



# Direct Imaging Searches with the Apodizing Phase Plate Coronagraph

Matthew Kenworthy<sup>1</sup>, Tiffany Meshkat<sup>1</sup>, Gilles Otten<sup>1</sup>,  
Frans Snik<sup>1</sup>, Johanan Codona<sup>2</sup>

(1) Leiden Observatory, The Netherlands, (2) Steward Observatory, USA



[kenworthy@strw.leidenuniv.nl](mailto:kenworthy@strw.leidenuniv.nl)

The red colours of extrasolar planets make thermal infrared wavelengths (3 to 5 microns) compelling for direct imaging surveys.

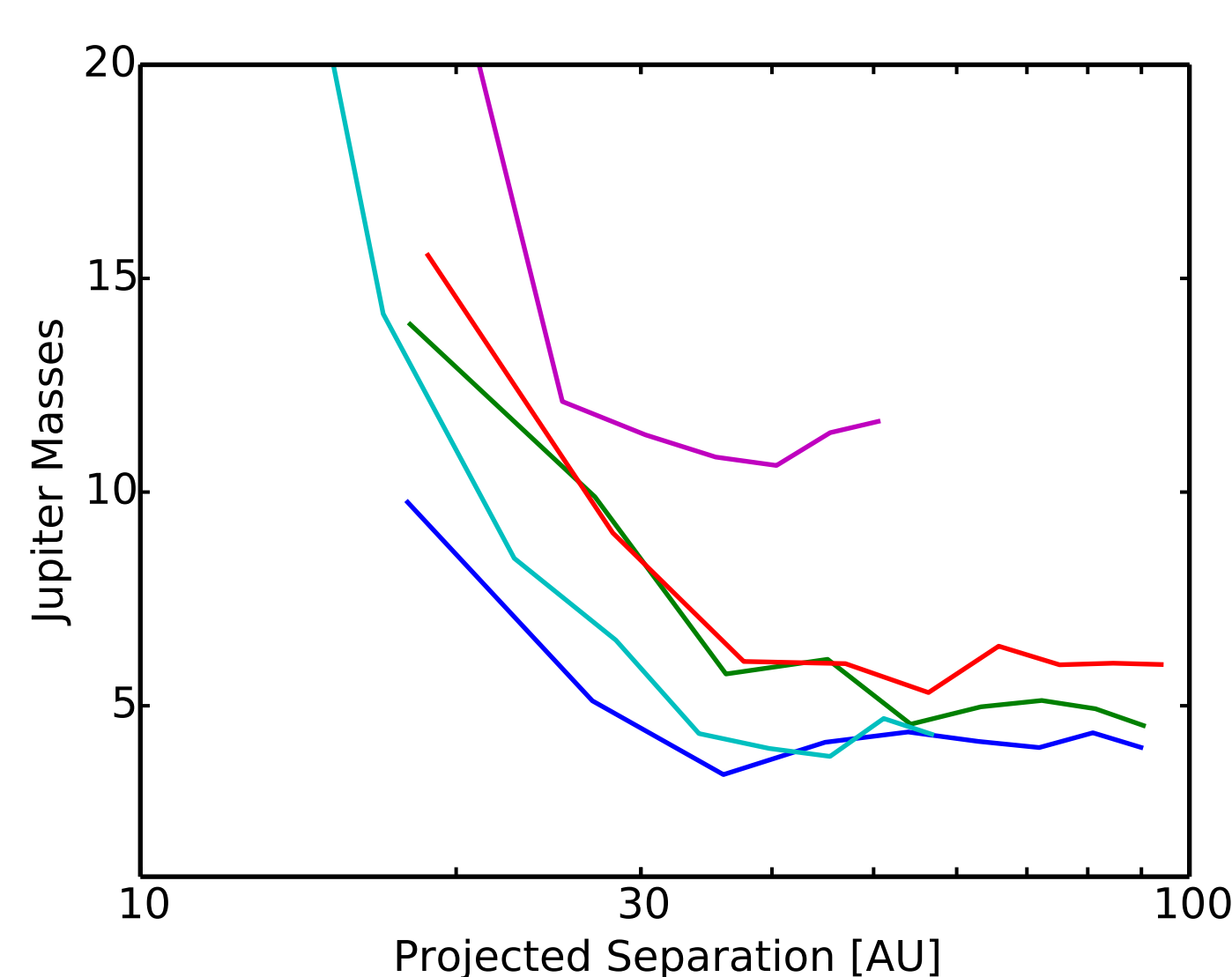
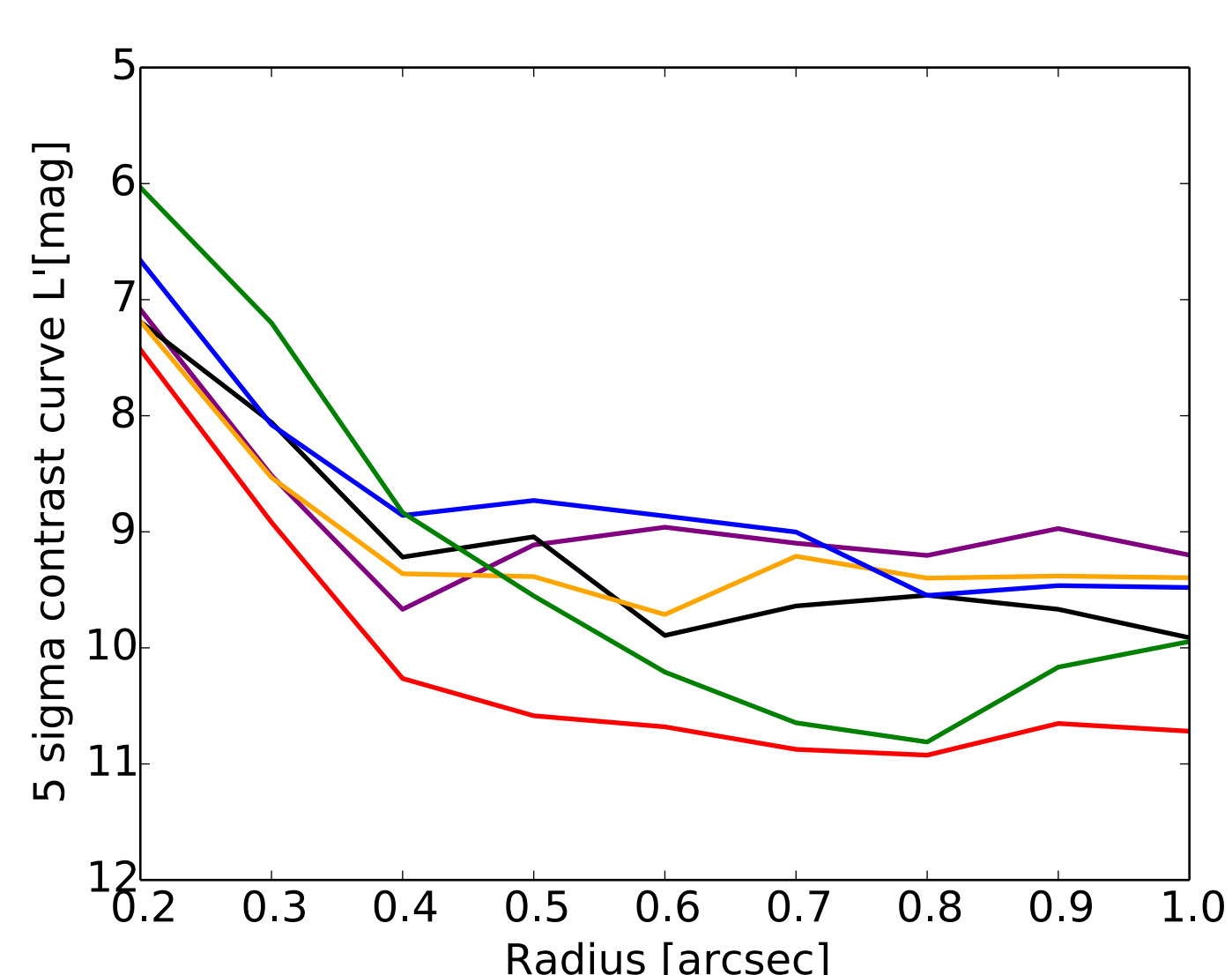
Coronagraphs increase imaging sensitivity by reducing the diffracted light from the parent star.

