Improving and Assessing Exoplanet Sensitivity for Direct Imaging with a Matched Filter

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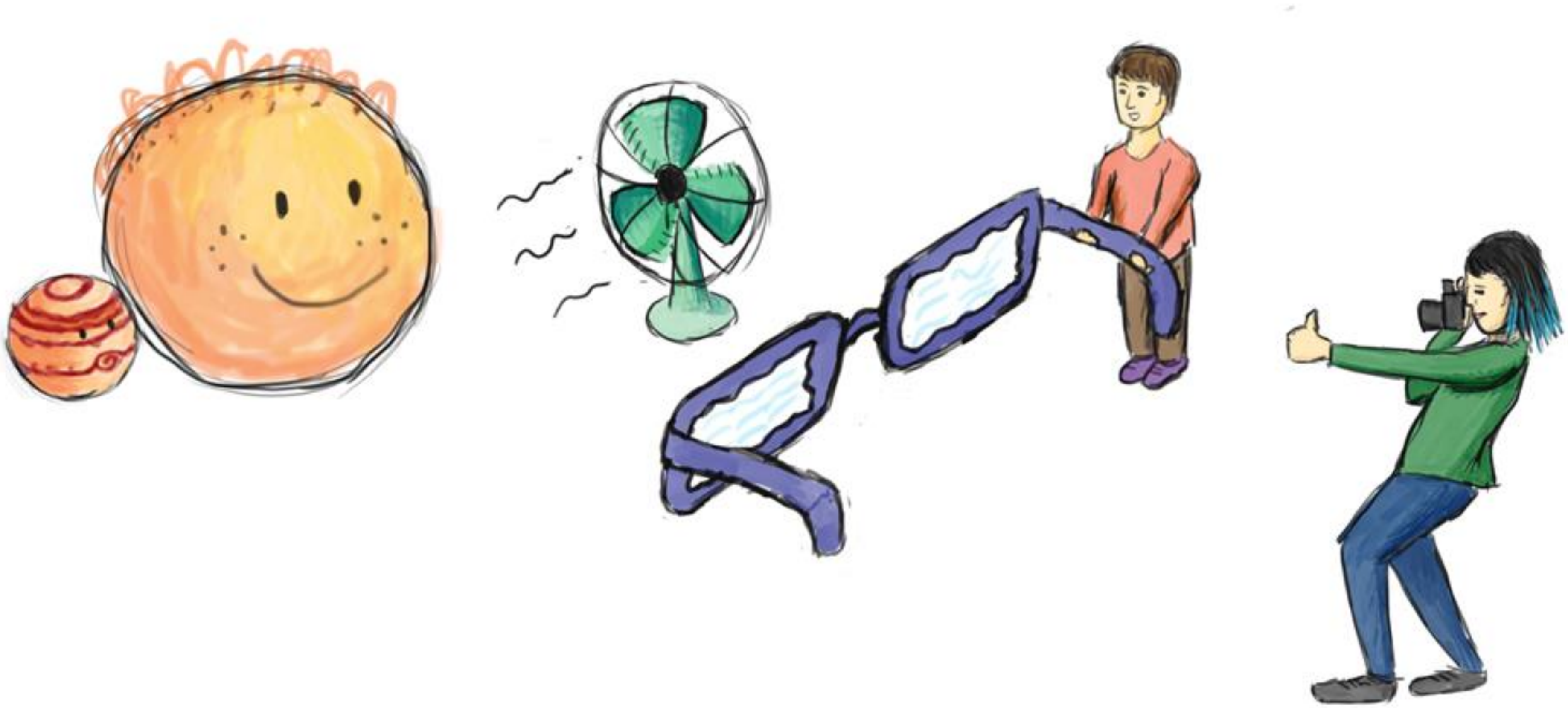
Bruce Macintosh,
GPIES *et al.*

The Gemini Planet Imager (GPI)



Credit: Jason Wang (UC Berkeley)

The GPI Team (a subset)

