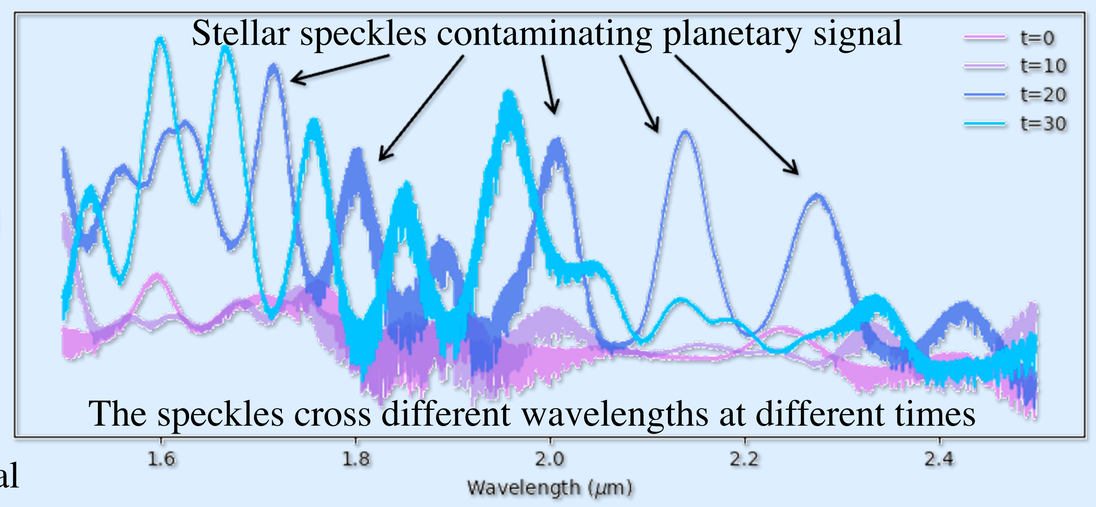
Slit temporal scanned area (STS)



Merged star and planet contributions.

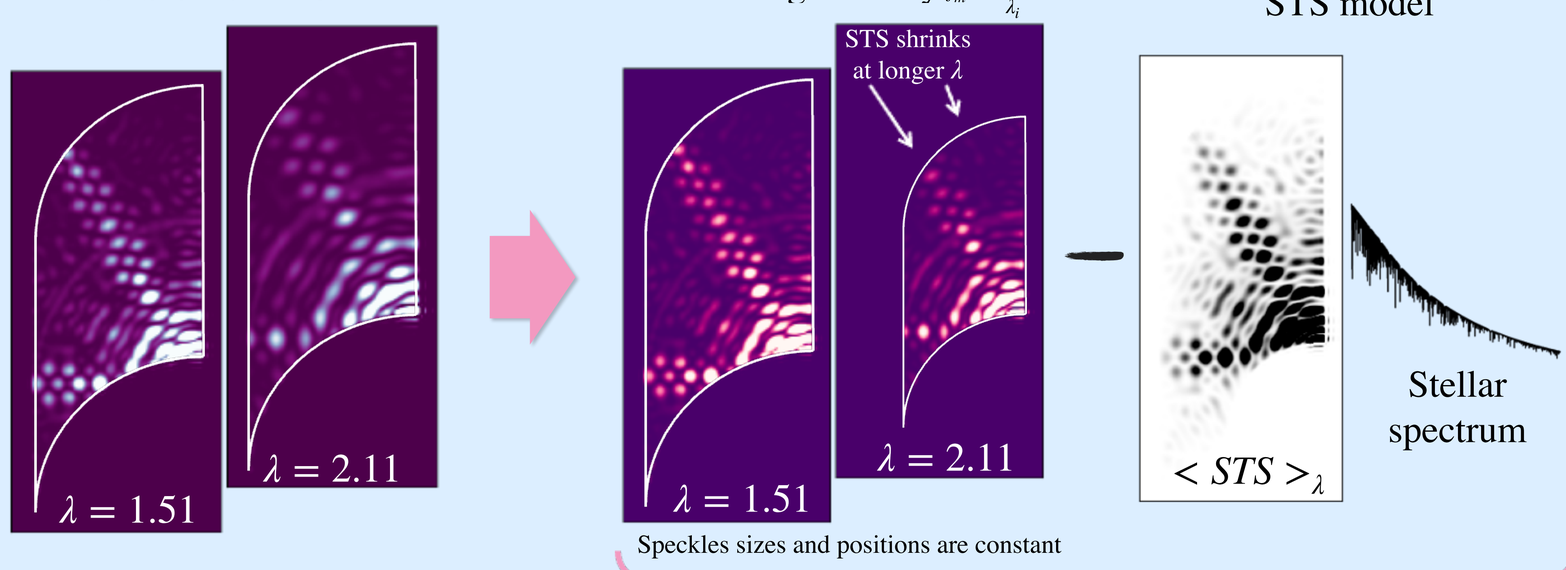
Can we directly extract the planet's spectrum from the STS?