Poster in Session IV at EBI 2014

## Holey Disk Survey

(Bailey and Meshkat)

6 stars from VLT Southern Survey

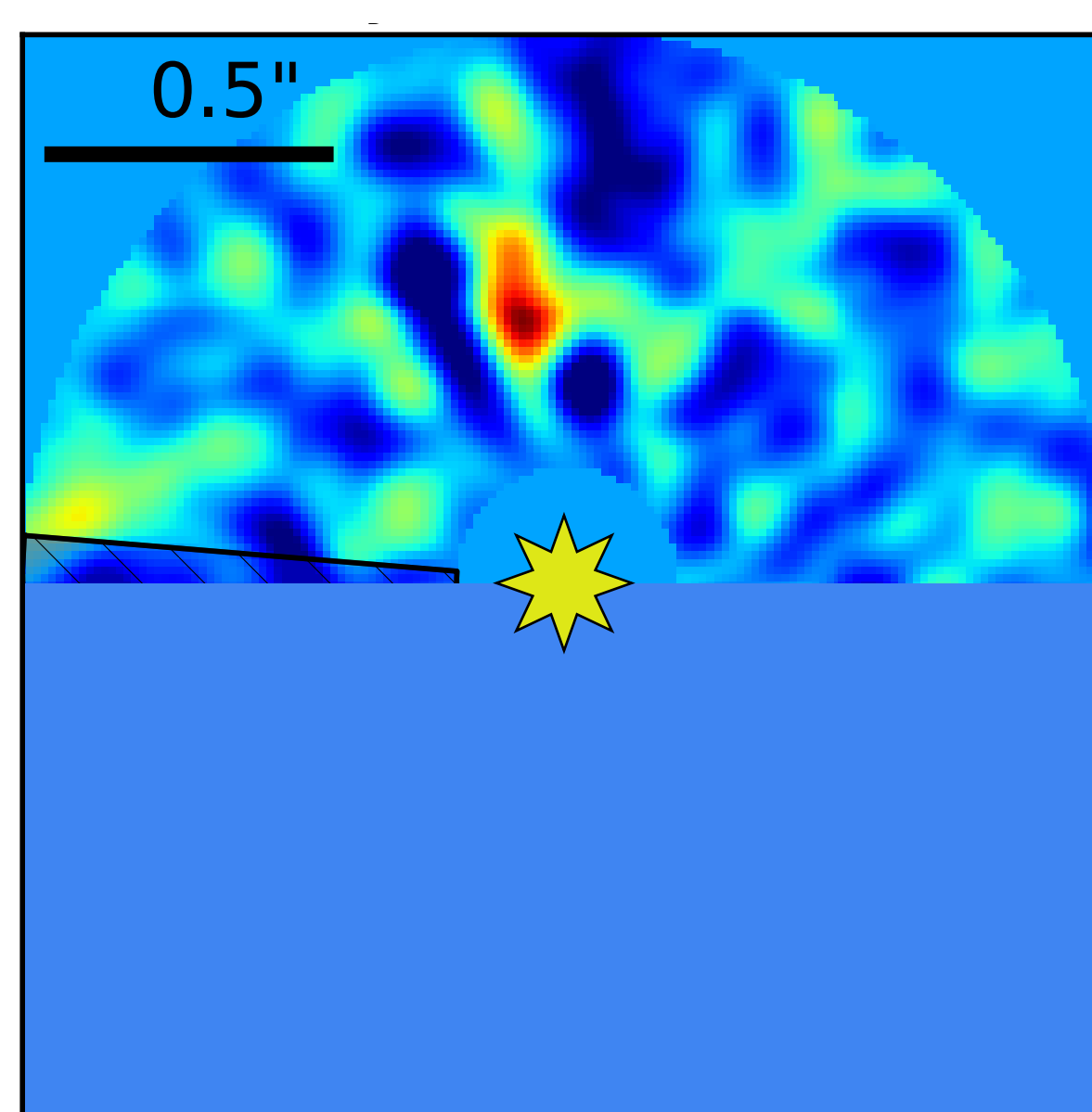


Looking for planets that clean out slots in dusty disks is yielding results – HD 95086b (Rameau 2013) and HD 106906b (Bailey 2014)

