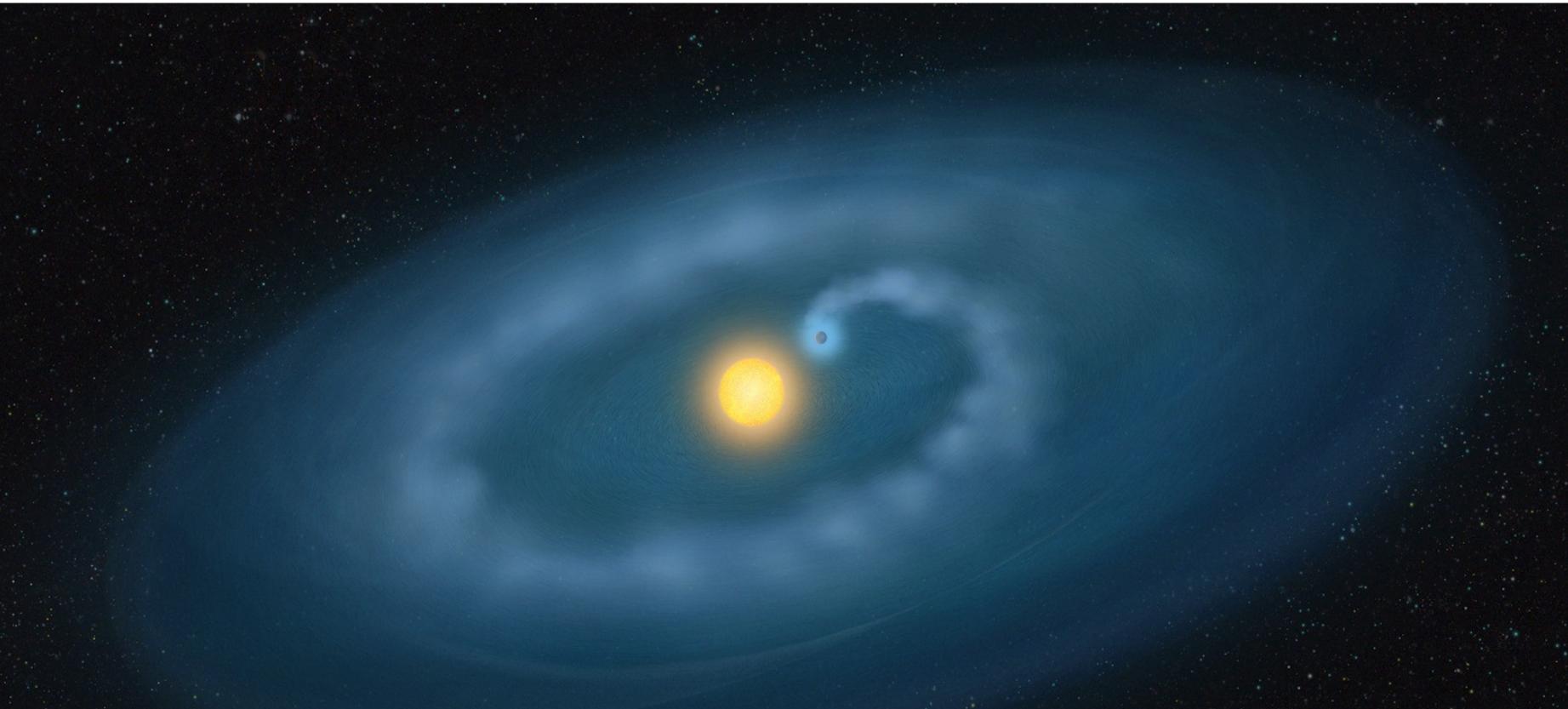
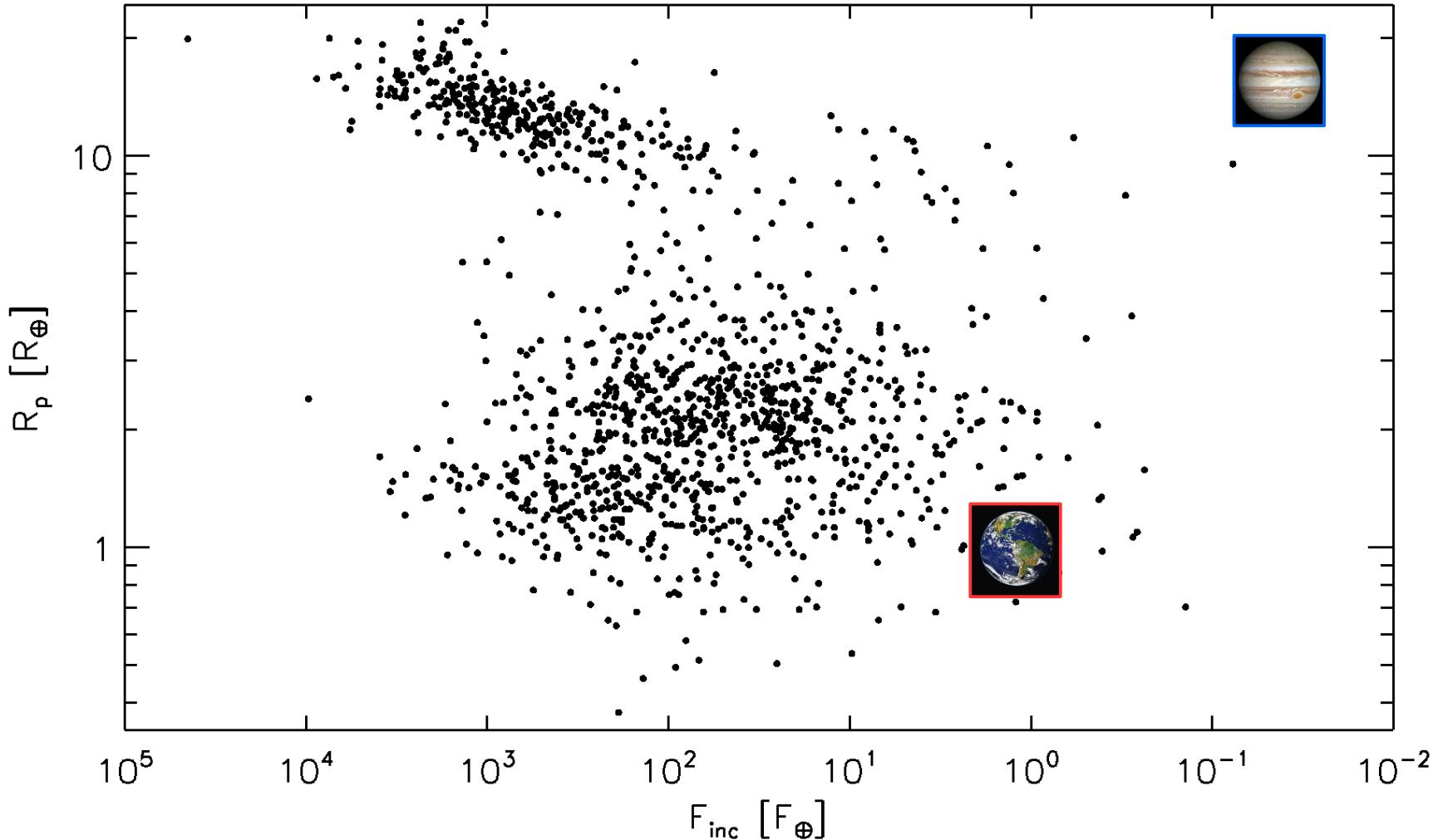


