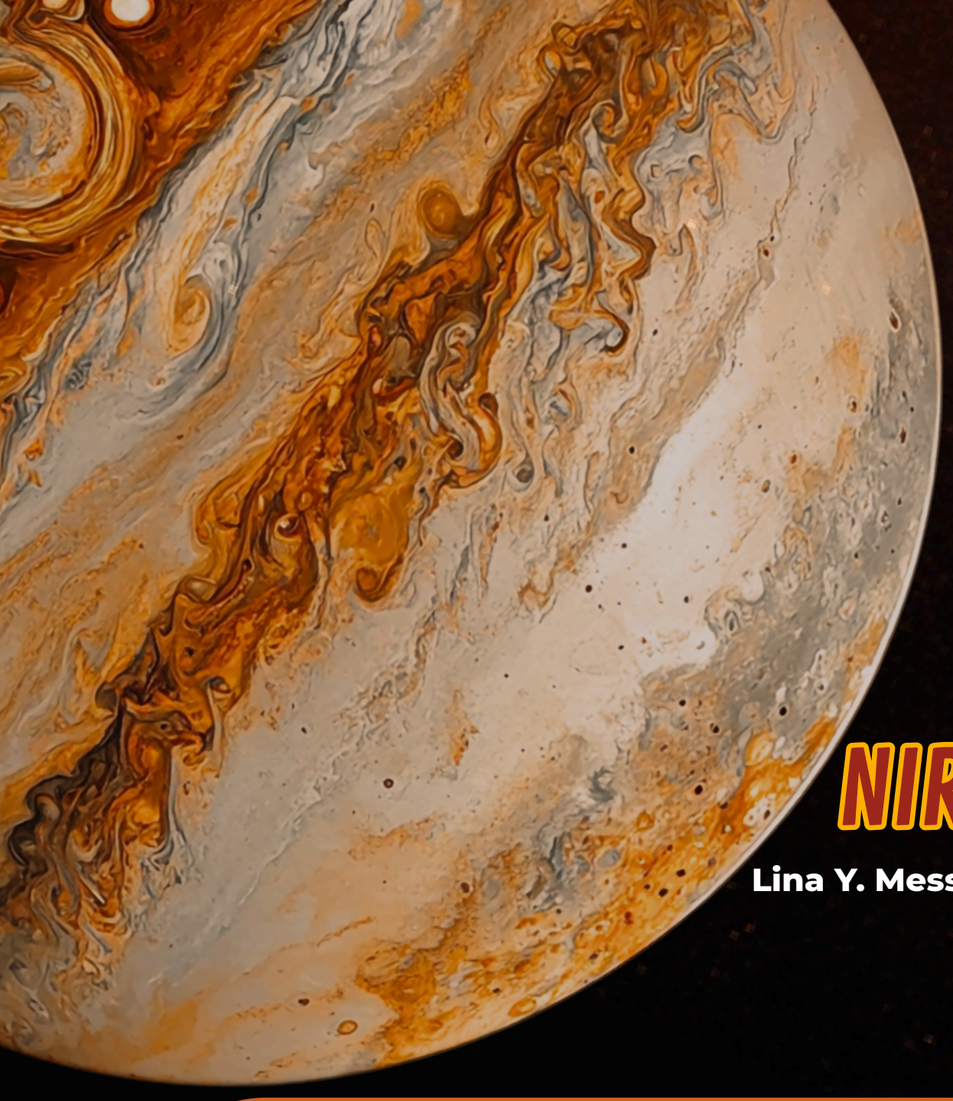


Hi, I'm Lina !
1st year PhD Student in Astrophysics @ UniGe
✉️ lina.messamah@unige.ch

📍 Catch me around the poster or during coffee breaks!

