Probing Substellar Formation in a Feedback-Dominated Environment with Euclid

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SUBSTELLAR

Funded by the European Union

European Research Council
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Substellar objects cannot sustain ^{1}H-burning :

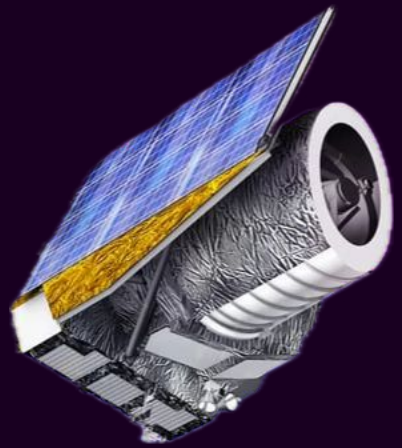
Brown Dwarfs ⇢ $13M_{Jupiter} \lesssim M \lesssim 75\ M_{Jupiter}$

Free-floating planetary-mass objects ⇢ $M \lesssim 13M_{Jupiter}$

Ultracool Dwarfs (UCDs) : substellar objects + lowest-mass stars
⇢ spectral type > **M6**

(OBAFGK**MLTY**)

Why Euclid?



Launched July 2023

Nominal survey: 6 years

1.2m diameter primary mirror

Diffraction limited

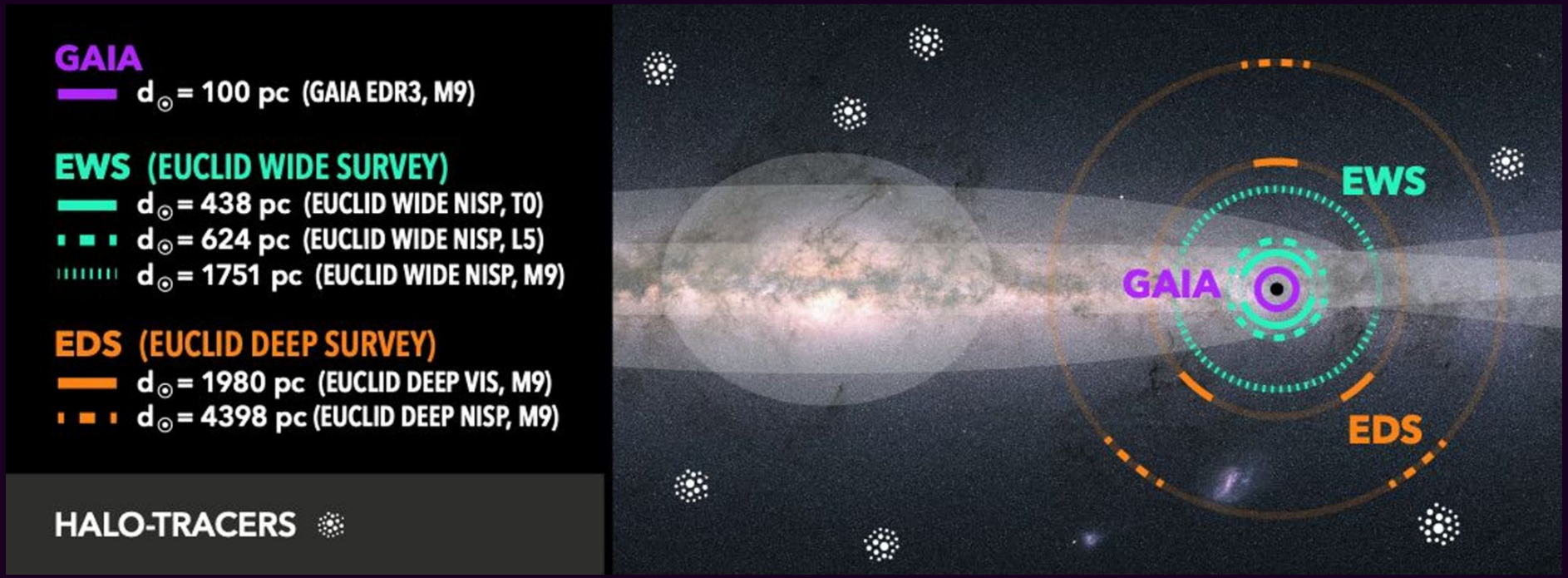
Visual Imager 0.55 - 0.9 μm **VIS**

Near-Infrared GRISM Spectrometer
1.2 - 1.9 μm (red grism)