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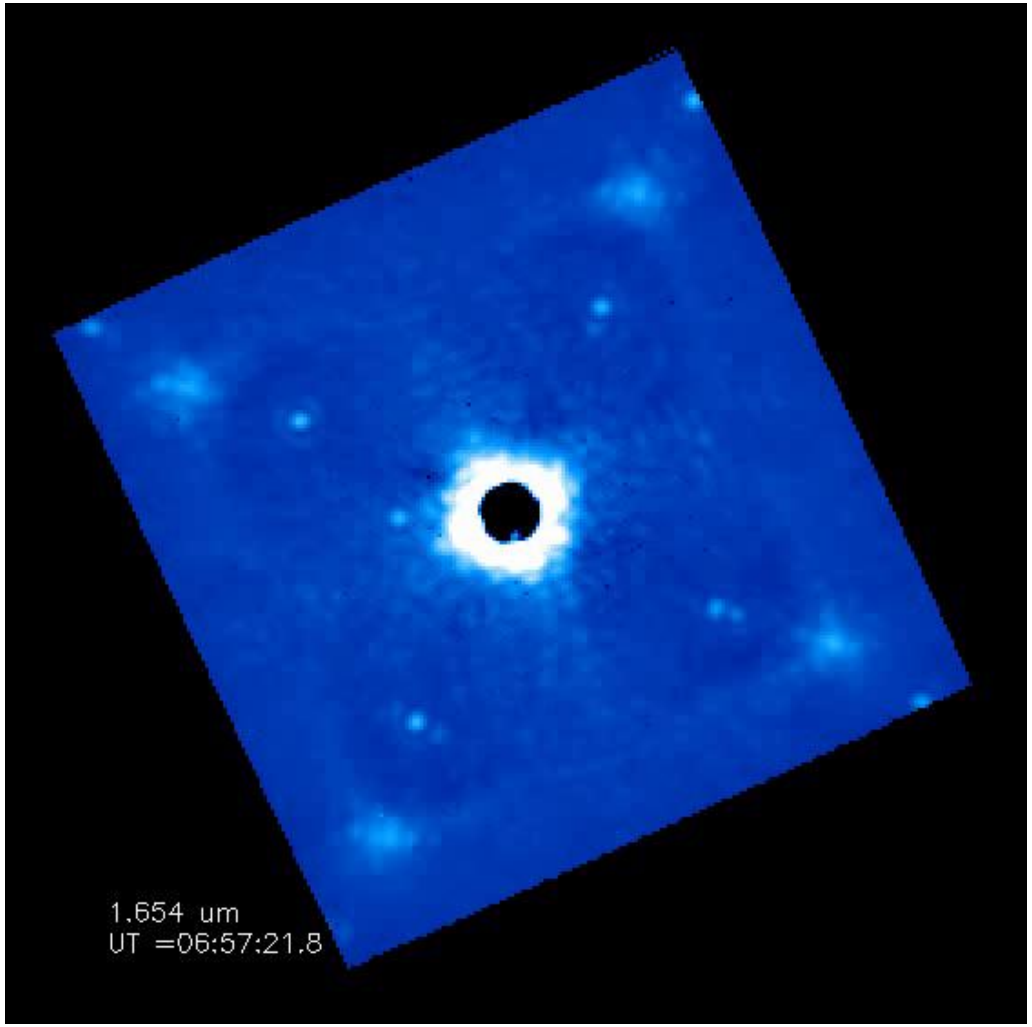