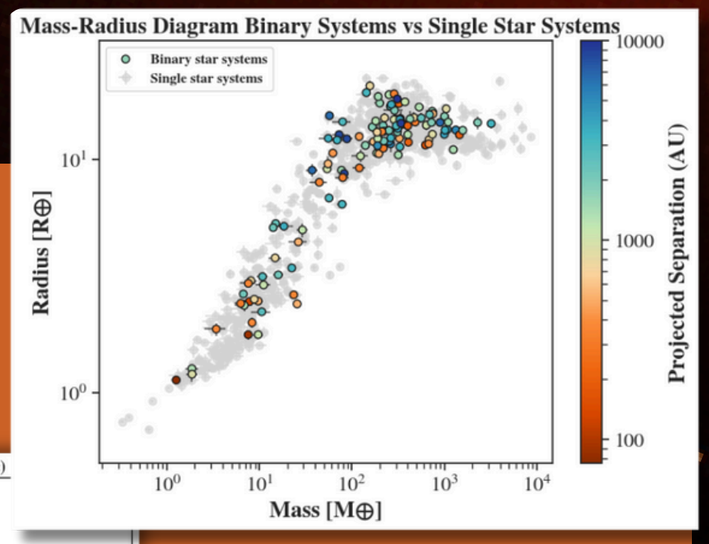
In the Company of Two: NIRPS Hunts Planets in Binary Stars

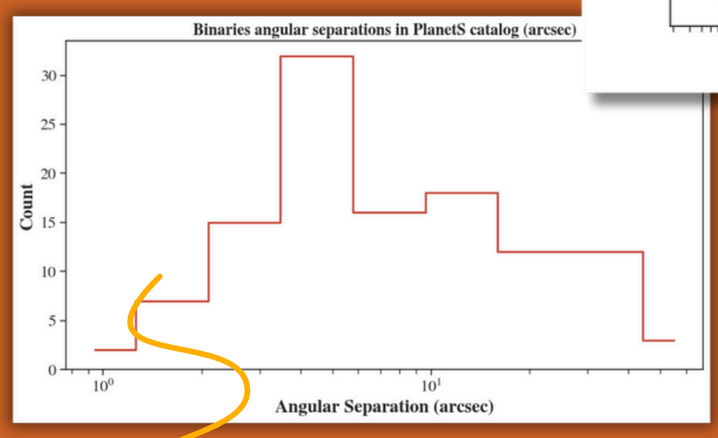
Lina Y. Messamah, F. Bouchy, J. Venturini, L. Parc, A. Nigioni, Y. Frensch, and NIRPS Consortium

Refining the Exoplanet Census with Gaia and PlanetS

- The **PlanetS** catalog of **transiting** exoplanets (*Otegi et al. 2020, Parc et al. 2024*) has been updated using Gaia astrometry (*El-Badry et al. 2021*), uncovering binary companions (or multiples) to many planet-hosting stars by matching parallaxes and proper motions and filtering out clusters.
- Robust and reliable classification of **S-type transiting exoplanets.**
- This update enables **demographic studies and comparisons between binaries and single-star systems.**

Messamah et al. (in prep)



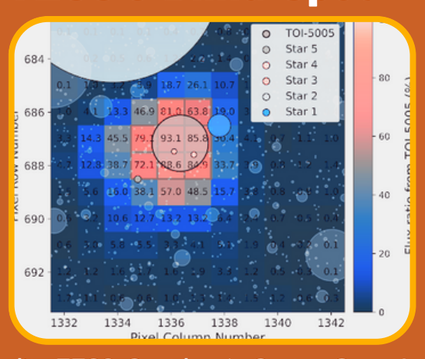


Target Selection: Resolving TESS's Blind Spot

- With a pixel scale of 21" **TESS cannot resolve close binary stars.**

→ **Which star is the host ?**

- For each candidate we compute the probability of the planet orbiting either component.