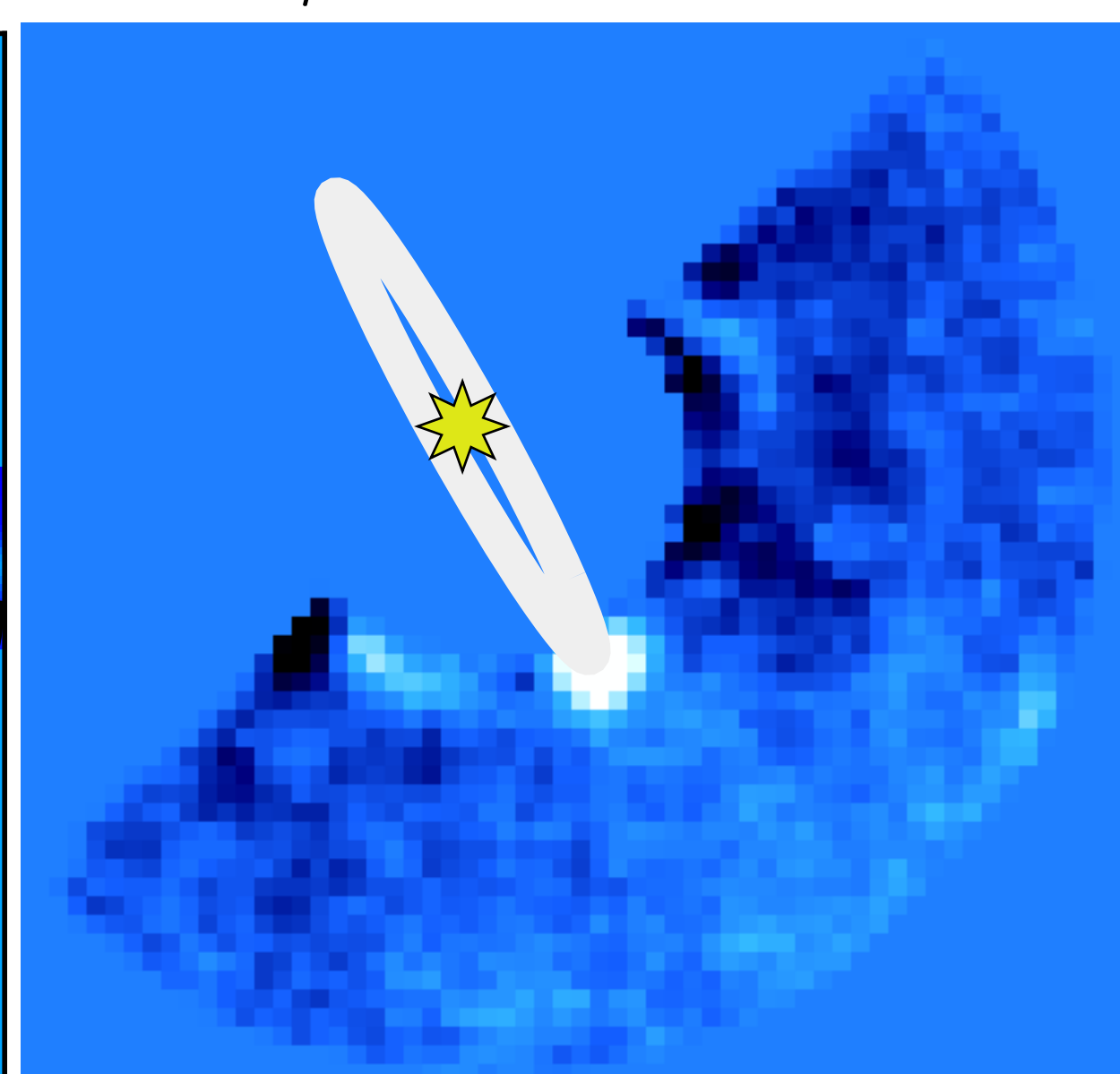
The Apodizing Phase Plate (APP) coronagraph is easy to use and increases sensitivity from 0.3 to 0.8 arc seconds at L' band in NaCo on the 8.4m VLT. (Kenworthy 2010, 2013)

Searching for planets around massive stars and in circumstellar disks with gaps cleared out by forming planets is yielding exoplanet candidates.