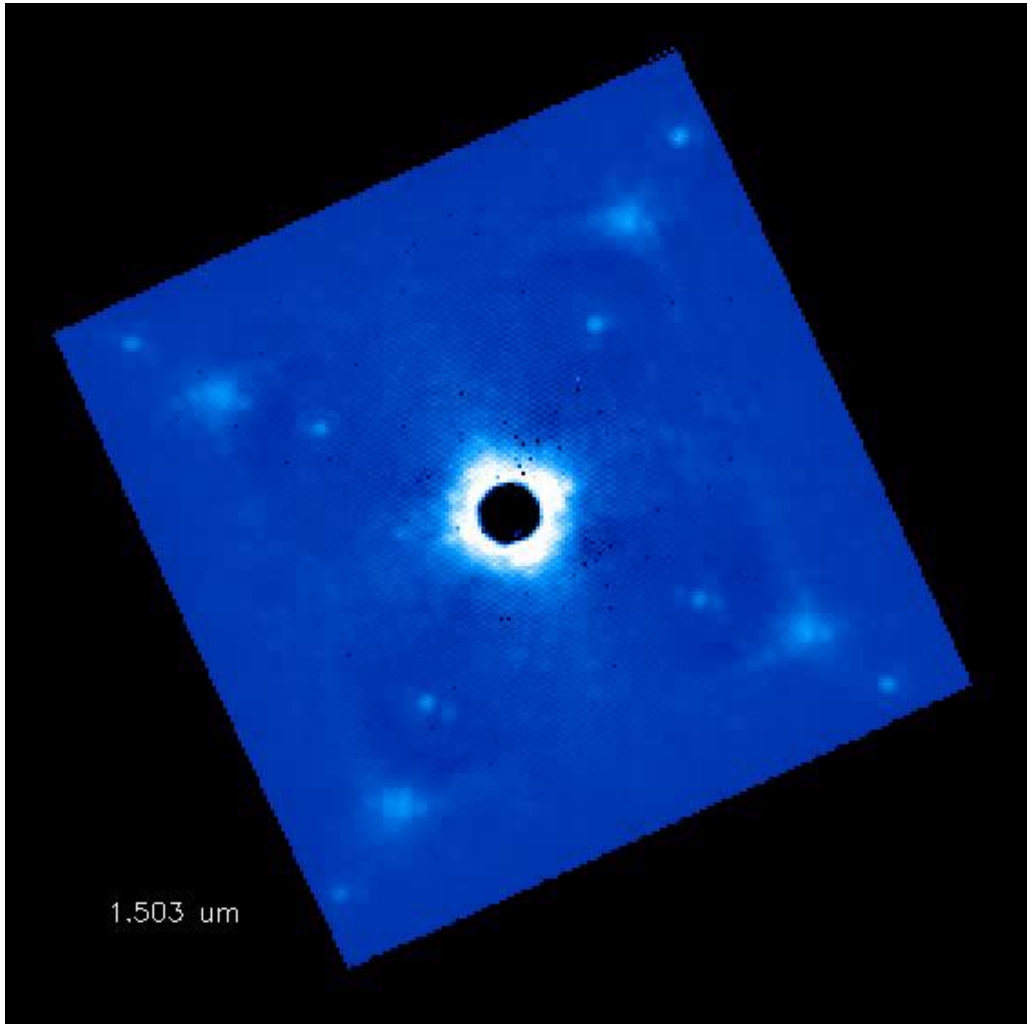
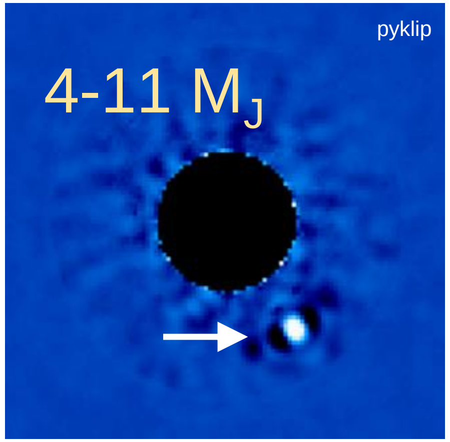
Direct Imaging Observing Strategies





