AO performances critical for exoplanet science ? (1/2)

*__ELT SCAO performances:__ associated assumptions (telescope, etc) and end to end error budget? Need for unified inputs for the instruments teams (even if they may evolve with the knowledge of the global system)

**jitter, windshake, residual aberrations (cophasing...), pupil motion

* Impact of **missing segments** on the primary on image quality? What is needed to get simulations of the impact on instruments performances?

* Estimation of achievable contrasts: respective impact of corona devices, NCPA & post processing

*** Which planets can be detected** given the expected contrasts performances (req)? according to the goals performances?

- In case of goal performances, what are the steps forward?

AO performances critical for exoplanet science ? (1/2)

10^5 (or 10^6 or 10^7 ...)

AO performances & exoplanets (1/2)

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* Impact of **missing segments** on the primary on image quality? What is needed to get simulations of the impact on instruments performances?

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*** Which planets can be detected** given the expected contrasts performances (req)? according to the goals performances?

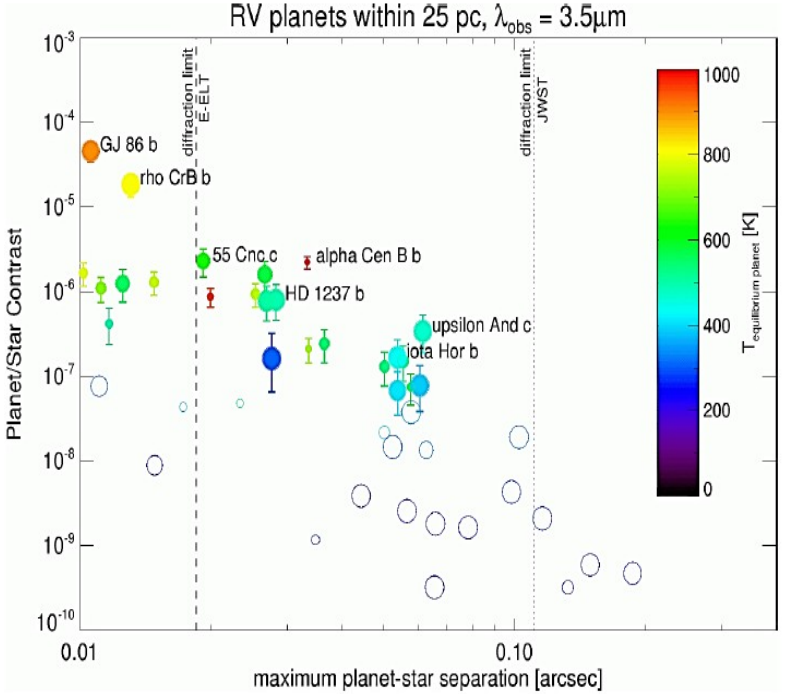
- In case of goal performances, what are the steps forward?

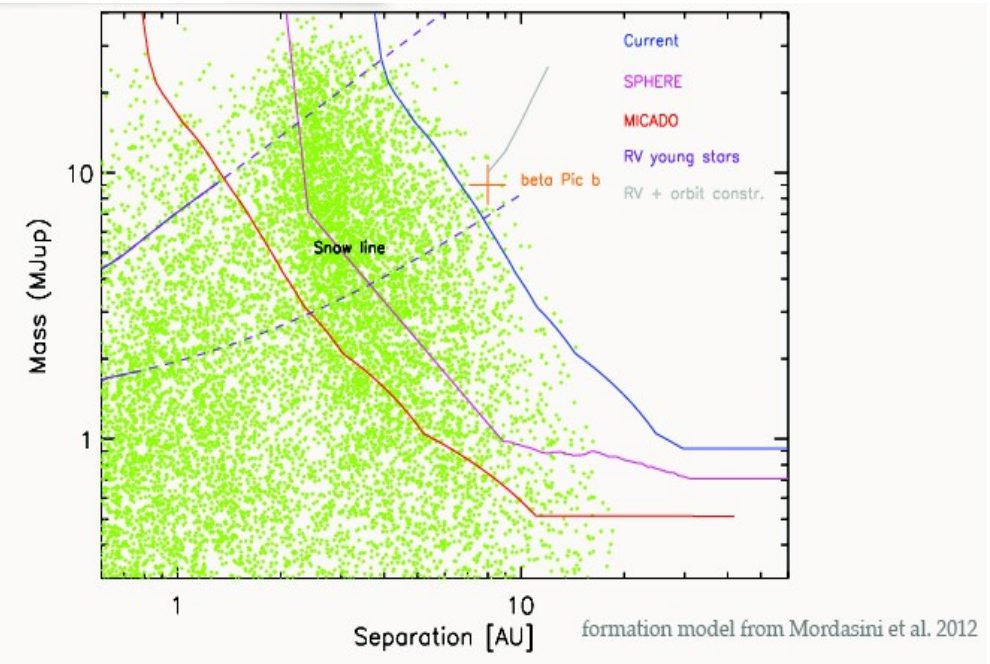
* **Potential ground braking science** (e.g. coupling HRS and high contrast imaging): any additional needs for the AO?