Planetary atmospheric escape

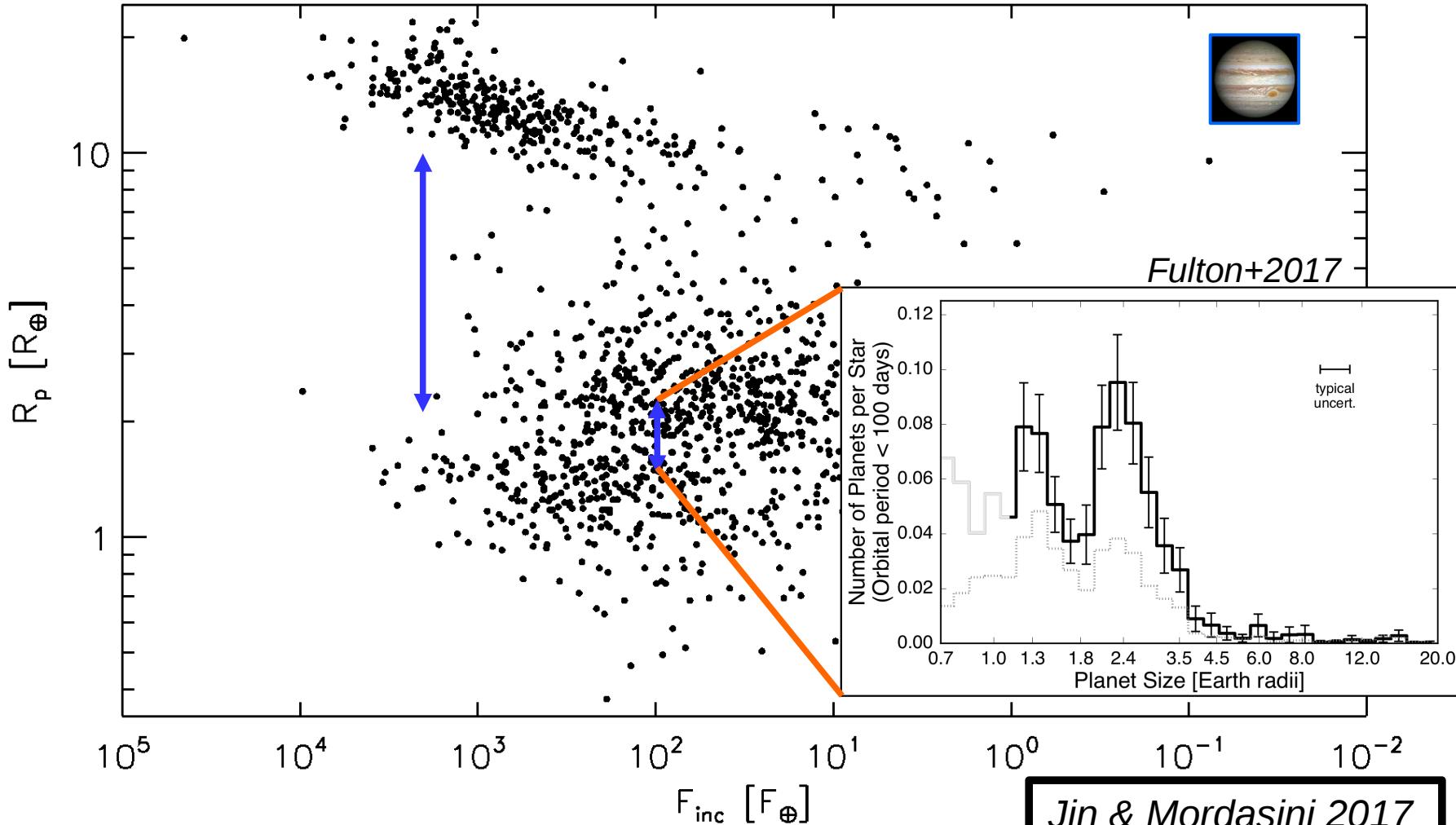


Luca Fossati
Space Research Institute, Austrian Academy of Sciences, **GRAZ**

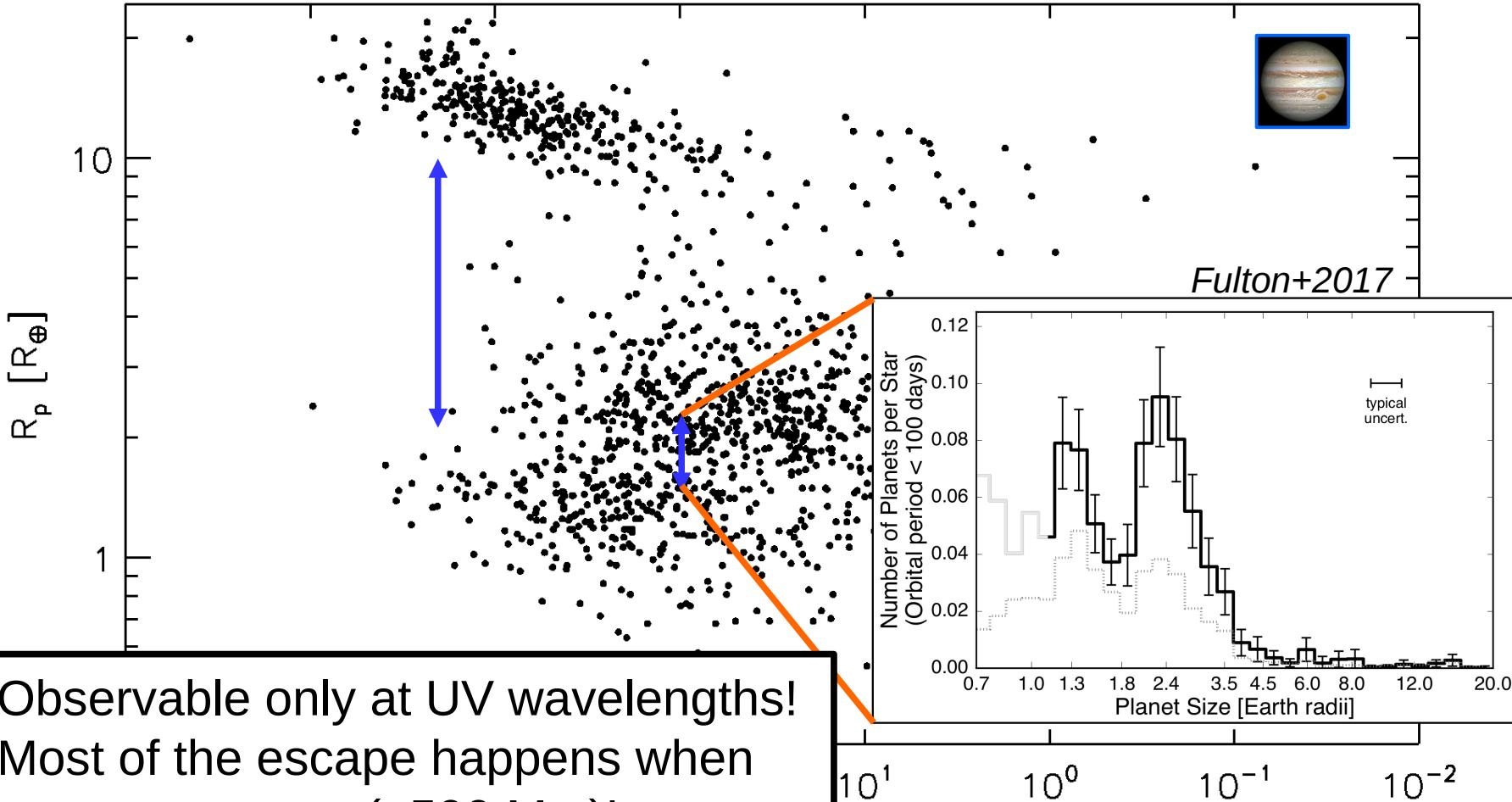
Context: exoplanet population



