Discovery space and science with the PLACID stellar coronagraph

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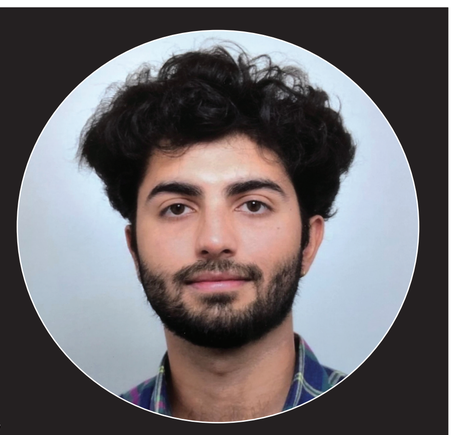
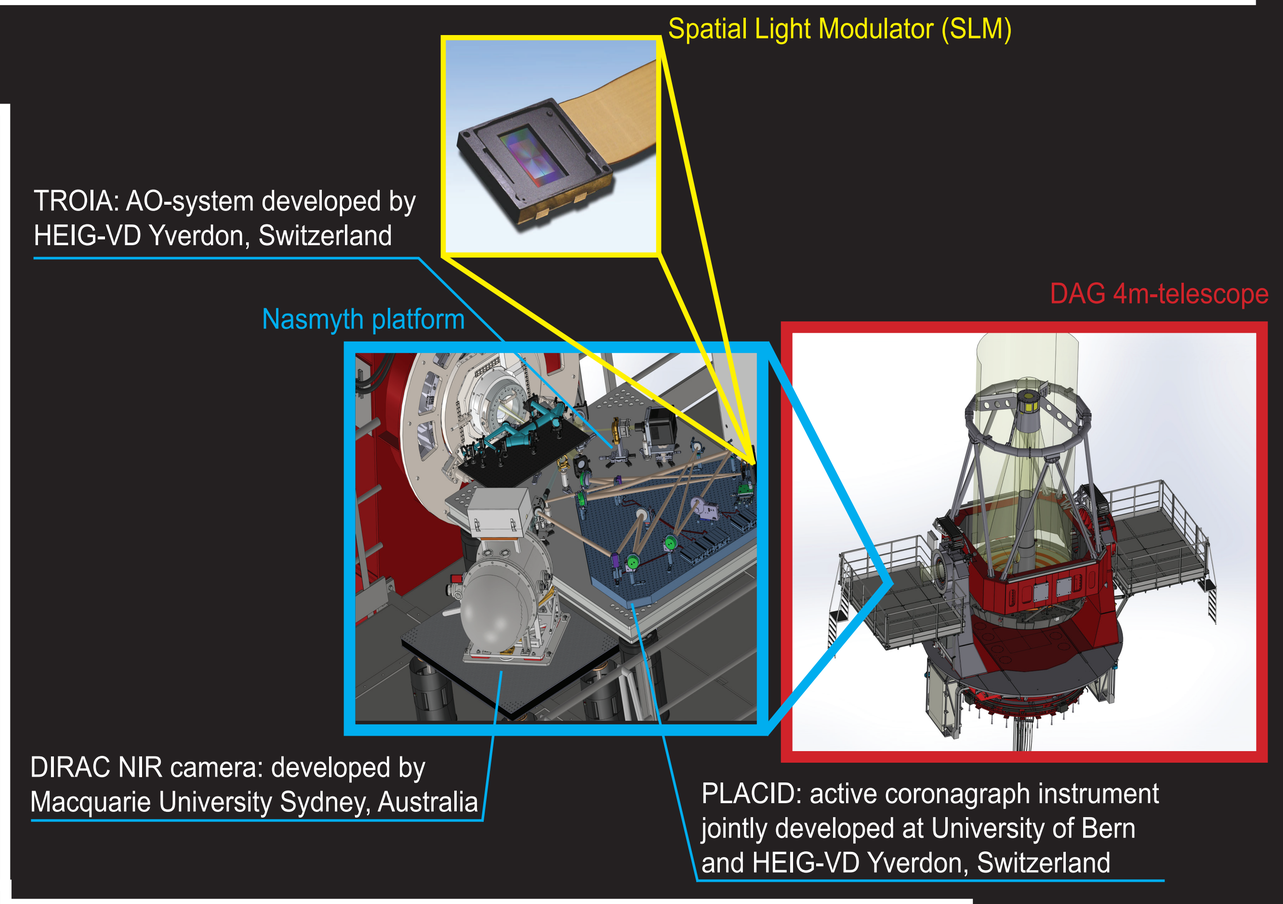
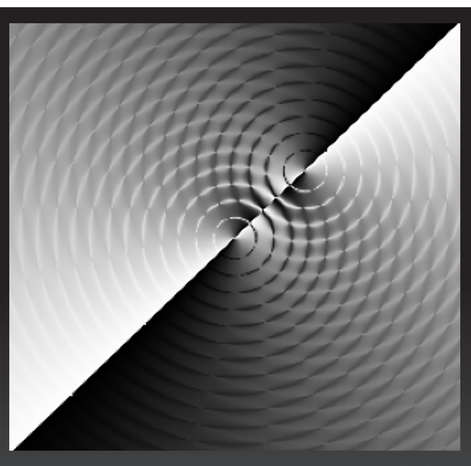