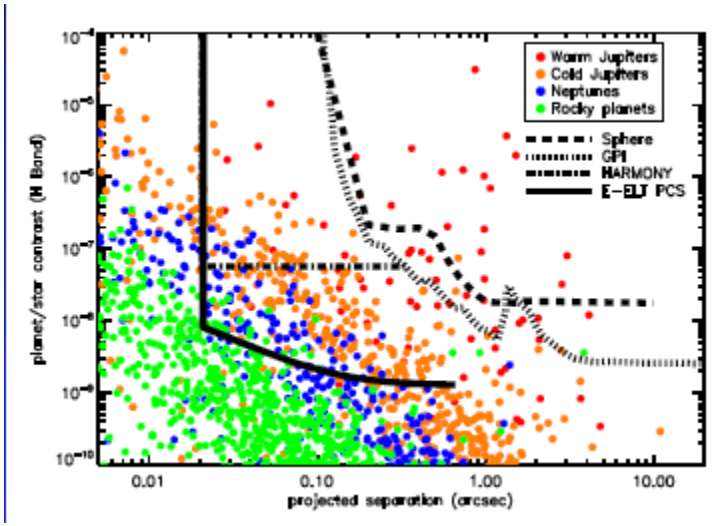
AO performances & exoplanets (2/2)

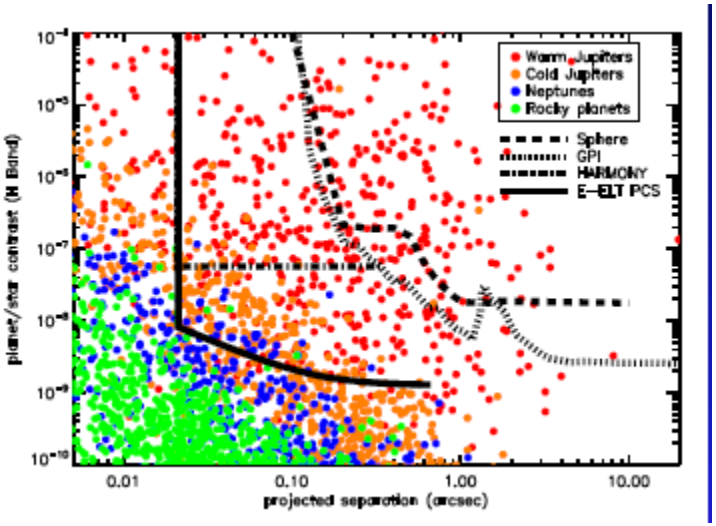
* **HIRES** and AO
* **HARMONI and** exoplanets: expected performances? First light?
* **METIS: background limited** at 2lambda/D in 10 years from now (L, M): realistic? What steps forward?

* **Next steps of AO facilities** (LTAO, MCAO) at ELT: any impact on exo-planet science? (performances, additional constraints)
* **Plan towards PCS** ? Lessons from Sphere; lessons from first light instruments in terms of high contrast performances?


RV planets within 25 pc, λobs = 3.5µm
Planet/Star Contrast
maximum planet-star separation [arcsec]
diffraction limit E-ELT
diffraction limit JWST
GJ 86 b
rho CrB b
55 Cnc c
alpha Cen B b
HD 1237 b
upsilon And c
iota Hor b
T equilibrium planet [K]


Current
SPHERE
MICADO
RV young stars
RV + orbit constr.
beta Pic b
Snow line
Mass (MJup)
Separation [AU]
formation model from Mordasini et al. 2012


Warm Jupiters
Cold Jupiters
Neptunes
Rocky planets
Sphere
GPI
HARMONY
E-ELT PCS
planet/star contrast (N Band)
projected separation (arcsec)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Planet/star combination	Transmission	Reflected light	Thermal emission
Mini-Neptune, a = 0.1 AU, Teq = 700 K, K0 star, d = 10/30 pc (non-transiting/transiting)	10^{-4}	10^{-6} @ λ=1.0 μm s = 2 λ/D	10^{-5} @ λ=3.5 μm s = 0.6 λ/D
Super-Earth, a = 0.1 AU, Teq = 255 K, M4 star, d = 5/15 pc (non-transiting/transiting)	10^{-5}	10^{-7} @ λ=1.0 μm s = 4 λ/D	10^{-5} @ λ=10 μm s = 0.4 λ/D
Jupiter, a = 2 AU, Teq = 180 K, G2 star, d = 15/110 pc (non-transiting/transiting)	10^{-5}	10^{-8} @ λ=1.0 μm s = 27 λ/D	10^{-7} @ λ=10 μm s = 2.7 λ/D
Young Jupiter, a = 10 AU, Teq = 1200 K, G2 star, d = 30 pc (non-transiting)	N/A	10^{-9} @ λ=1.0 μm s = 67 λ/D	10^{-4} @ λ=2.0 μm s = 33 λ/D
...	...	...	...