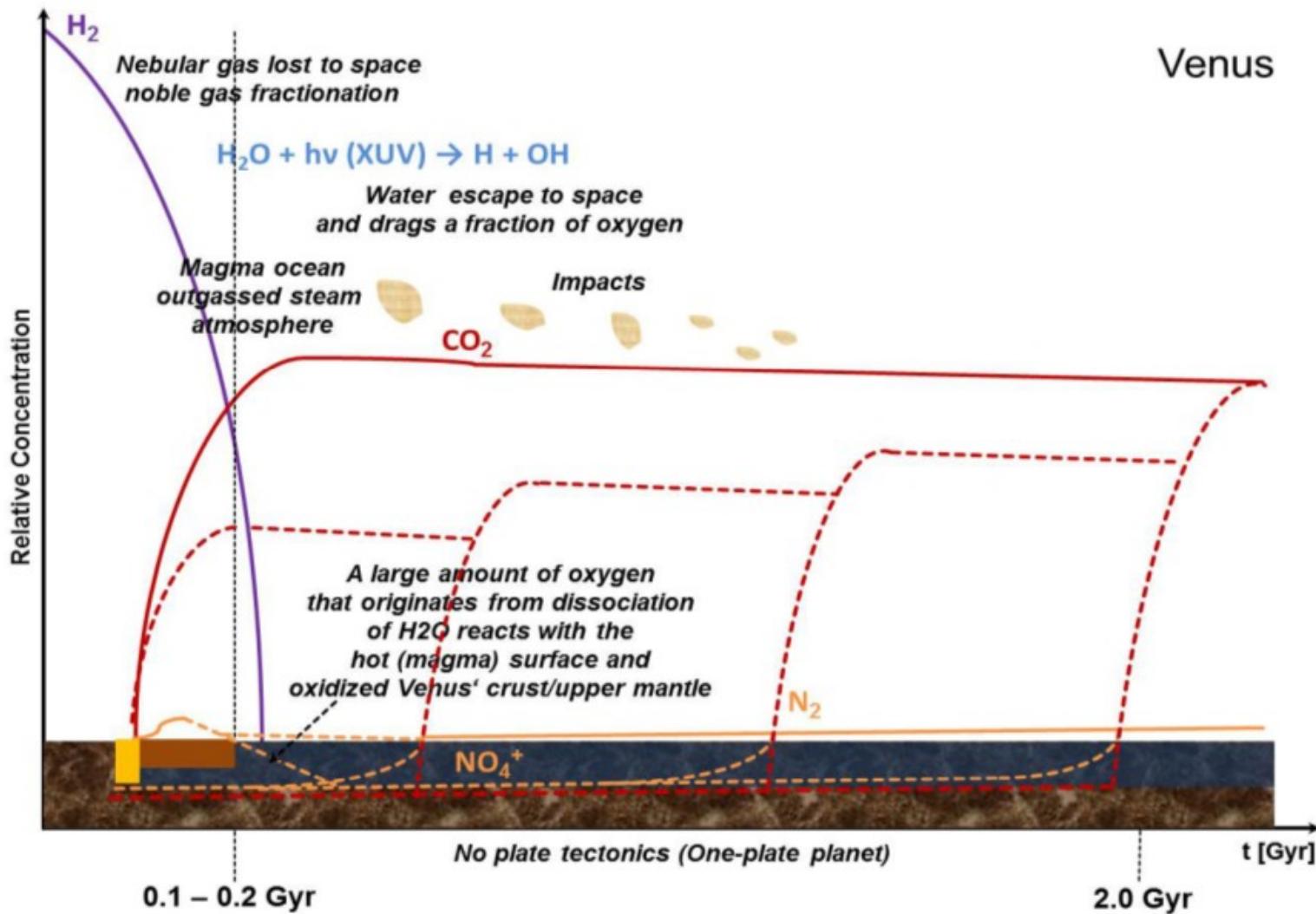
Evidence of atmospheric escape



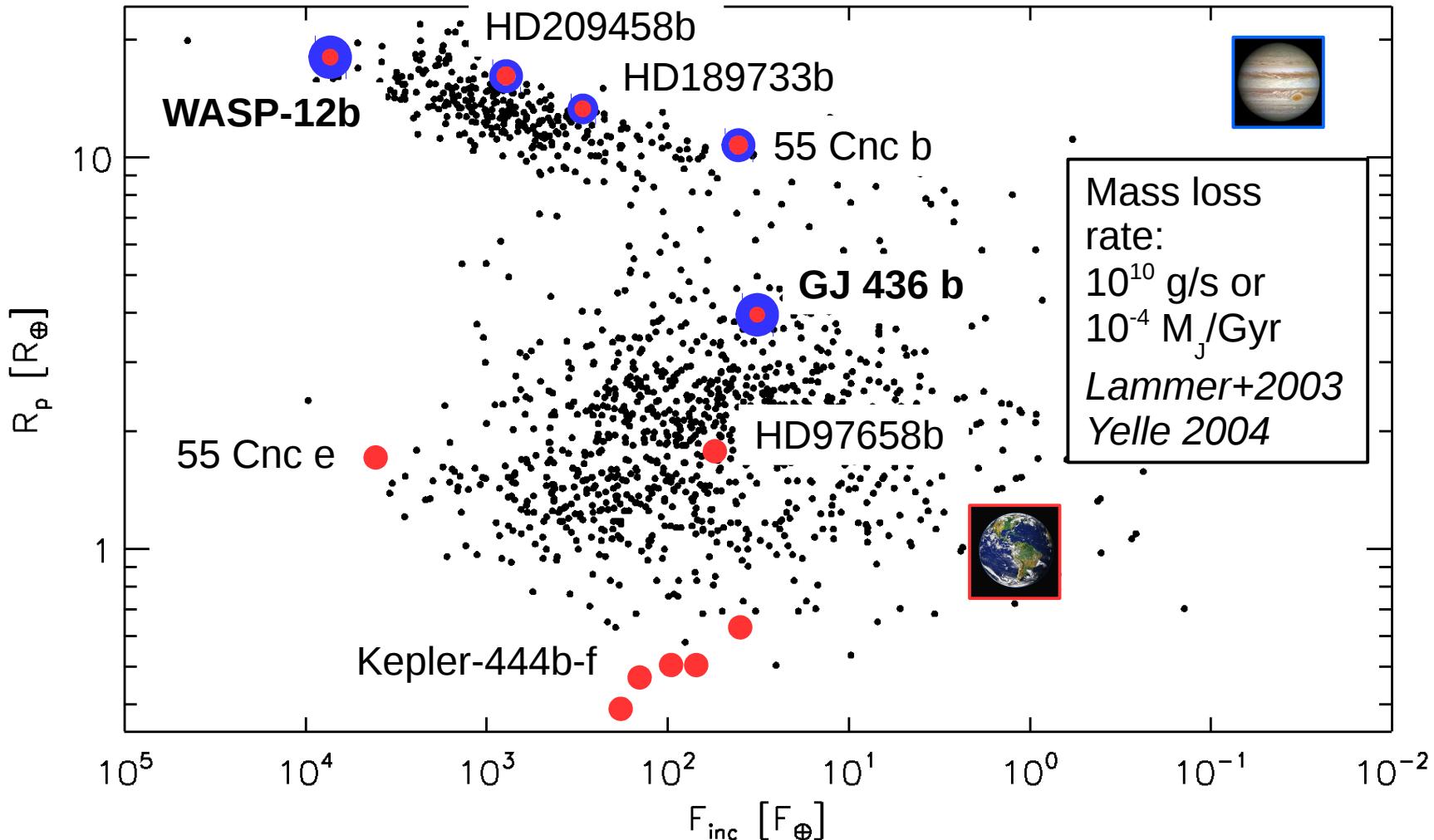
Evidence of atmospheric escape



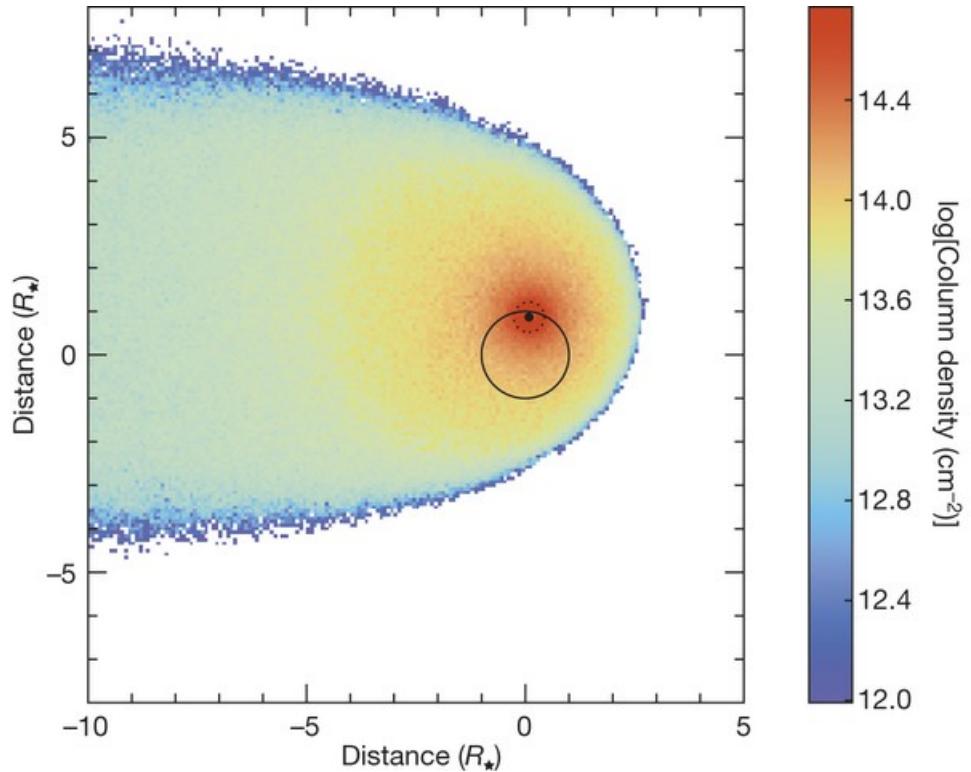
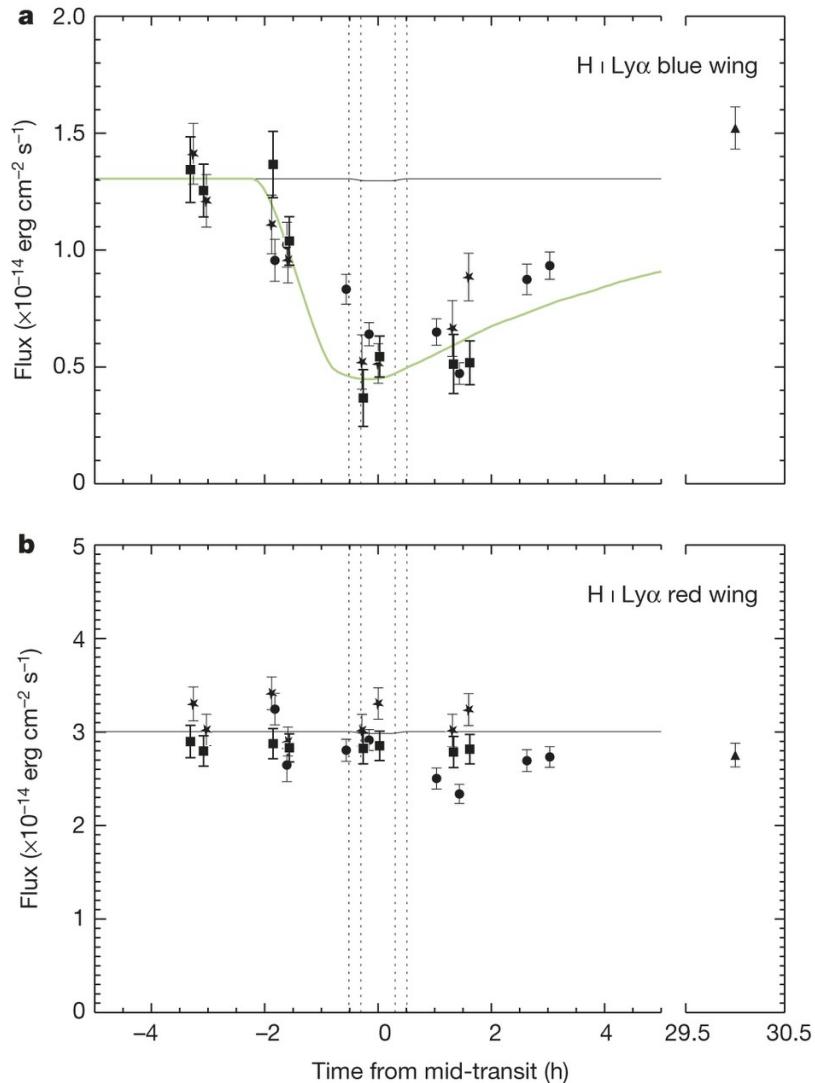
Solar system