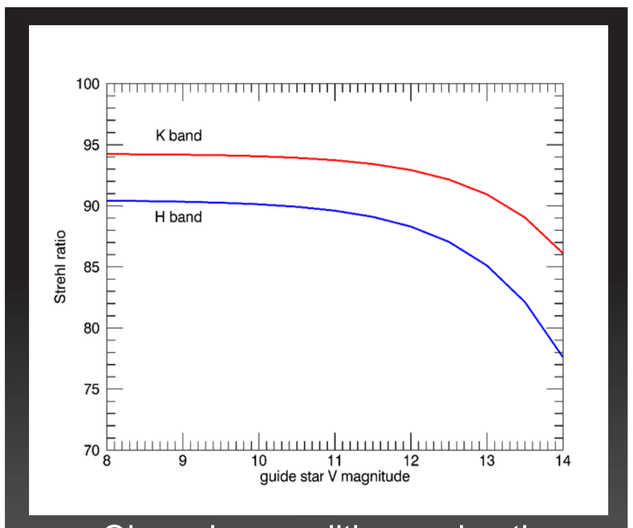
Introduction

- PLACID (Programmable Liquid-crystal Active Coronagraph Imager for the DAG telescope) is a coronagraphic instrument, providing adaptive high-contrast imaging capbilities from H - to Ks - band
- PLACID uses a pixelated Spatial Light Modulator (SLM) to generate coronagraphic focal-plane masks (FPMs)
- First high-contrast instrument in the world fielding an SLM-based “adaptive coronagraph” on a 4-m ground telescope (DAG, Doğu Anadolu Gözlemevi, Erzurum)
- Instrument delivered in March 24, first light expected by end of 2024
- Remote reconfiguration on-demand to adapt e.g. observing conditions, multiple star coronagraphy, correcting aberrations, segmented primary mirrors, e.g.: ELT, HWO)





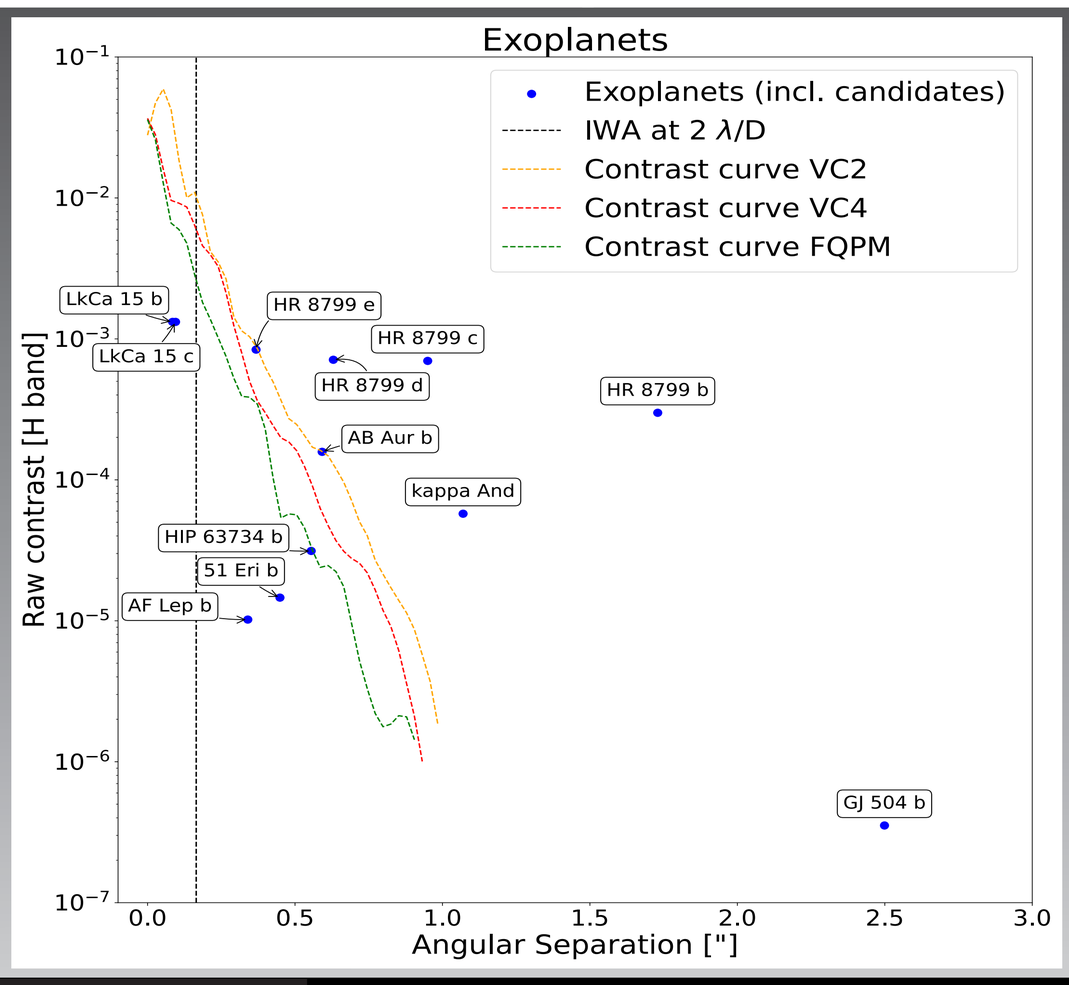
n=2 vortex FPM programmed for a binary star (can be rotated intime to perform ADI)