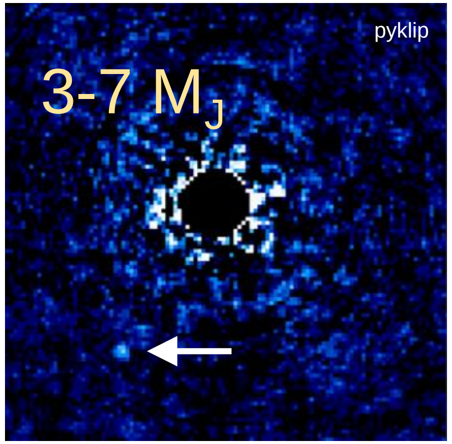
GPIES Companions Detected

(Updated from J. Wang's slide)



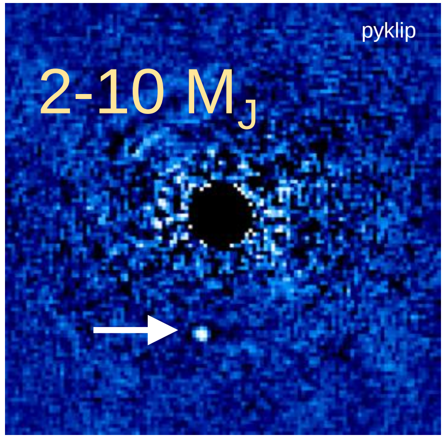
β Pic b

Millar-Blanchaer et al. 2015
Wang et al. 2016
Chilcote et al. 2017



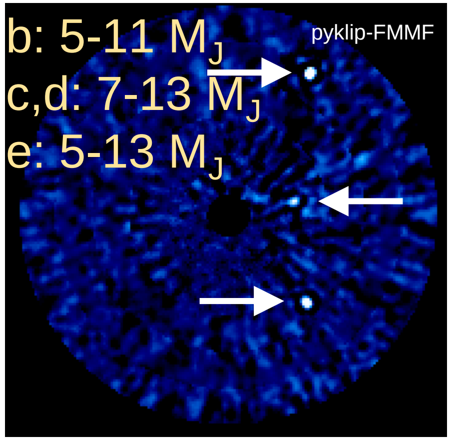
HD 95086 b

De Rosa et al. 2016
Rameau et al. 2016