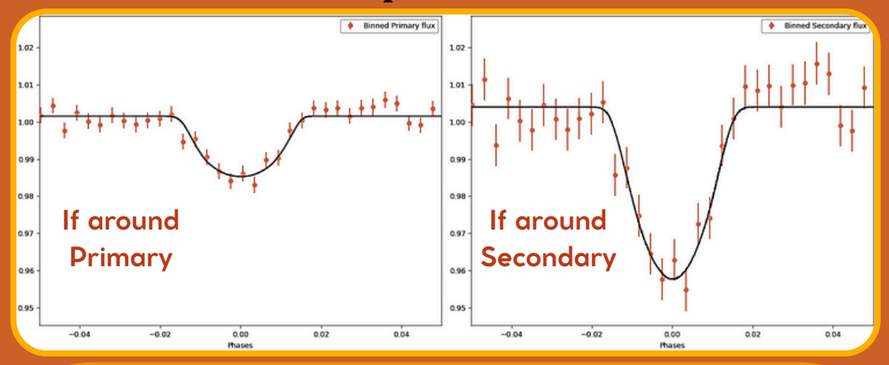


Credit : TESS-Cont by: A. Castro-Gonzalez

$$\rho_* \approx \frac{3\pi}{P^2 G}\left\{\frac{(1+\sqrt{\Delta F_{obs}})^2 - b^2[1-\sin^2(t_T\pi/P)]}{\sin^2(t_T\pi/P)}\right\}^{3/2}$$

(Seager and Mallen-Ornellas 2003)

$$\rho_{*,1} \rightarrow \Delta F_{obs} = (1+\frac{F_2}{F_1})\delta$$

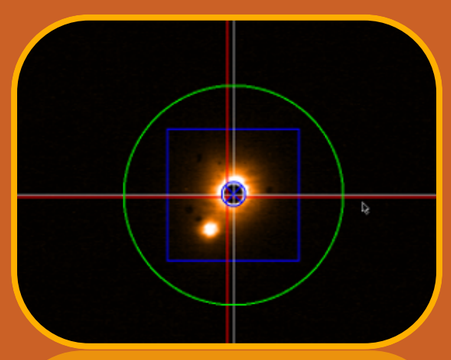


Our sample selection focuses on:

- Bound binaries with projected separations < 500 AU
- Systems with at least one K or M dwarf
- J magnitude < 14 (limit of NIRPS Wave Front Sensor)
- Observability from La Silla

NIRPS Peering Through the Binary Fog

- Observation bias toward **wide angular separation** → **Close** stellar companions **not resolved**
- **NIRPS** installed on the ESO 3.6m telescope at La Silla, Chile, is equipped with **Adaptive Optics** → **resolves** binaries down to **0.4 arcsec**
- Motivation for our ongoing **follow-up program of transiting planets in binary systems** with **NIRPS.**

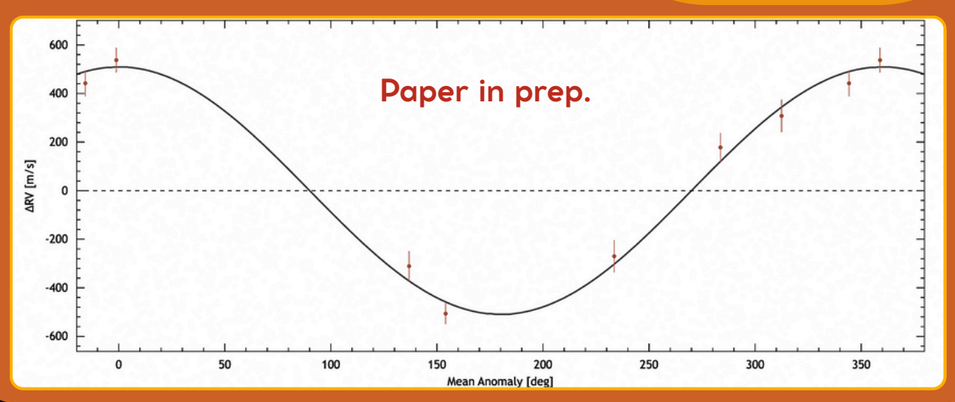


Screenshot of the guiding camera of NIRPS showing a resolved binary star of ~1"

First Detection: A Giant Planet in a Binary of M-Dwarfs

- **First detection** from the NIRPS binaries sub-program : A **Jupiter-like planet transiting** an M-dwarf in a **wide (~400 AU) binary.**

- **M0-M2V binary**
- **ang_sep : 2.3"**
- **Radius : 0.97 Rj**
- **Mass : 1.8 Mj**



Doyon R, Bouchy F, Pepe F, et al. (2025) The Messenger 194
Bouchy, F., Doyon, R., Pepe, F., et al. (2025), A&A in press

Swiss National Science Foundation
PlanetS National Centre of Competence in Research
UNIVERSITÉ DE GENÈVE