Photometric Imager Y, J, H **NISP**

Mellier et al. 2025

Euclid space telescope reach



Martín et al. 2023

Euclid space telescope - The Numbers

	Before EUCLID	After EUCLID
Number of confirmed UCDs	~10^3	~10^5

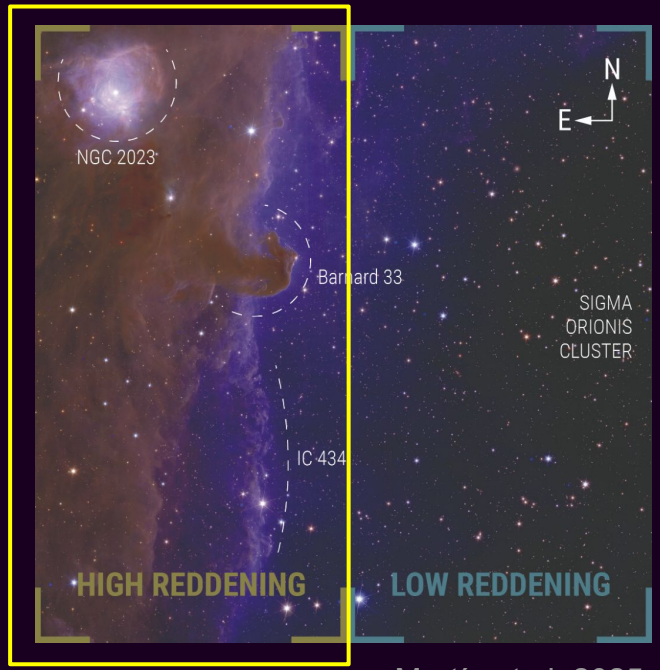
Žerjal et al.2025
Martín et al. 2021
Solano et al. 2021

UCD candidates: > 1 million

DR1: ~10^4 confirmed UCDs

Euclid ERO Horsehead field

Dataset: Euclid ERO

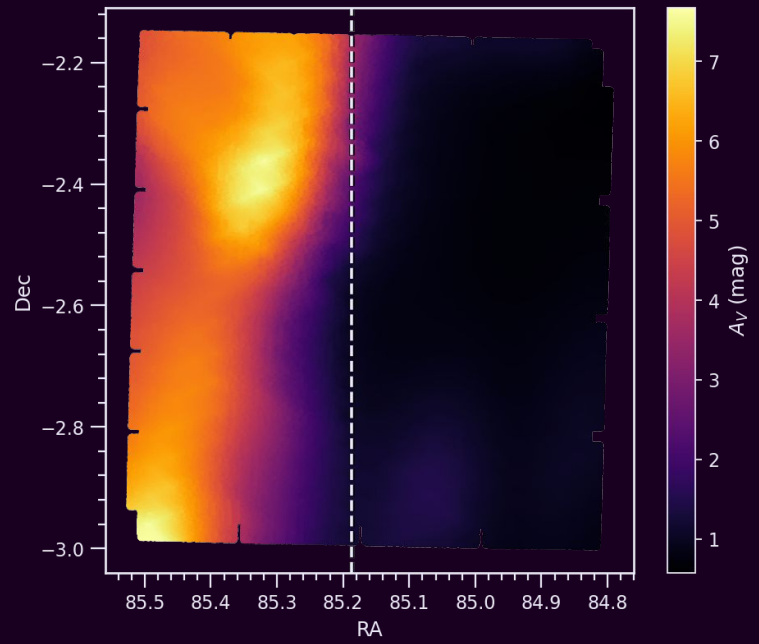


Martín et al. 2025

- 1st Euclid data available
- Nearby (~400 pc)
- Young objects
- Active star formation
- Complex structure
- No substellar objects previously found