Overview of observations



Mildly irradiated planets: GJ436 b



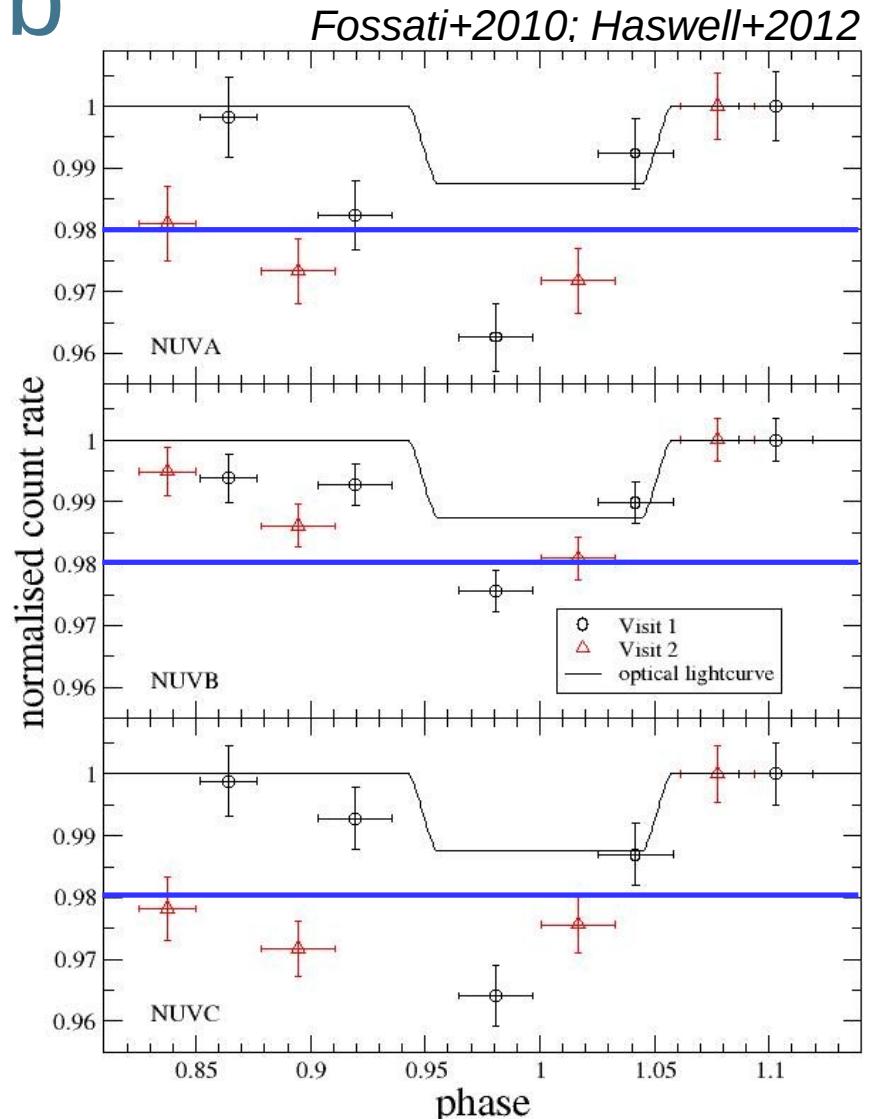
Ehrenreich+2015
Bourrier+2015,2016

Tens of theoretical works dedicated to
exoplanet atmospheric escape
Fossati+2015 (Springer), for a review