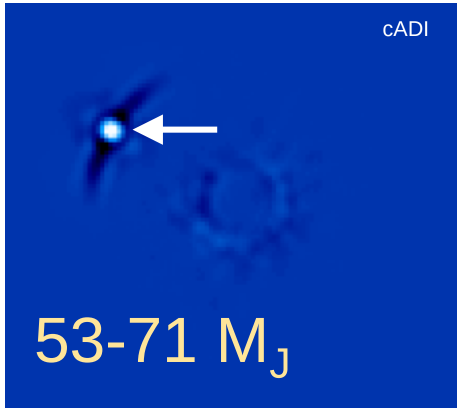
51 Eri b

Macintosh et al. 2015
De Rosa et al. 2015
Rajan et al. 2017

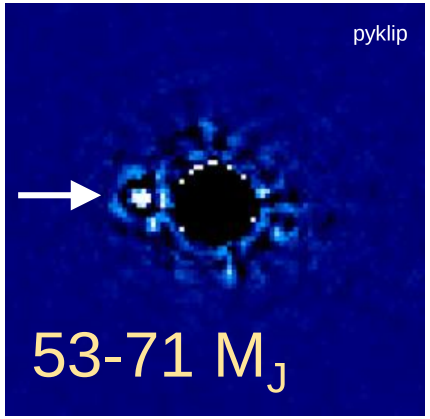


HR 8799 c,d,e

Greenbaum et al. in prep

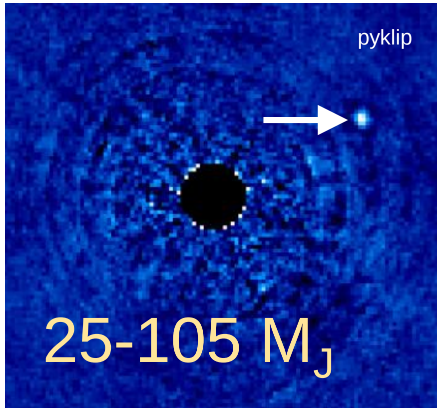


PZ Tel
B



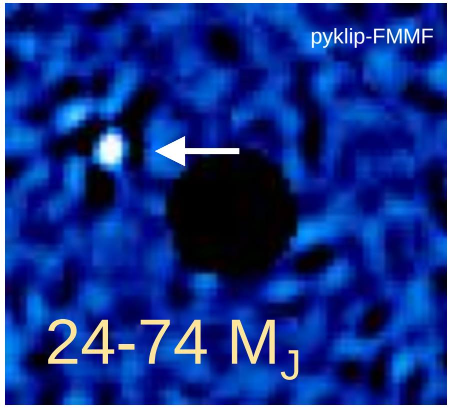
HD 984 B