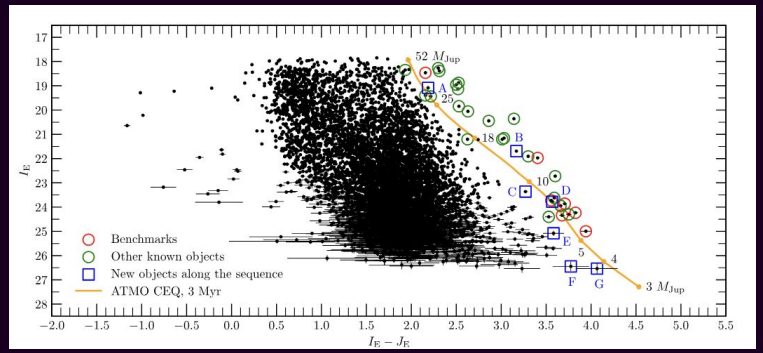
Euclid ERO Horsehead field

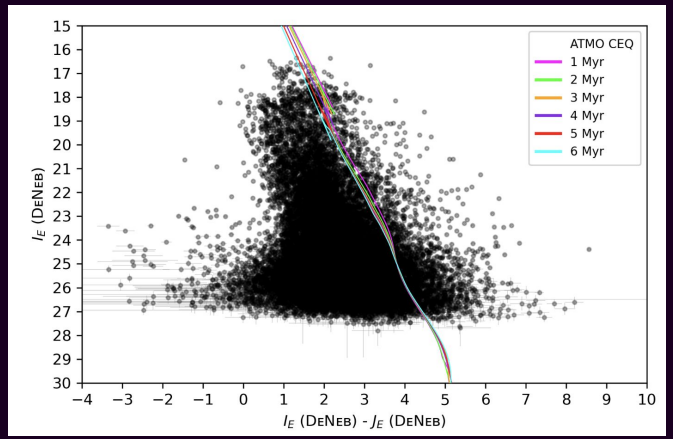
Dataset: Euclid ERO



Schlegel et al. (1998) / Schlafly & Finkbeiner (2011) + `dustmaps`

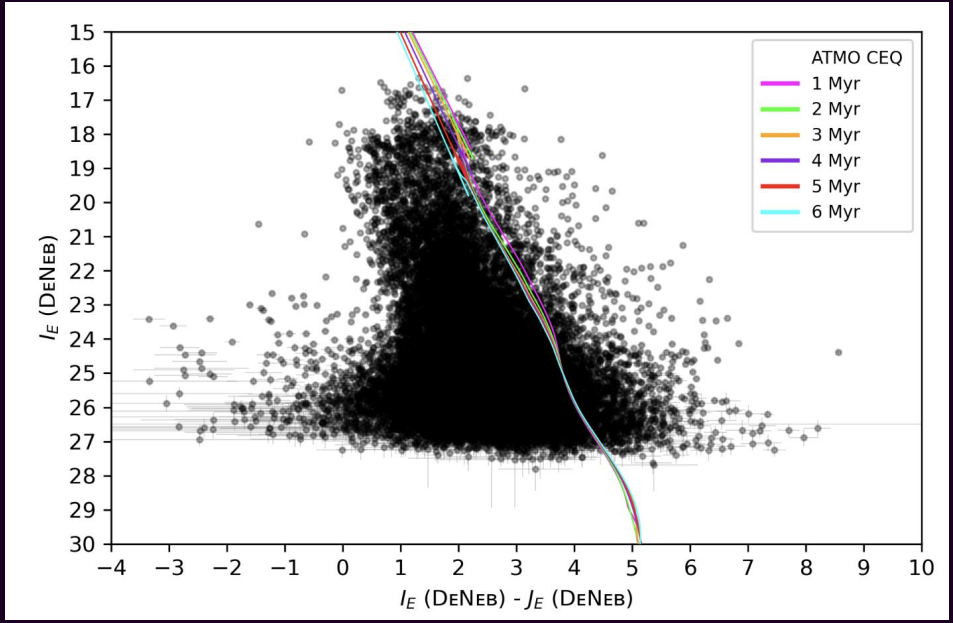
Martín et al. 2025



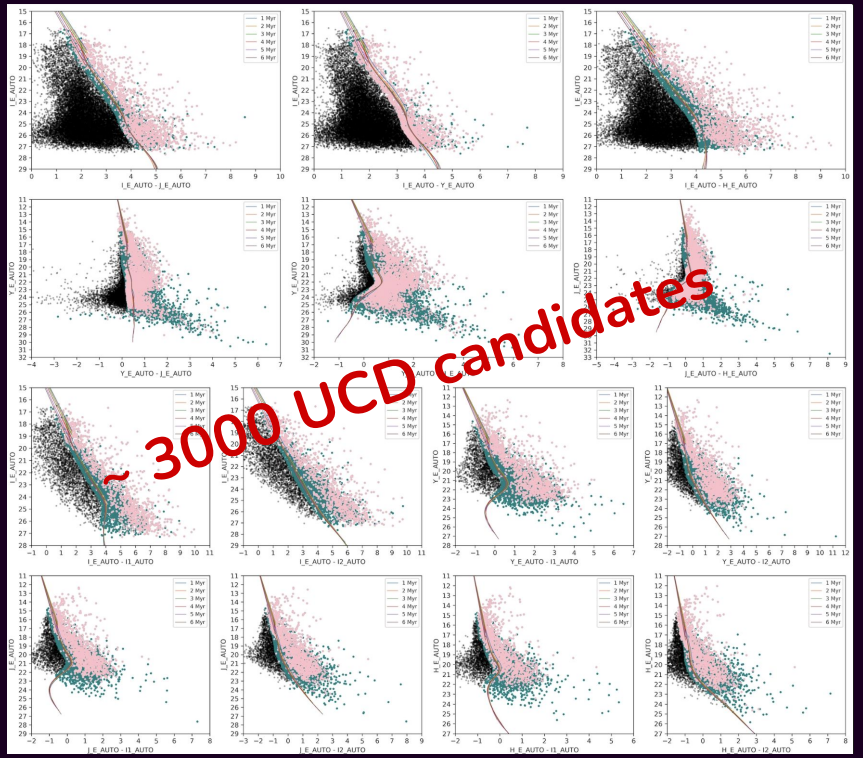


Tsilia et al. in prep

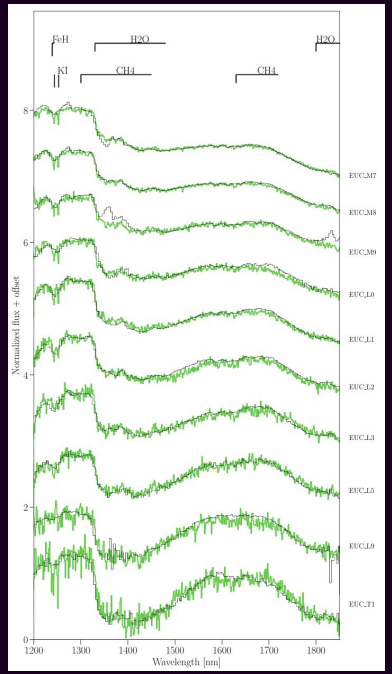
Hunting for Ultracool Dwarfs