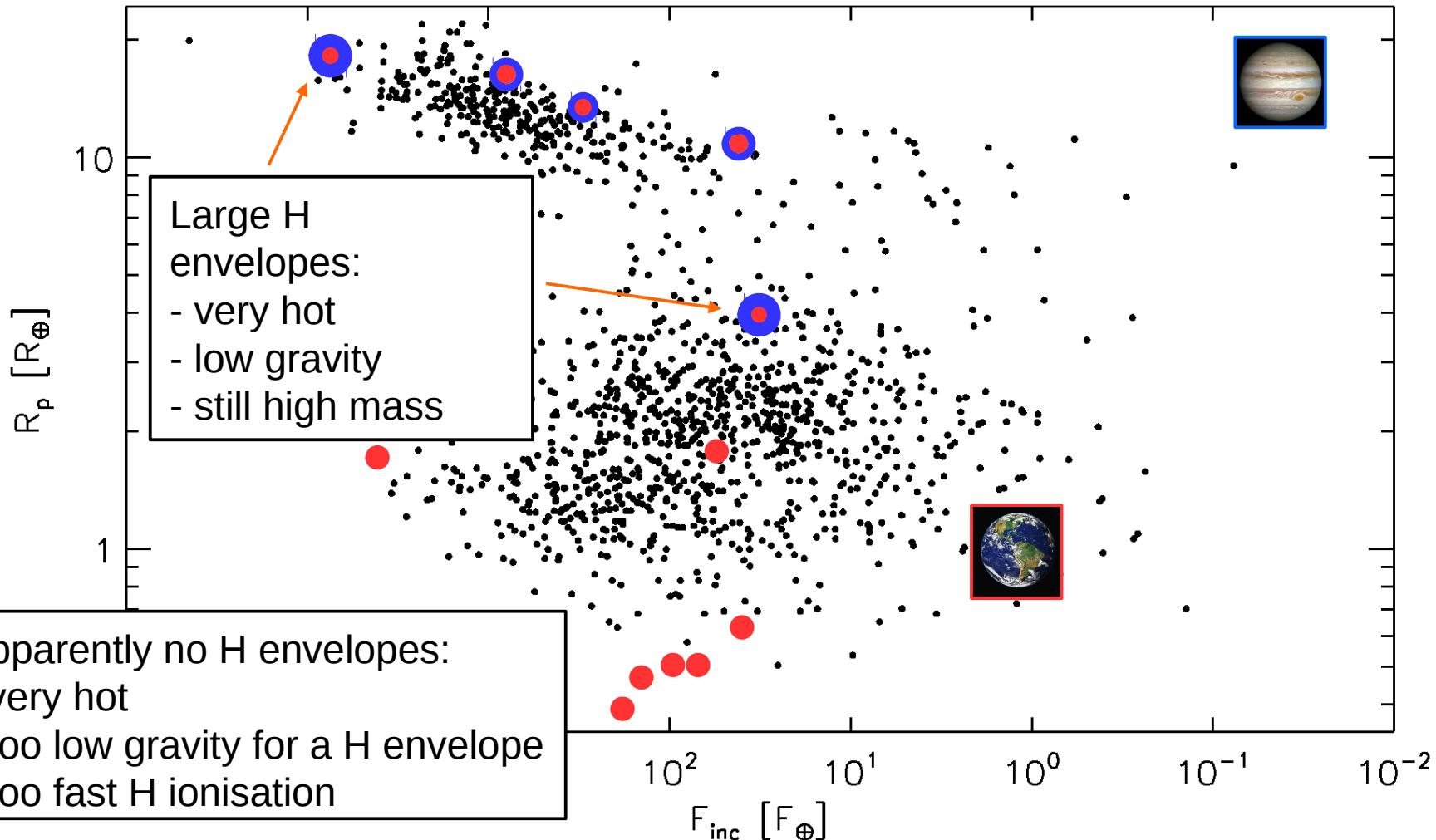
Planetary transits in the NUV: WASP-12 b

- Detection of an escaping atmosphere
- Detection of Mg2 and Fe2 in the planet upper atmosphere
- Detection of an early-ingress: bow-shock ahead of the planet, supported by either the planetary magnetic field or by the expanding planetary atmosphere

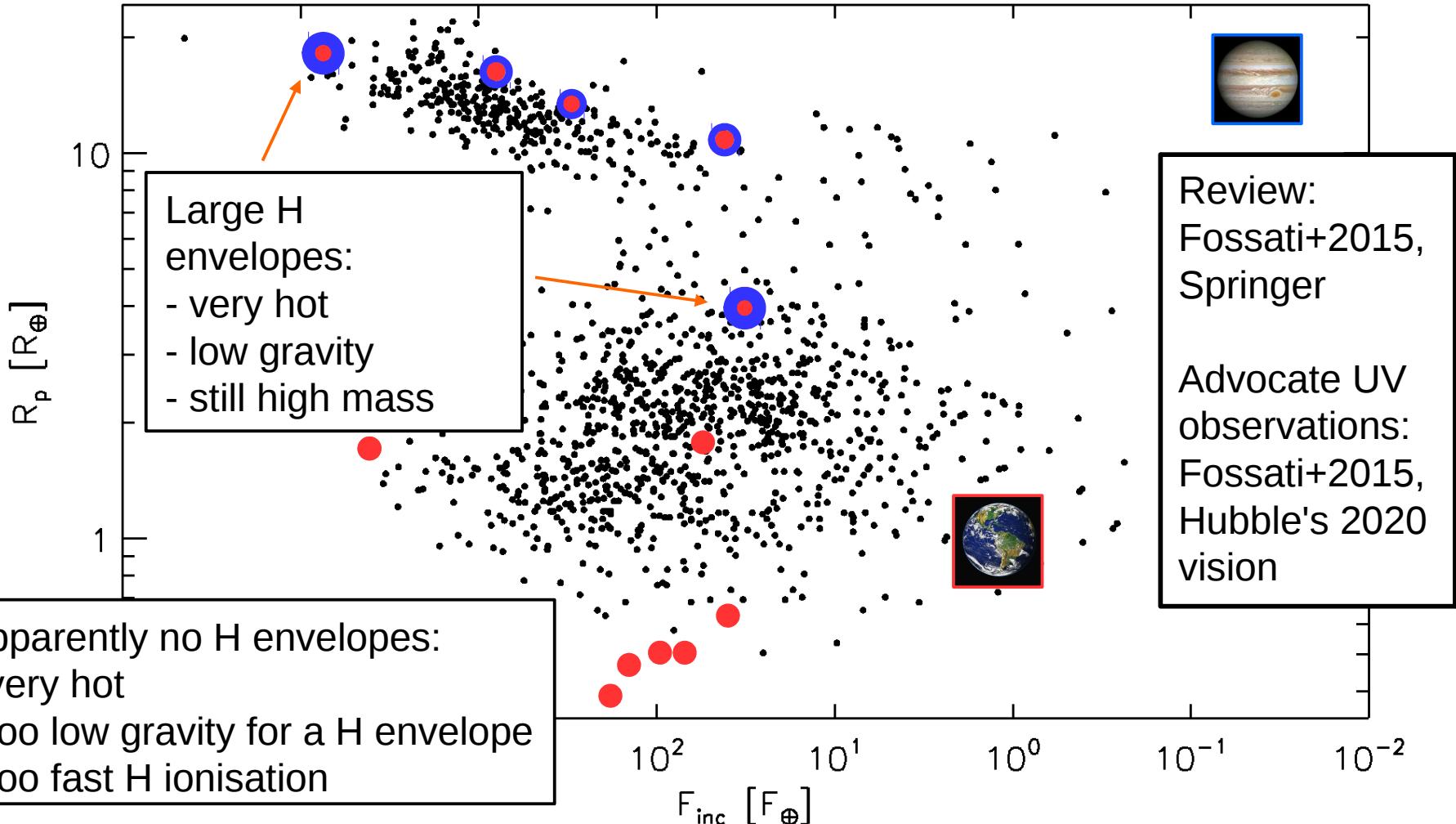
*Fossati+2010; Haswell+2012; Nichols+2015
Lai+2010; Vidotto+2010; Bisikalo+2013;
Fossati+2013*