HD 100546 b



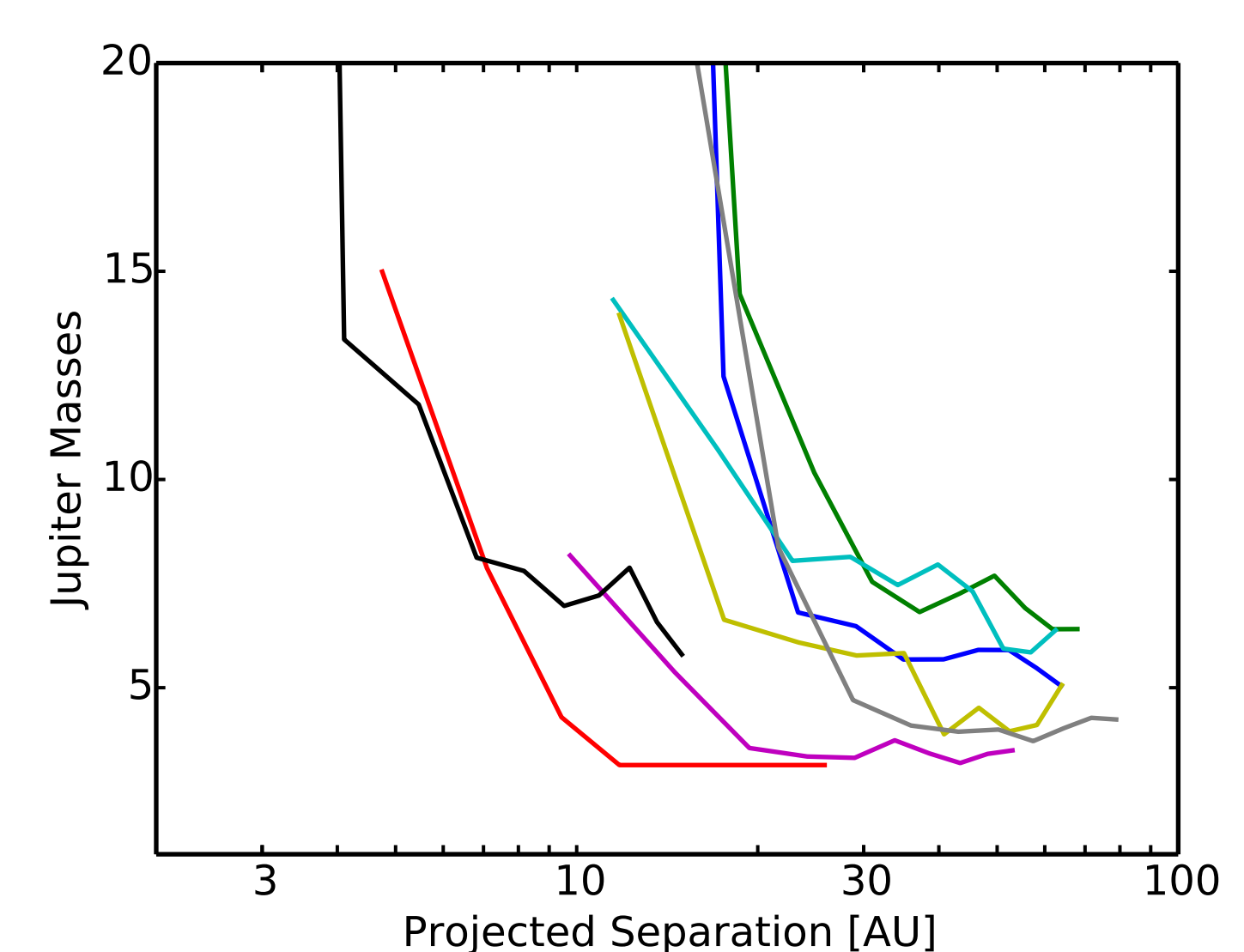
