DIRECT IMAGING POTENTIAL OF OUTER COMPANIONS OF ECLIPSING BINARY STARS WITH 4-METER TELESCOPE OF THE EASTERN ANATOLIA OBSERVATORY (DAG)

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EASTERN ANATOLIA OBSERVATORY (DAG) 4M TELESCOPE

Doğu Anadolu Gözlemevi (DAG) Eastern Anatolia Observatory	
Location	Karakaya, Erzurum, Türkiye
Altitude	3170 m
Seeing (lowest, median)	0.3”-0.9”
Primary Mirror	4 m
Focal Length	56 m

GOALS

* Select "the best" candidates for hierarchical triples with sub-stellar companions

* Select them based on various observables such as Eclipse Timing Variations (ETVs), light curve solutions with third light, RV variatons compatible with a third body, literature findings…

* Eclipsing binaries provide a magnitude (hence contrast) advantage during their eclipses

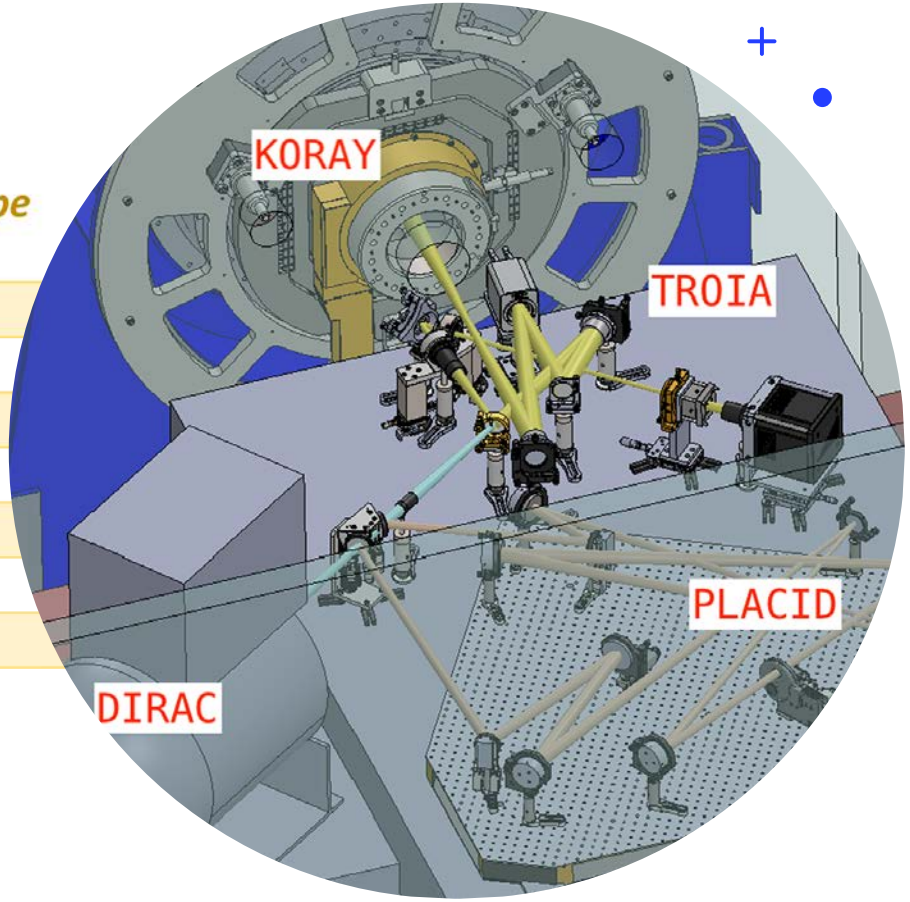
* Calculate the contrast ratios in the relevant wavelength range (H-band) and their angular separations based on orbital parameters