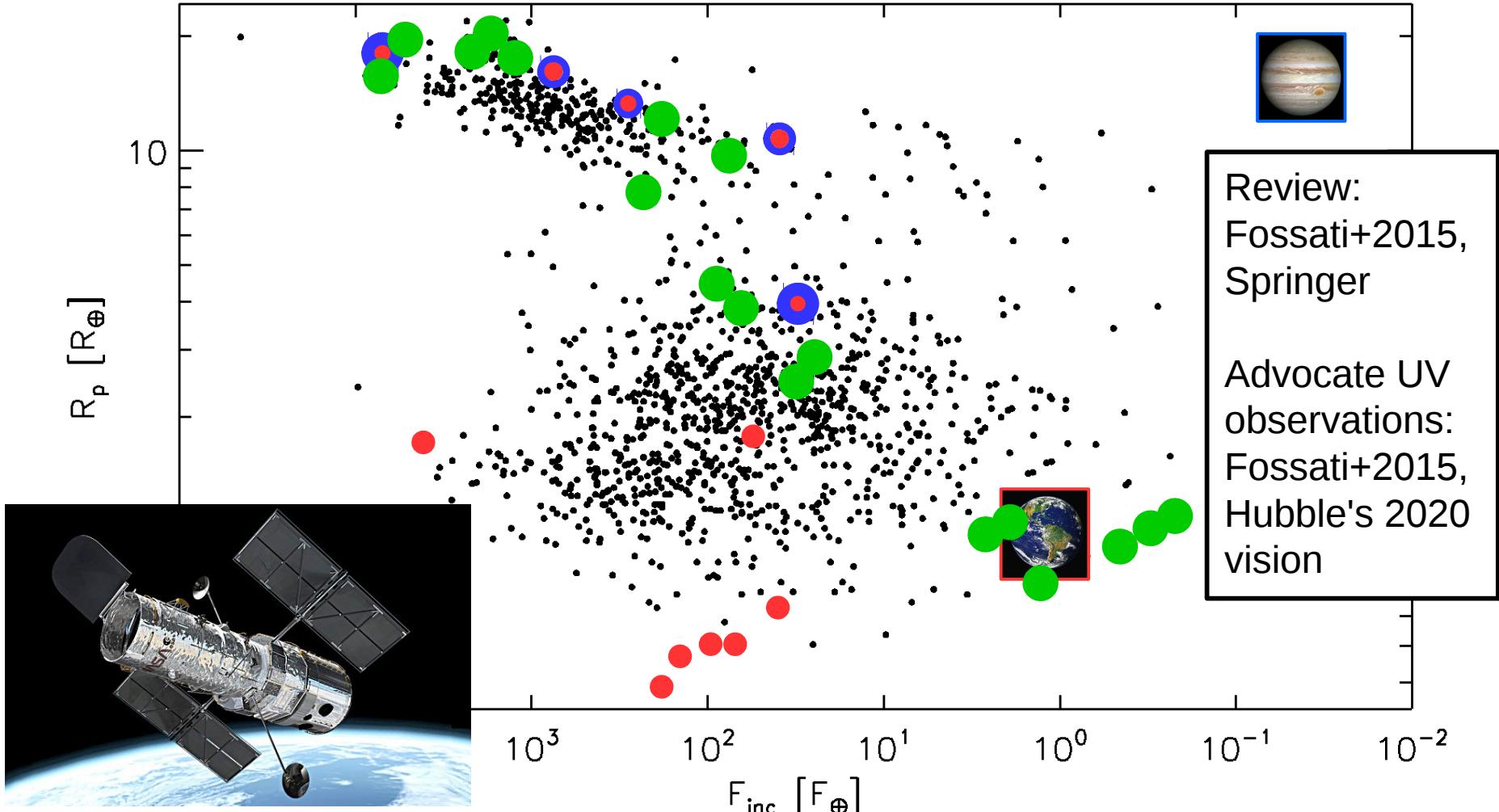
Observational results in context



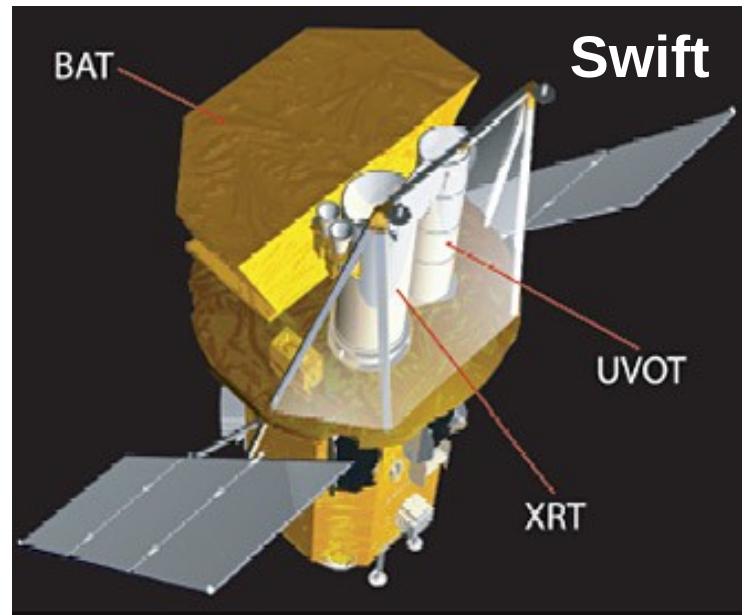
Observational results in context



Now / Near future: HST



Now and intermediate future (2020s)



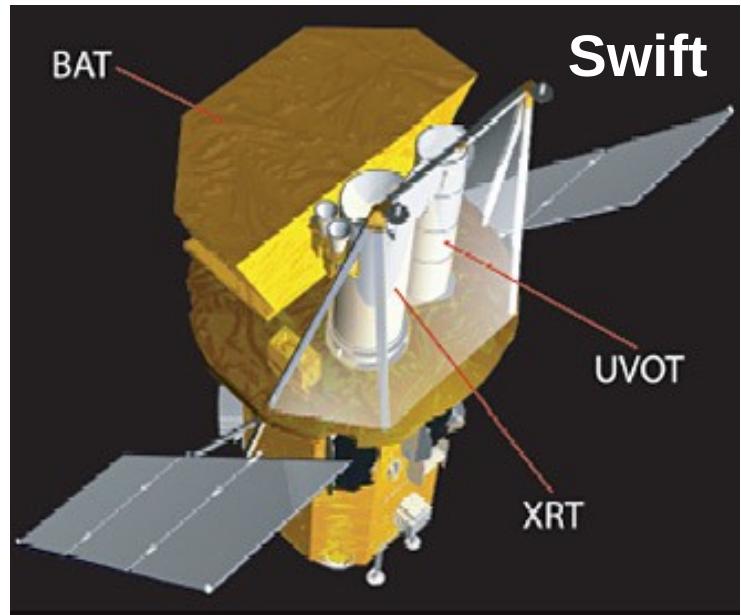
ASTROSAT



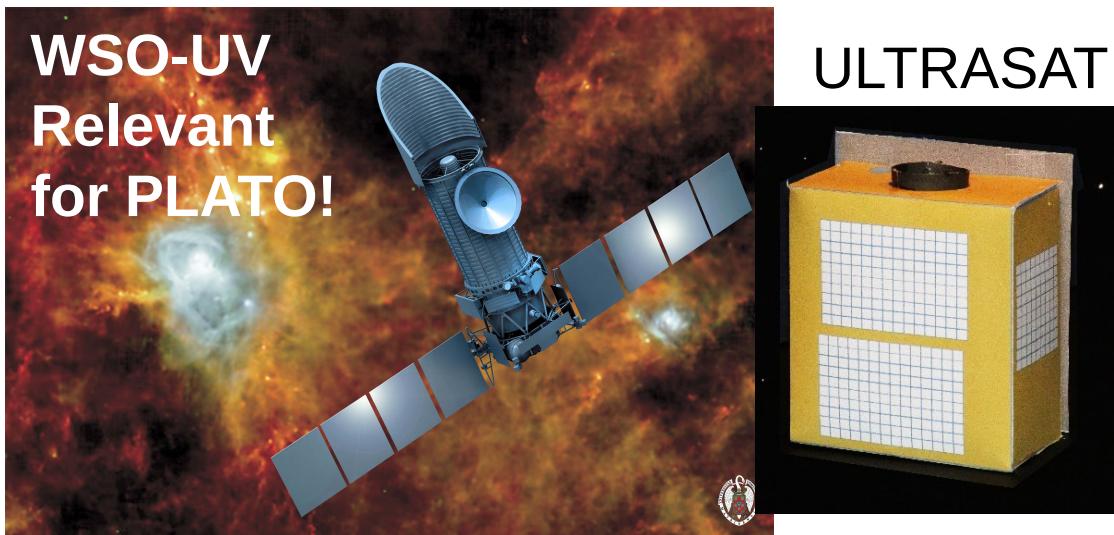
Now and intermediate future (2020s)