Johnson-Groh et al. 2017



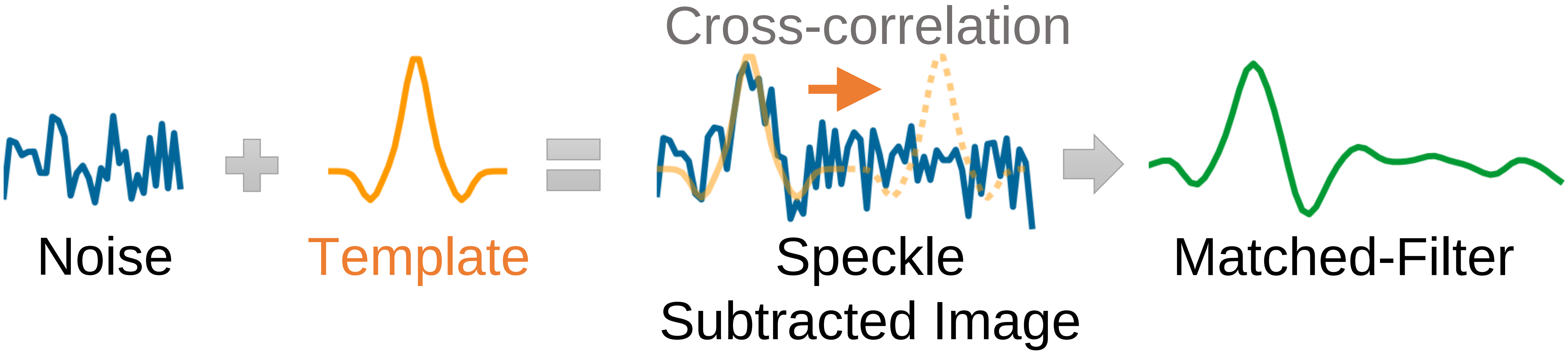
HR 2562 B

Konopacky et al. 2016

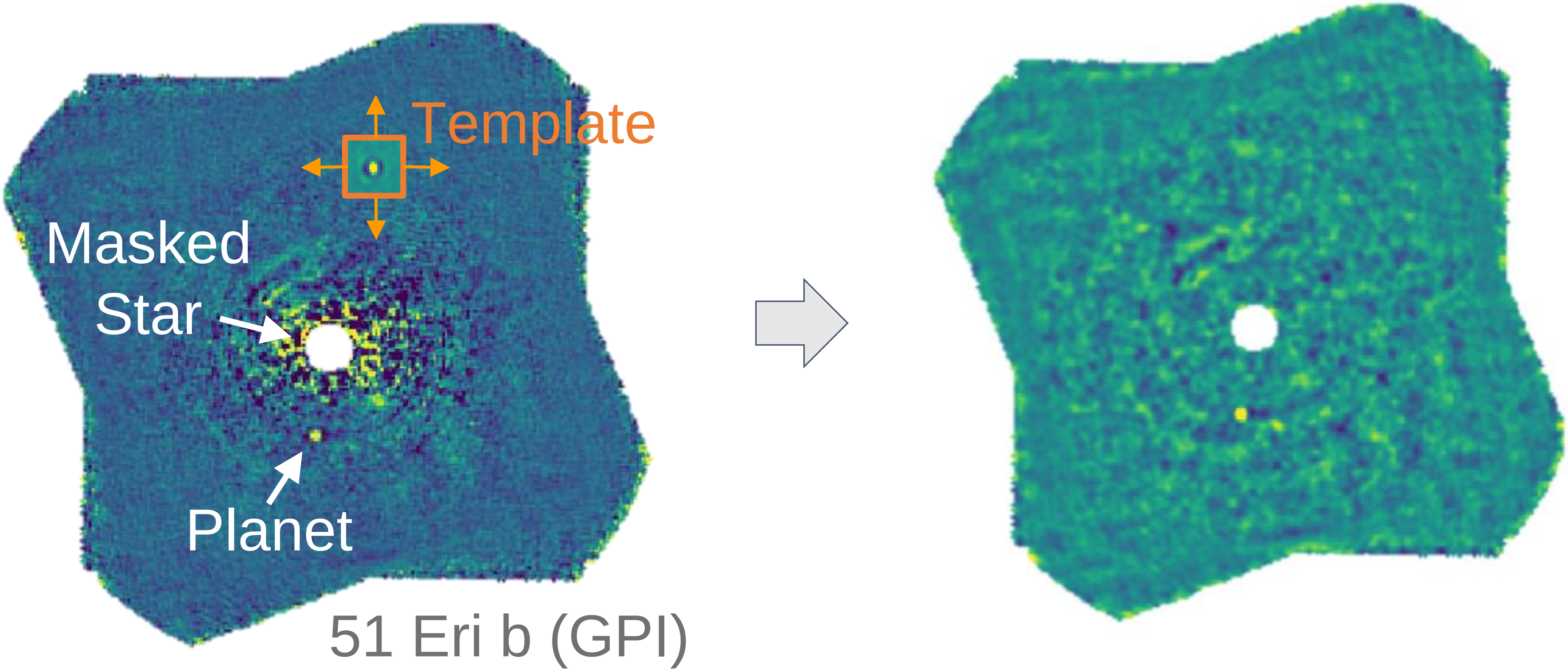


HD 206893 B

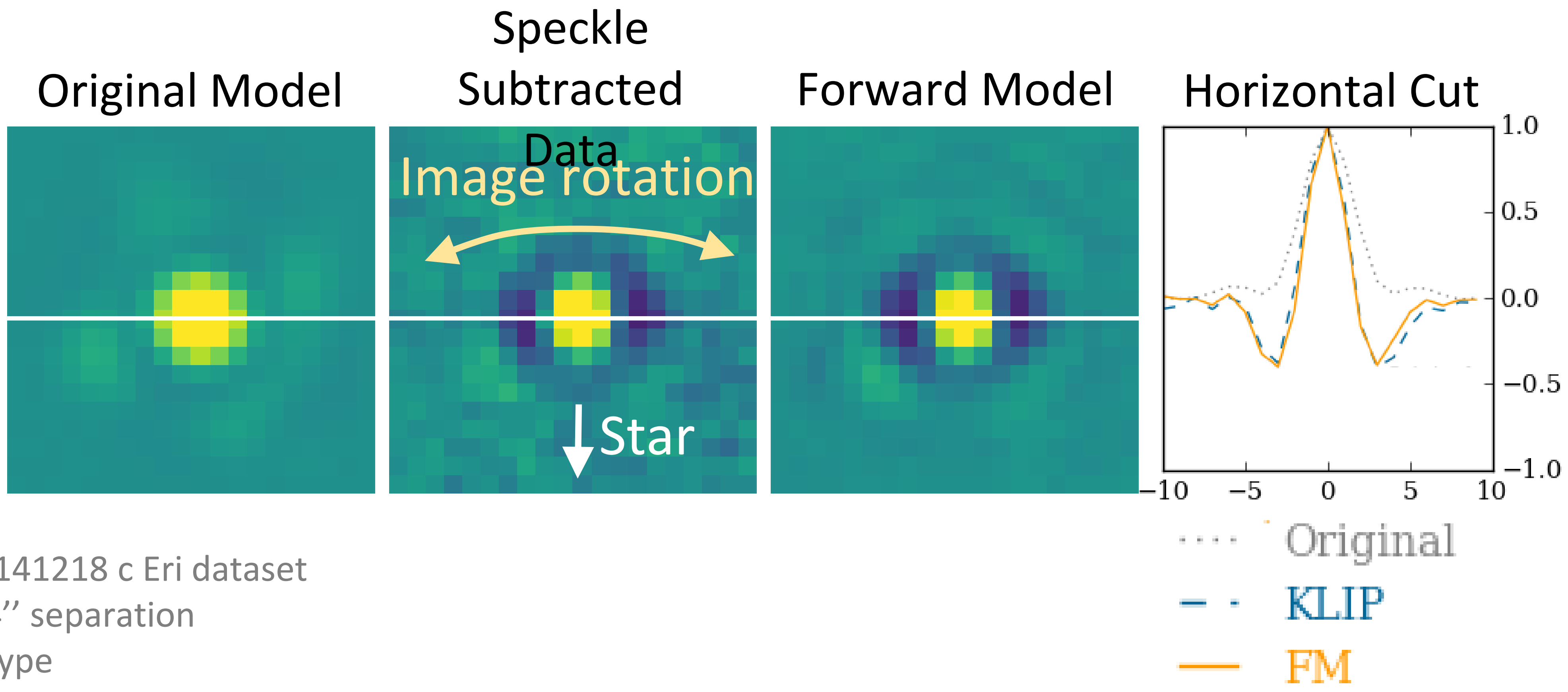
Matched Filter Concept



Matched Filter

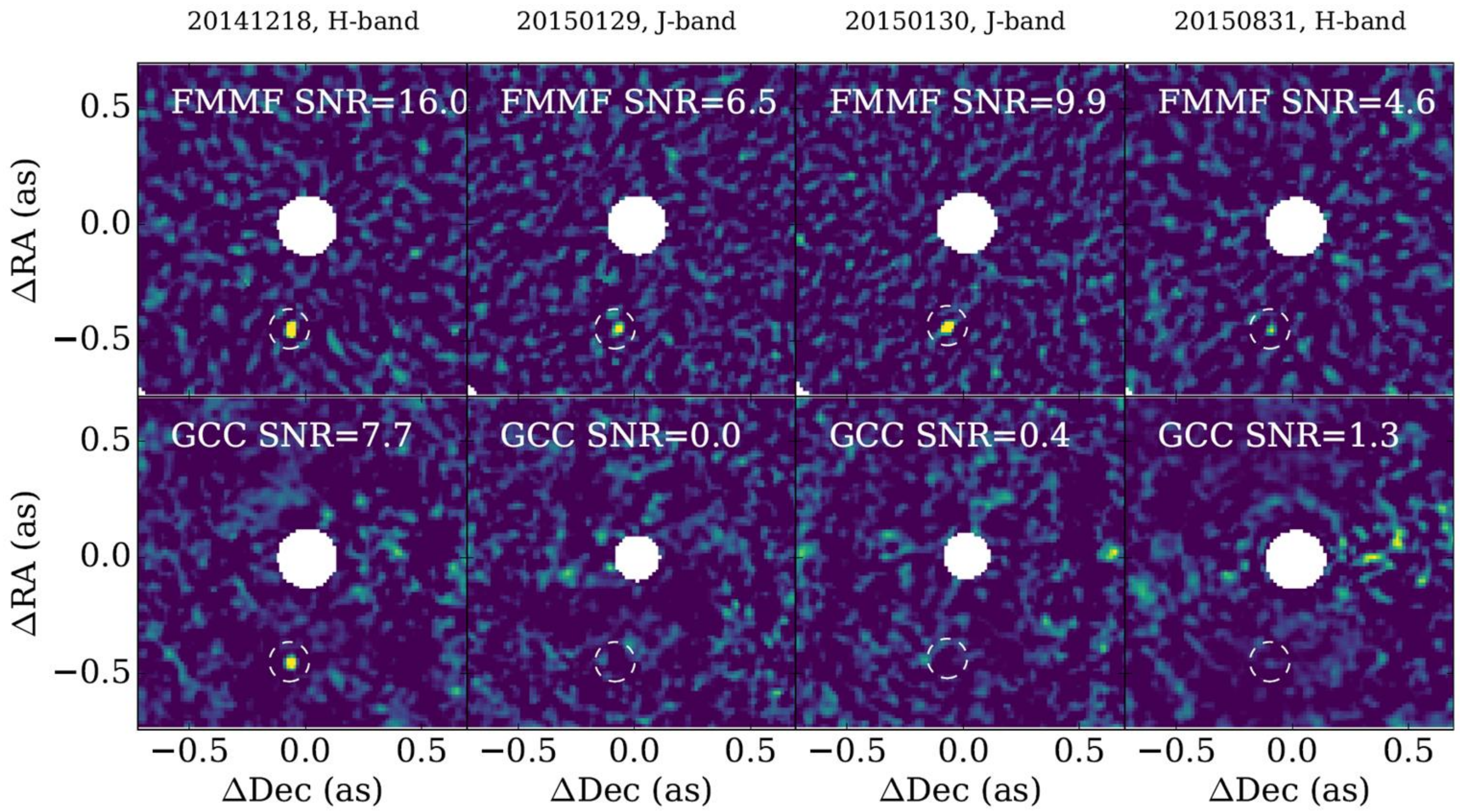


Planet Forward Model (cf. Pueyo 2016)