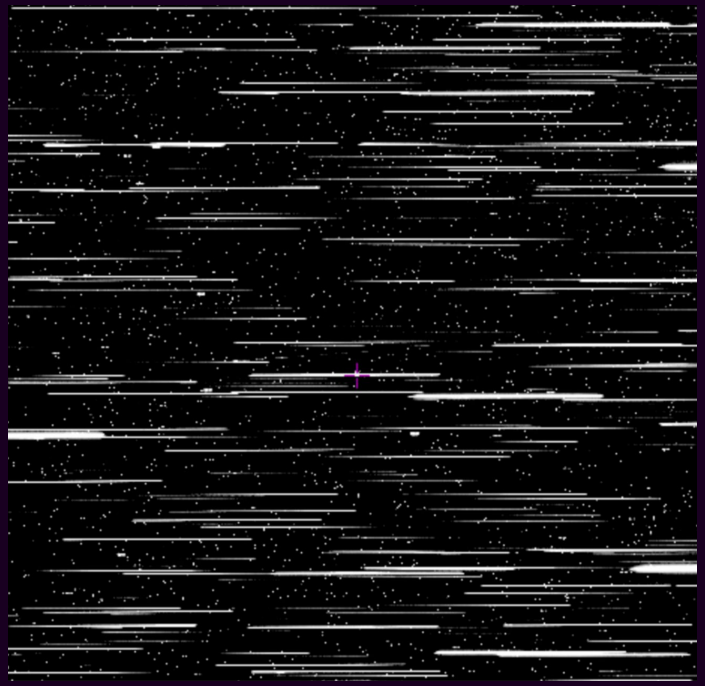
Tsilia et al. in prep



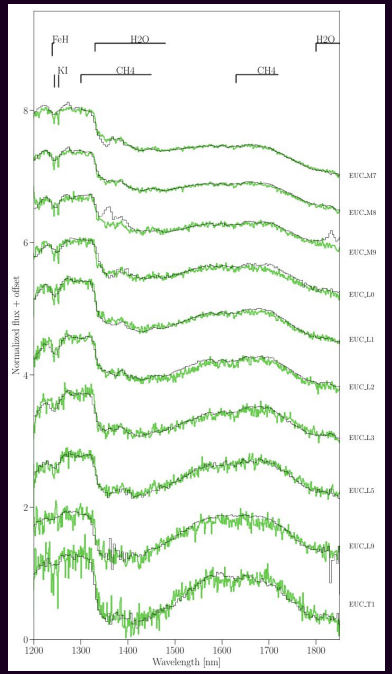
Hunting for Ultracool Dwarfs



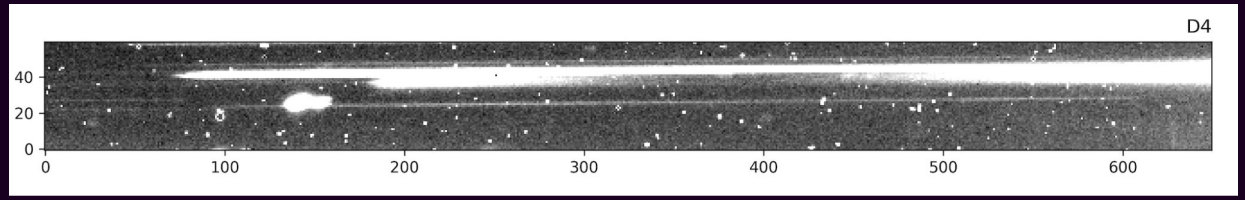
Dominguez-Tagle et al. 2025

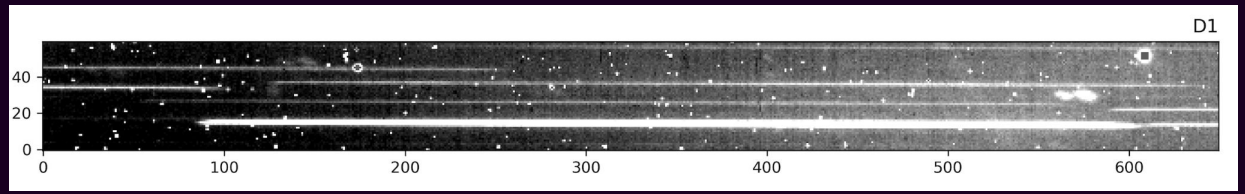


Hunting for Ultracool Dwarfs

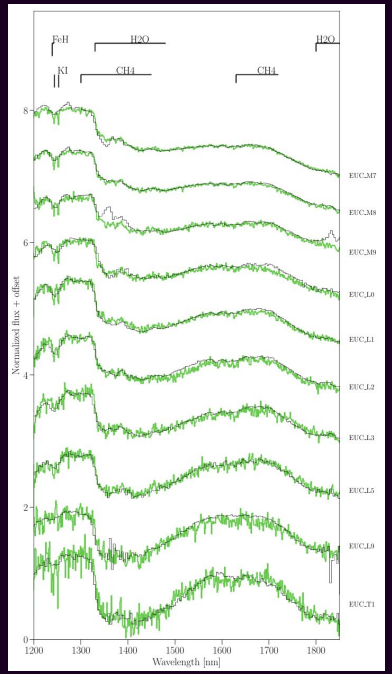


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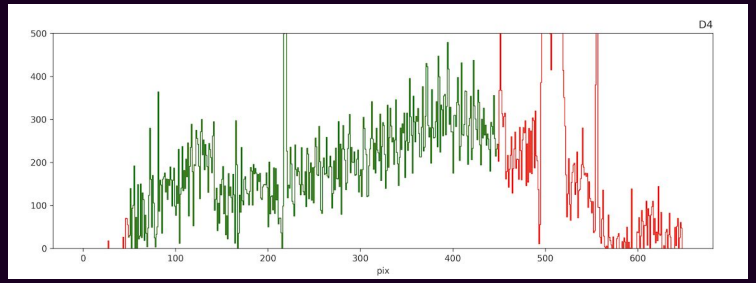


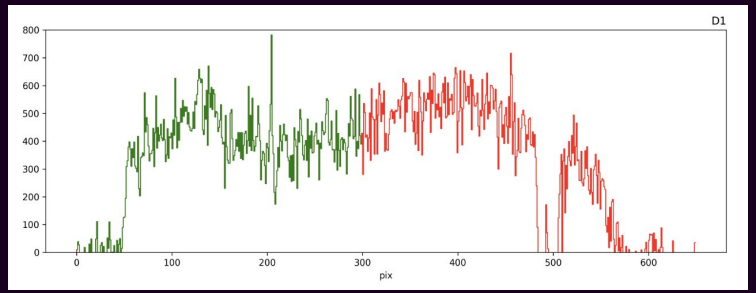


Hunting for Ultracool Dwarfs



Dominguez-Tagle et al. 2025





Summary

- ✦ Euclid ERO Horsehead field: Thousands of new UCD candidates in high-reddening region / dozens of good candidates
- ✦ Two UCDs confirmed, including 1st substellar object
- ✦ Spectroscopy in progress 🔄
- ✦ Tsilia et al. 2026a+b in prep

Thank you!

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