ASTROSAT



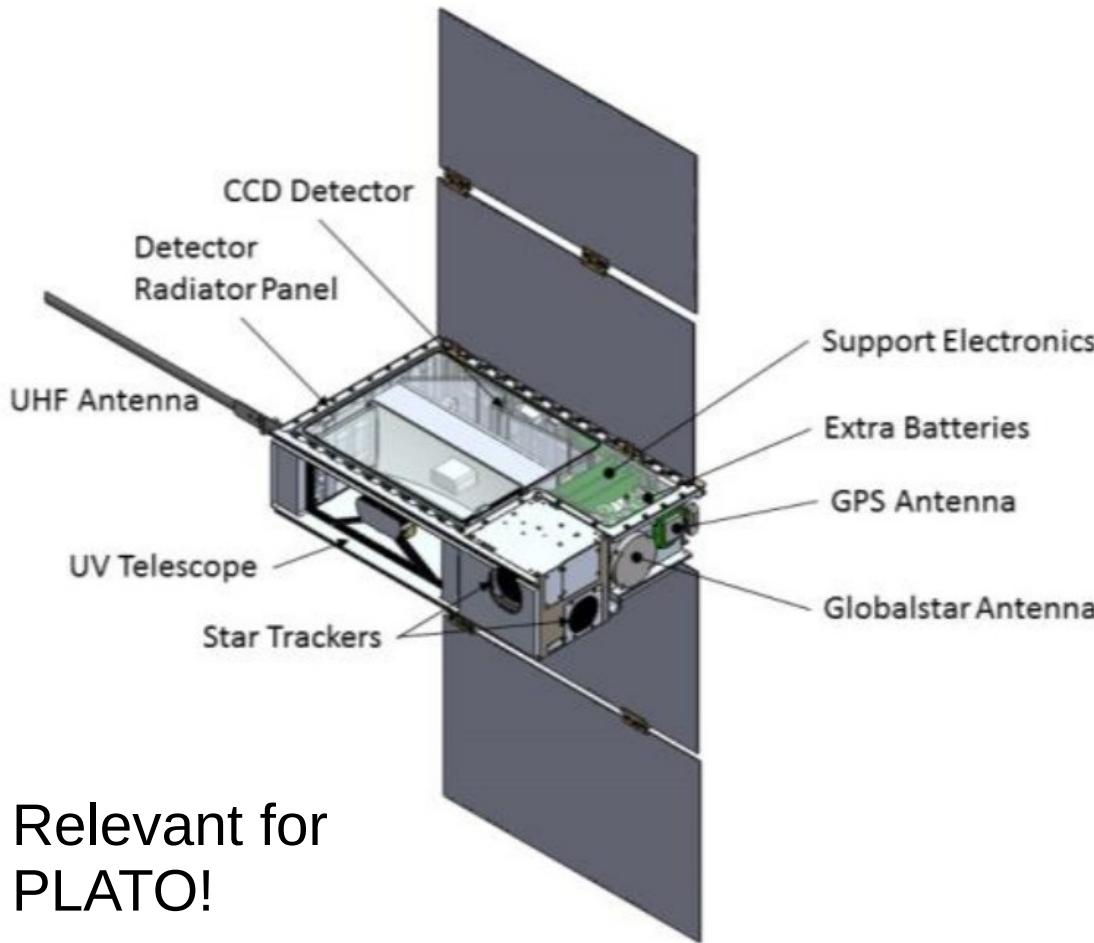
**WSO-UV
Relevant
for PLATO!**



Intermediate future (2020s)