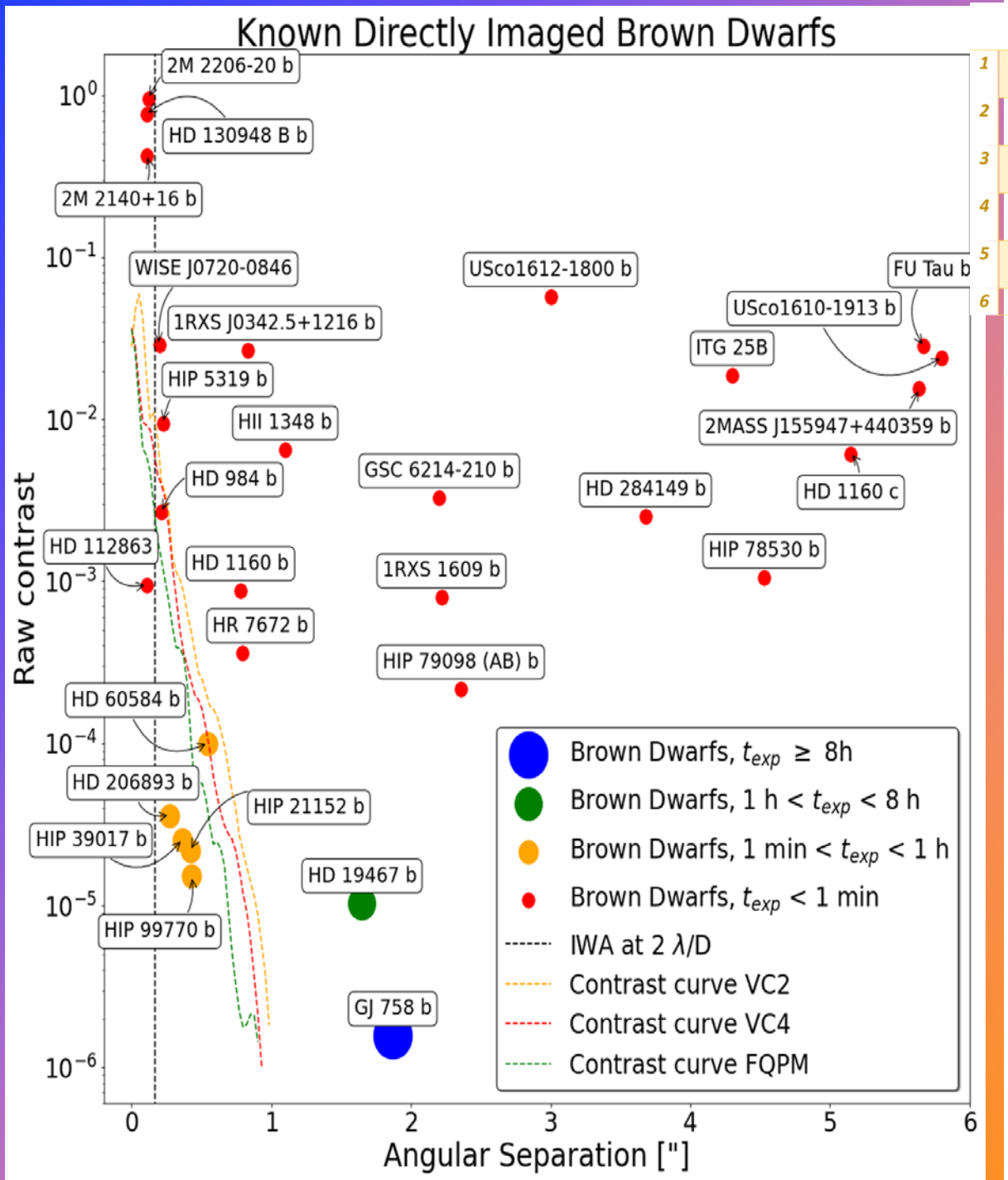
* Verify these detections with follow-up imaging observations

* Determine the limits of the DAG telescope and its its coronographic imaging system (DGS) with objects spanning a broad range of magnitudes and spectral types

The Programmable Liquid-crystal Active Coronagraphic Imager for the DAG Telescope PLACID

Observing Bands	H-Band: 1.63 µm, Ks-band: 2.15 µm
SLM Specification	**1920 x 1152 pixels, 8 bits**
Field of View	16” x 9.6”
λ/D at H-Band	**85 mas**
Optical Throughput	22%
Raw Contrast at 2 λ/D	**$< 5.3x10^{-2}$**
Raw Contrast at 5 λ/D	$< 5.3x10^{-4}$





	Object	Main ID	GAIA ID	Type	Angular Sep. ["]	Mag G	G Flux Ratio	Mag R	R Flux Ratio
1	GSC 1387-0475	StKM 1-704	663045166984556928	Double or Multiple Star	0.70	10.45	5.97E-01	9.36	6.77E-01
2	LV Vir	HD 117780	3603154515379811456	Spectroscopic Binary	0.89	8.96	6.96E-01	8.02	9.86E-01
3	V829 Her	V829 Her	1338980488599354880	Spectroscopic Binary	1.19	13.12	6.47E-02	--	--
4	NSVS 12277727	ASAS J050905-0741.7	3207798824412250112	Eclipsing Binary	1.55	15.38	1.31E-01	--	--
5	V508 Oph	V508 Oph	4496631923406506240	Spectroscopic Binary	1.66	16.24	4.39E-03	--	--
6	...								

* We are a putting together a list of eclipsing binaries with tertiary suggestions at the moment.

* We have the theoretical ontrast curves based on laboratory measurements.

* We expect to have the first light at the end of this year with the telescope, which will be followed by a commissioning period of the instruments.

SPIE Contributions for the DGS:

- Kühn et al. 2024, " The Programmable Liquid-crystal Active Coronagraphic Imager for the DAG telescope (PLACID) instrument "
- Tandon et al. 2024,, "Discovery space and science with the PLACID stellar coronagraph"
- Lin et al. 2024, "Future exoplanet direct imaging instruments "

THANK YOU

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