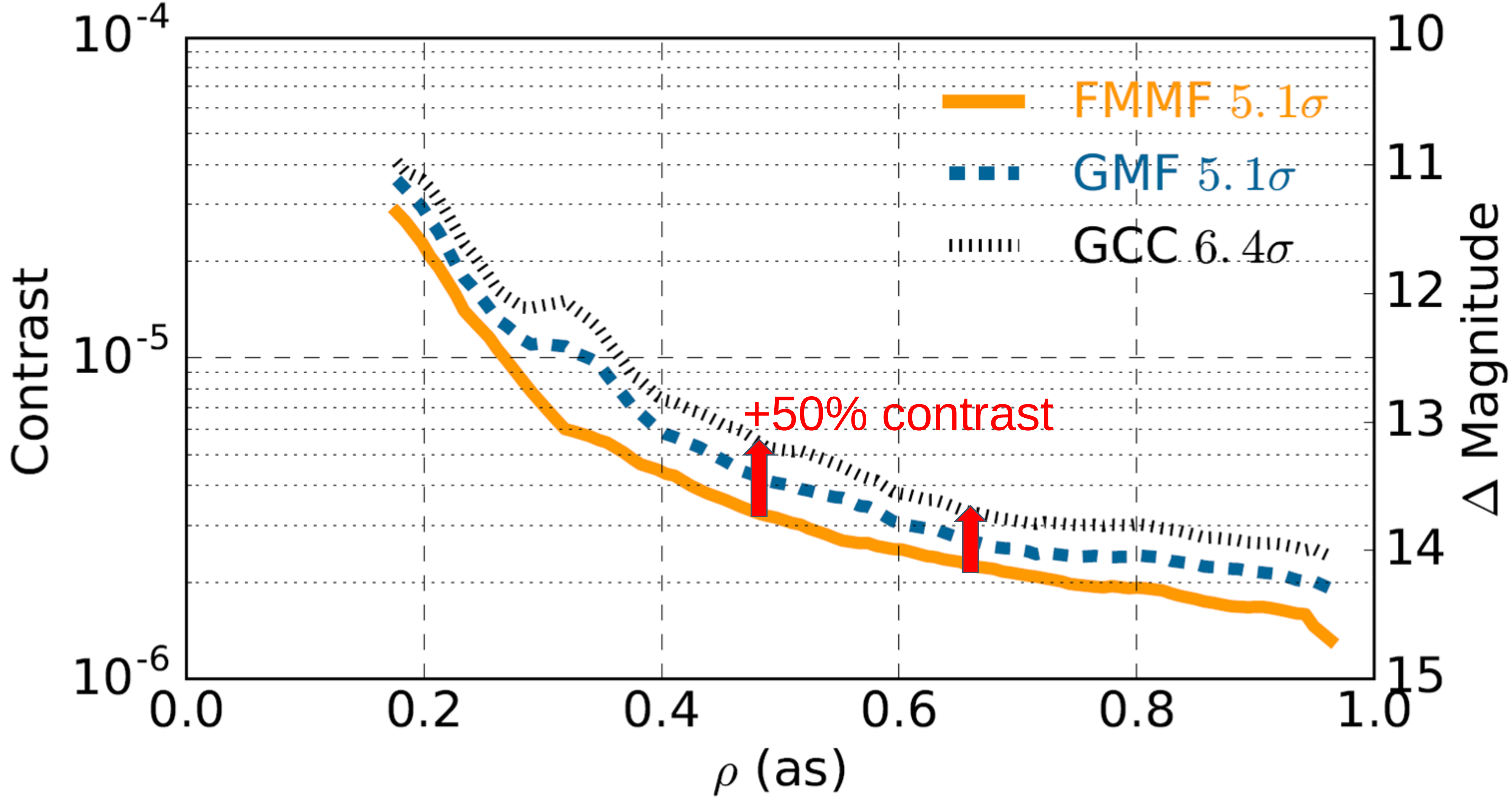


- 20141218 c Eri dataset
- 0.4'' separation
- T-type
- SNR≈10

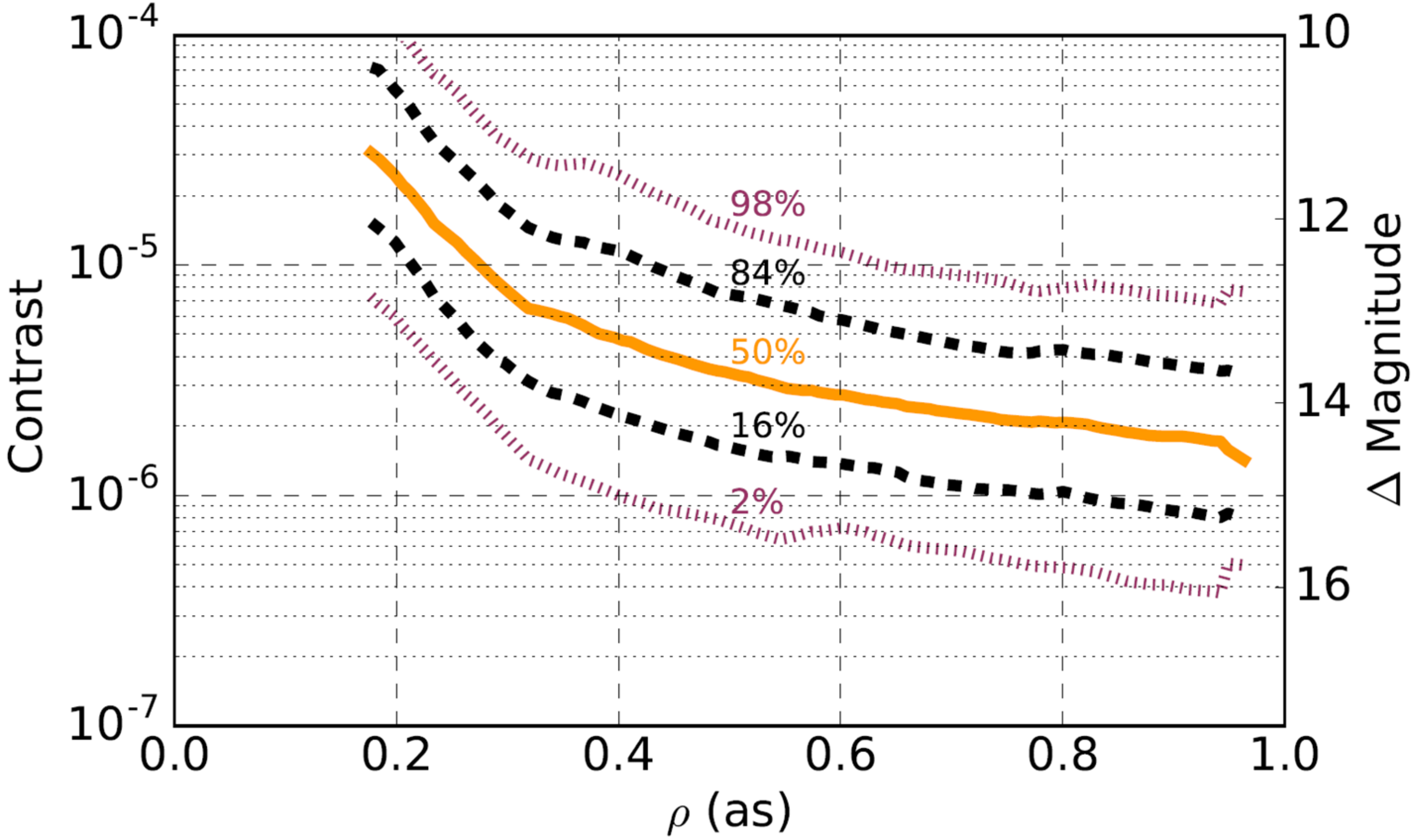
Forward Model Matched Filter



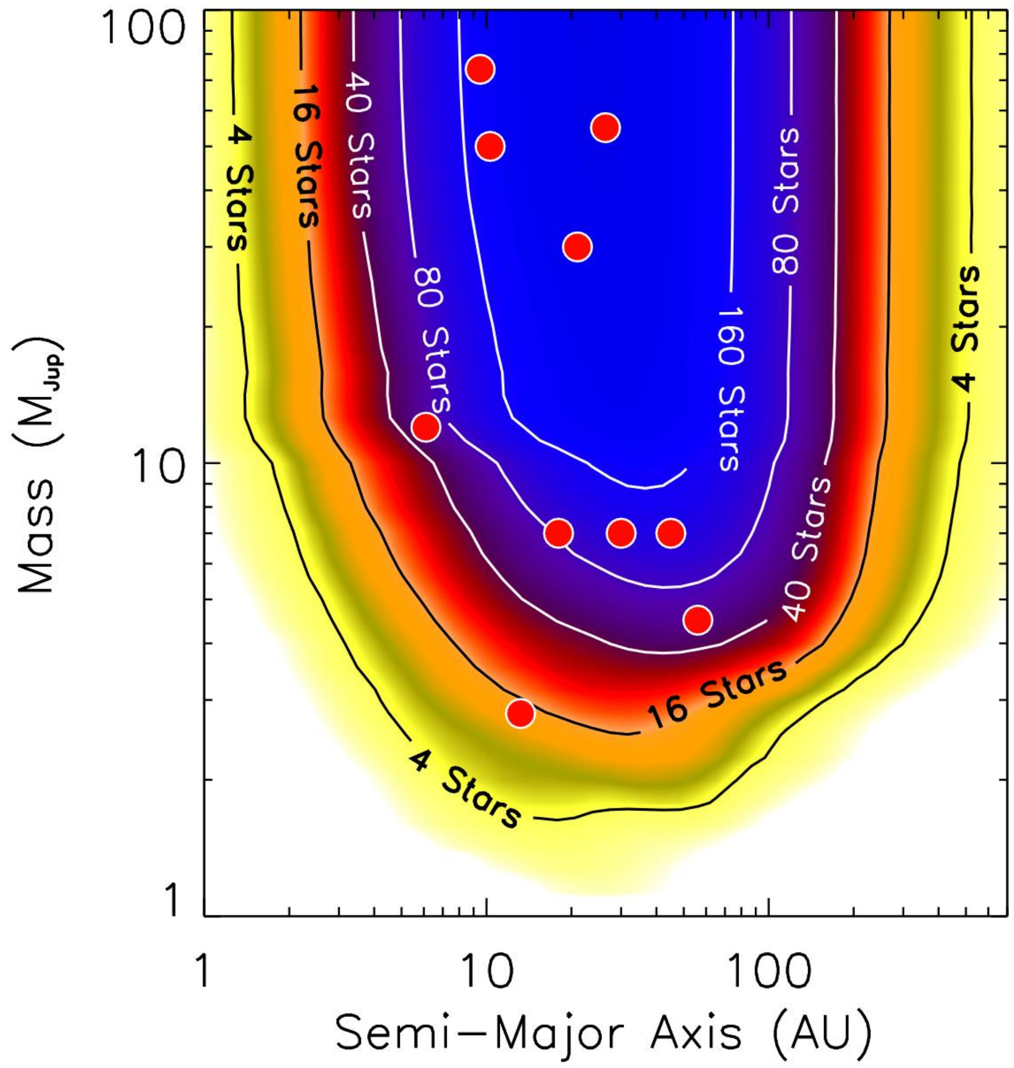
GPIES Median Contrast Curves



There is a wide spread in contrast curves



GPI constrains planet population out to 100s of AU



Credit:
Eric Nielsen
(SETI & Stanford)

Thanks!...

Checkout our code:
https://bitbucket.org/pyKLIP/

J.-B. Ruffio et al. (2017) *“Improving and Assessing Planet Sensitivity of the GPI Exoplanet Survey with a Forward Model Matched Filter”*

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