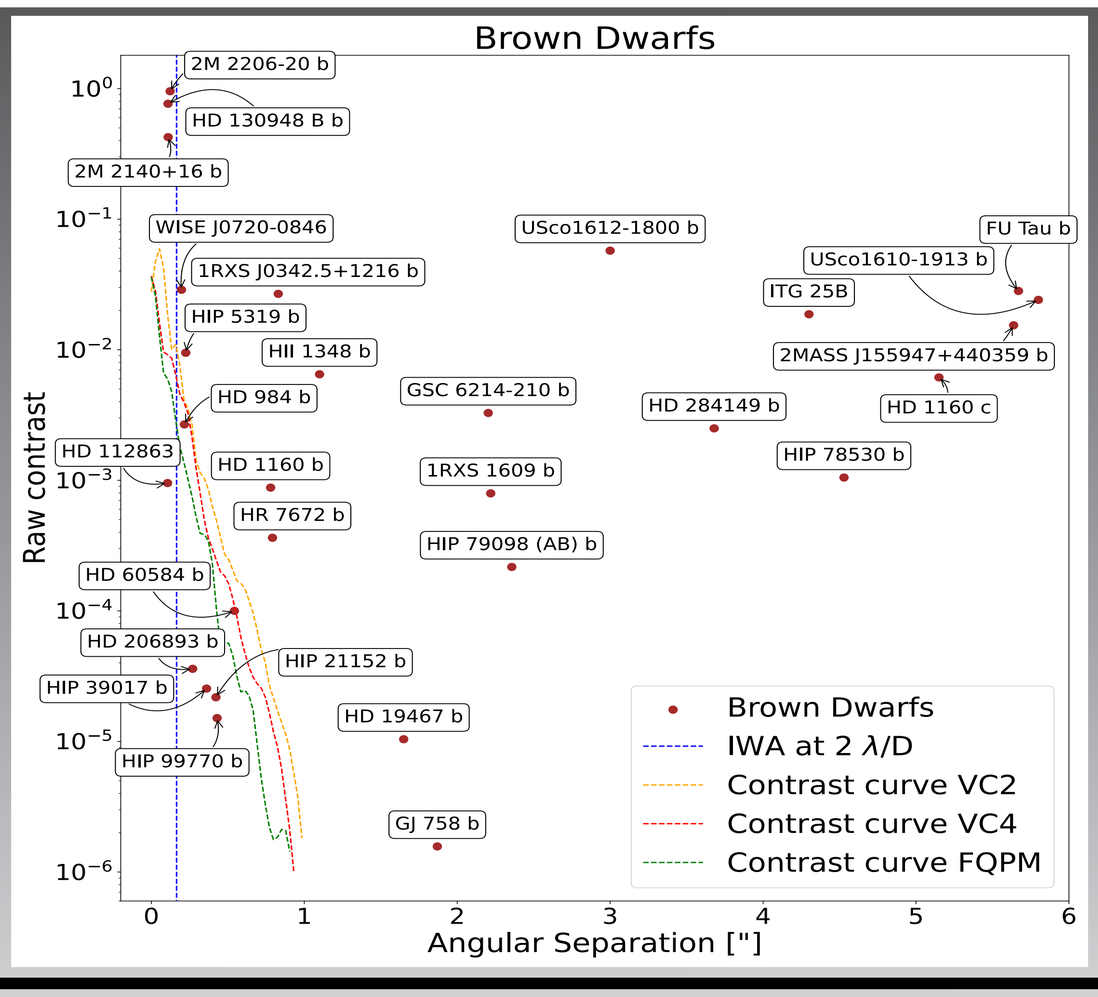


Observing conditions using the TROIA AO system at the DAG

PLACID targets & discovery space

- Known exoplanets / candidates, Brown Dwarfs, circumstellar disks, binaries/triples (engineering + for future multiple star coronagraphy)
- Gaia, TESS, PLATO direct-imaging follow-ups in the Northern hemisphere
- PLACID observational constraints:
  - Site: DEC: > -24°
  - TROIA AO guide star: V = 13 mag, PLACID: H = 12 mag
  - FOV: 16” x 9.6”





Conclusion

- Most planets and BDs feasible, as located at > 2 λ/D
- Planets:
  - HR 8799 a - d, kap And b, GJ 504 b
  - HR 8799 e, 51 Eri b, AB Aur b, etc. = borderline cases
    → post-processing, ADI, CDI (factor 10 improvement)
- Brown Dwarfs:
  - Borderline cases: HIP 5319 b, HD 984 b, HD 60584 b, ...

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