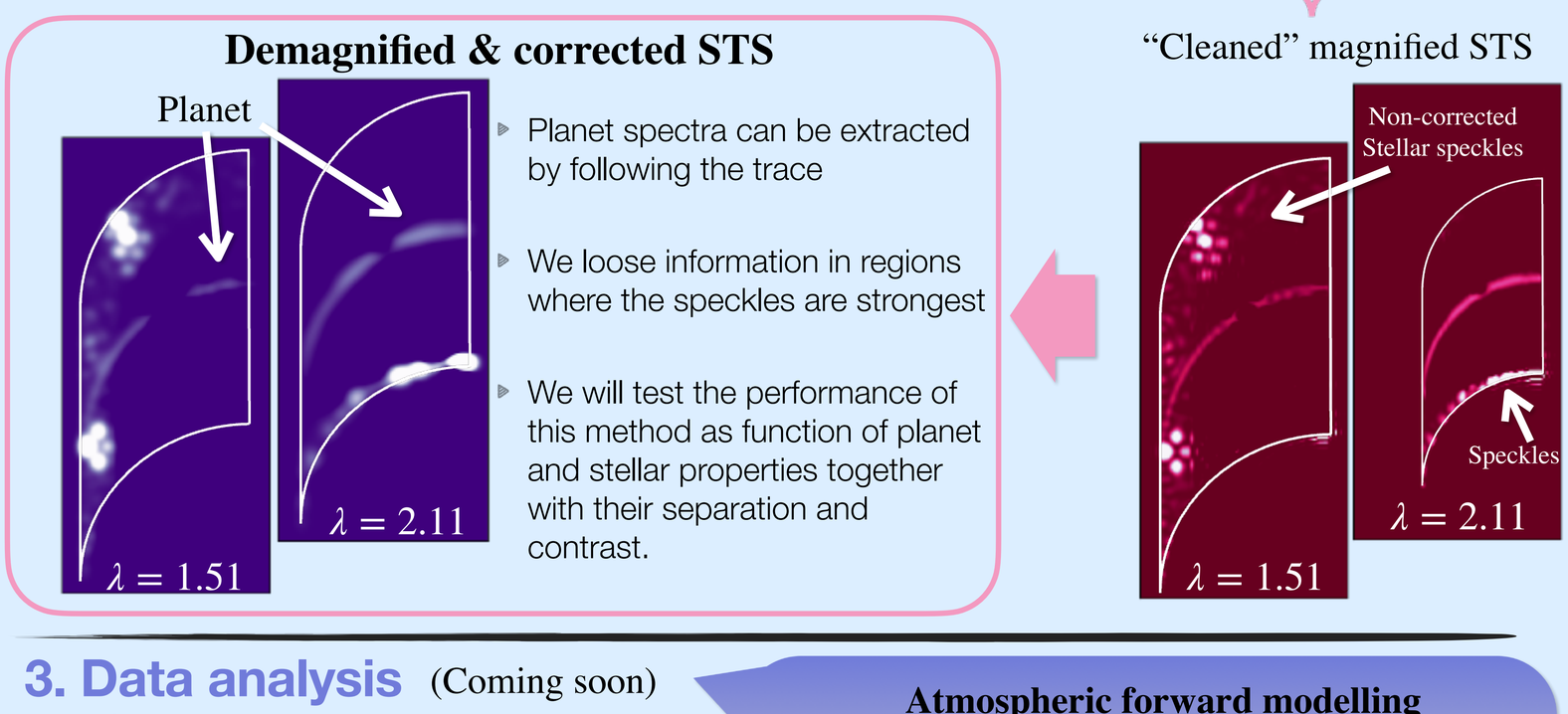




How to get rid of the speckles? We can use their wavelength dependency.

2. Data reduction





3. Data analysis (Coming soon)

Cross correlation (CCF)
To explore the detection capabilities as function of contrast and separation.

Atmospheric forward modelling
To explore the atmospheric parameters improvement with respect to known values derived from other observations.

- The ELT will be a highly demanded telescope
- The spectroscopic mode of MICADO will deliver high-spectral resolution of known planetary-mass companions
- This is work in progress, aiming to be prepared once that data arrive
- If you have questions, do not hesitate to contact us!

Images: ESO