PI: K. France
Col: B. Fleming

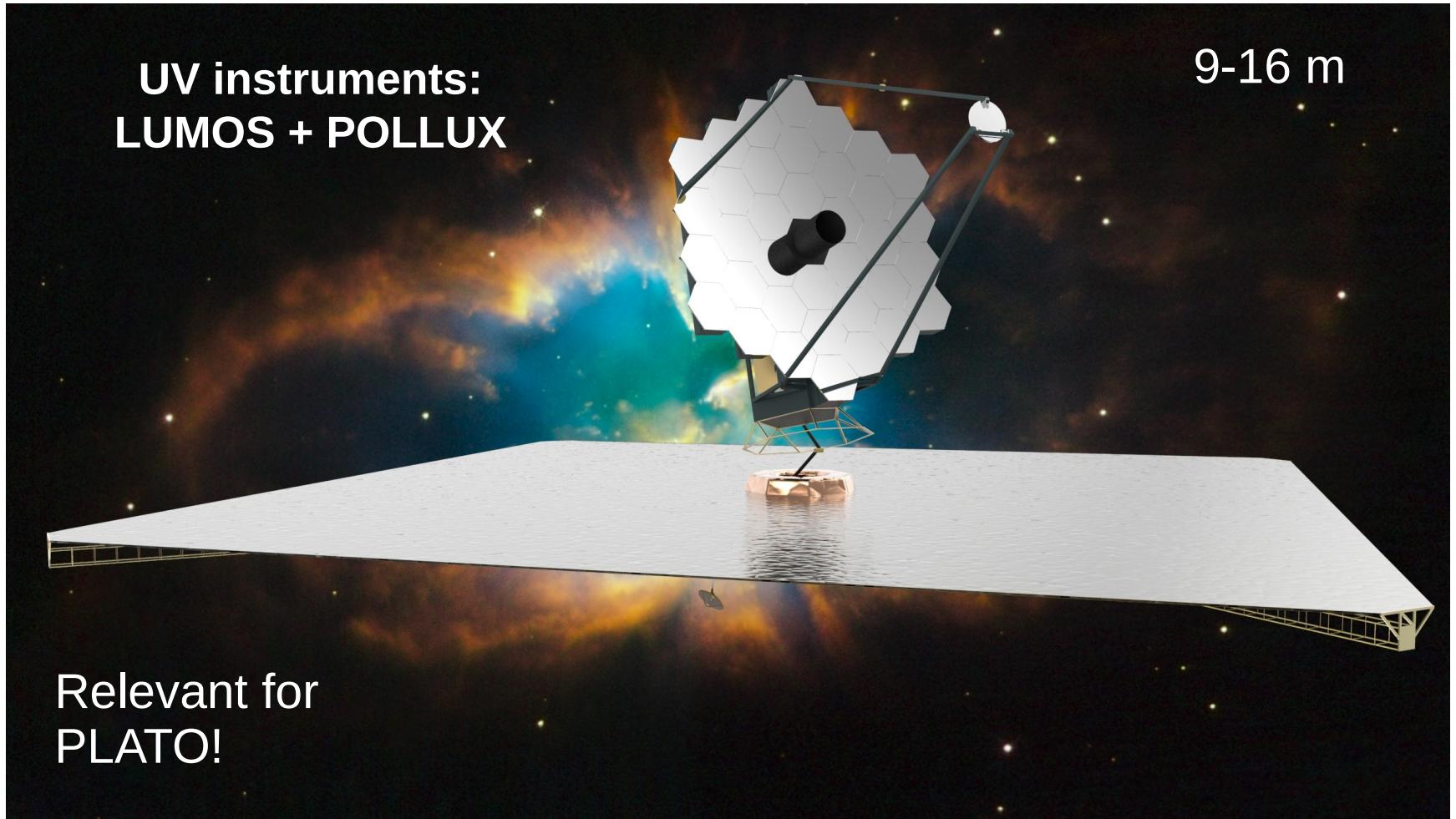
CUTE



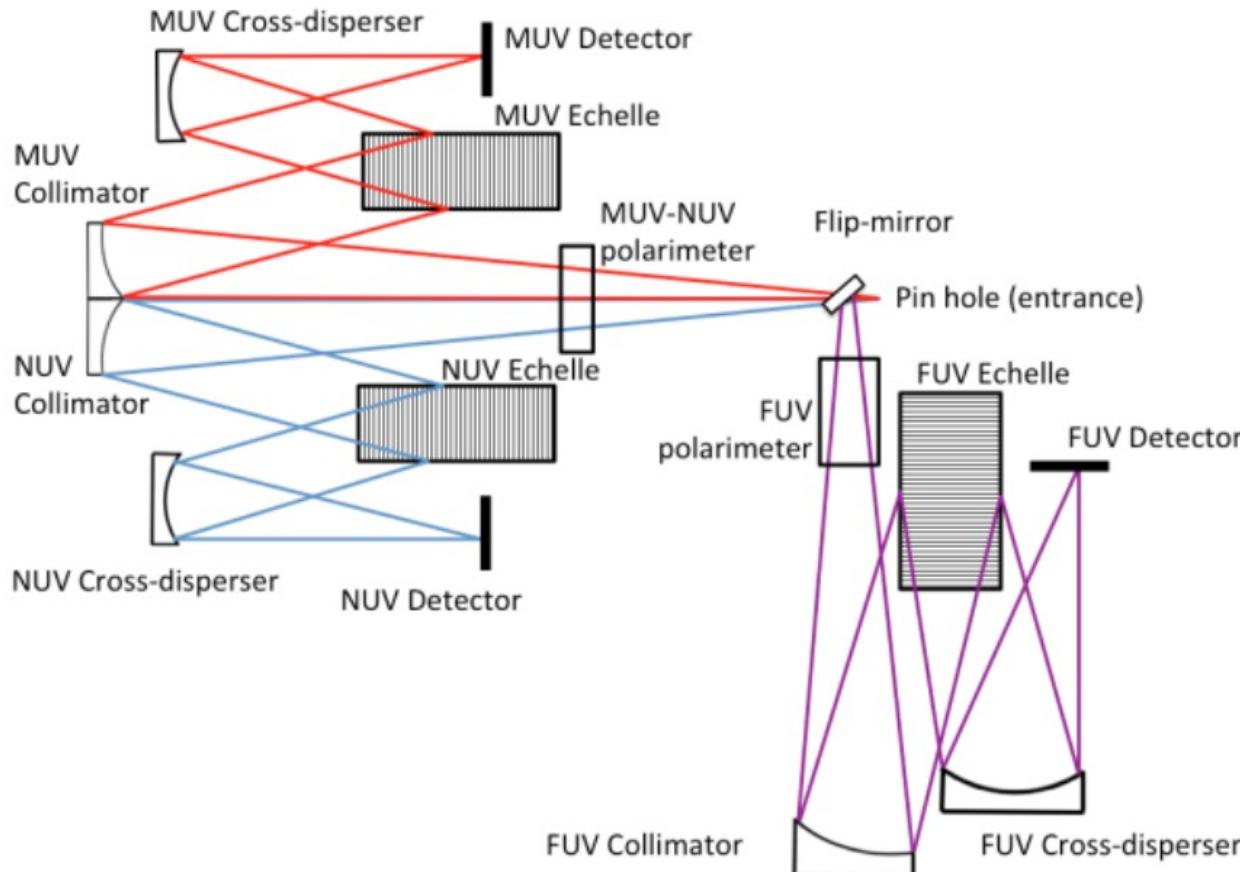
Relevant for
PLATO!

- NUV low resolution spectroscopy
- Monitor UV transits of about 20 nearby planets
- Detect species in planetary exospheres
- Measure mass loss rates
- 6U bus
- 20x8 cm primary
- 250 - 350 nm
- Resolution 2500
- launch ready in 2.5 years

Far future: LUVOIR (2030s⁺)



POLLUX



PIs: C. Neiner,
J.-C. Bouret

POLLUX: high-resolution
UV spectropolarimeter

Resolution 120000

FUV: 90 – 123 nm

MUV: 119 – 220 nm

NUV: 210 – 390 nm

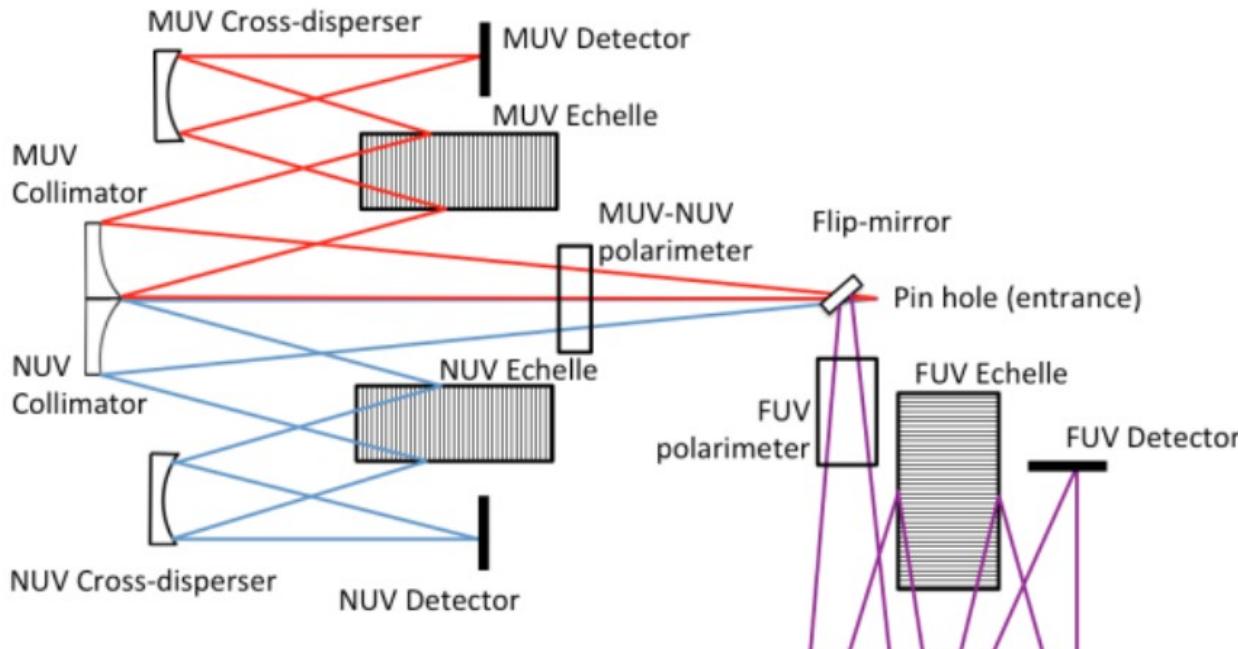
Retractable polarimeters

Circular + linear
polarisation

- exoplanet atmospheric characterisation through polarimetry

- star-planet interactions

POLLUX



POLLUX: high-resolution
UV spectropolarimeter

Resolution 120000

FUV: 90 – 123 nm

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Retractable polarimeters

Circular + linear
polarisation

Interested in joining the
POLLUX science
consortium and/or
exoplanet working group?
→ drop me an email

PIs: C. Neiner,
J.-C. Bouret

- exoplanet atmospheric
characterisation through
polarimetry

- star-planet interactions