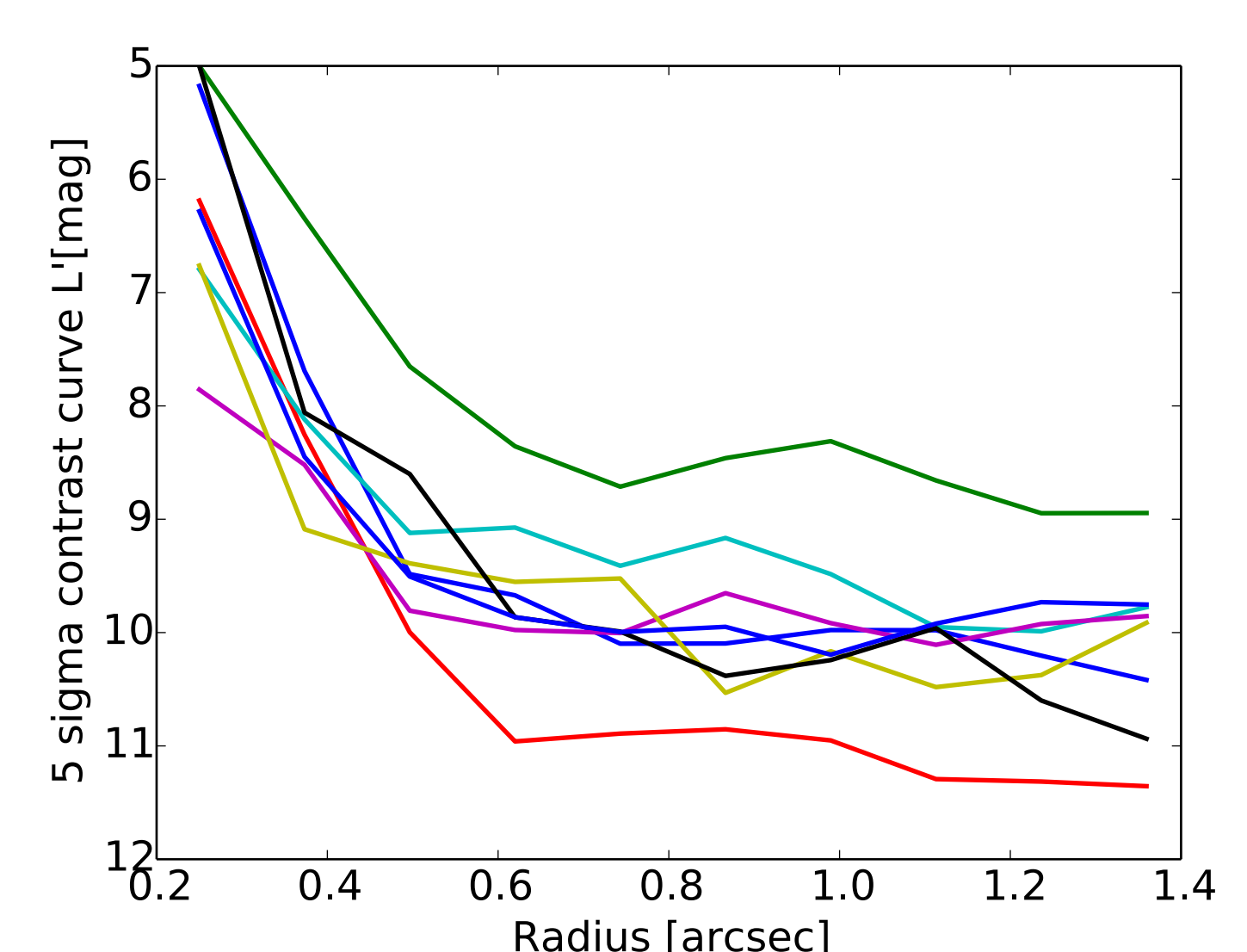
$\beta$  Pic b



## A/F Stars

(Meshkat and Quanz)

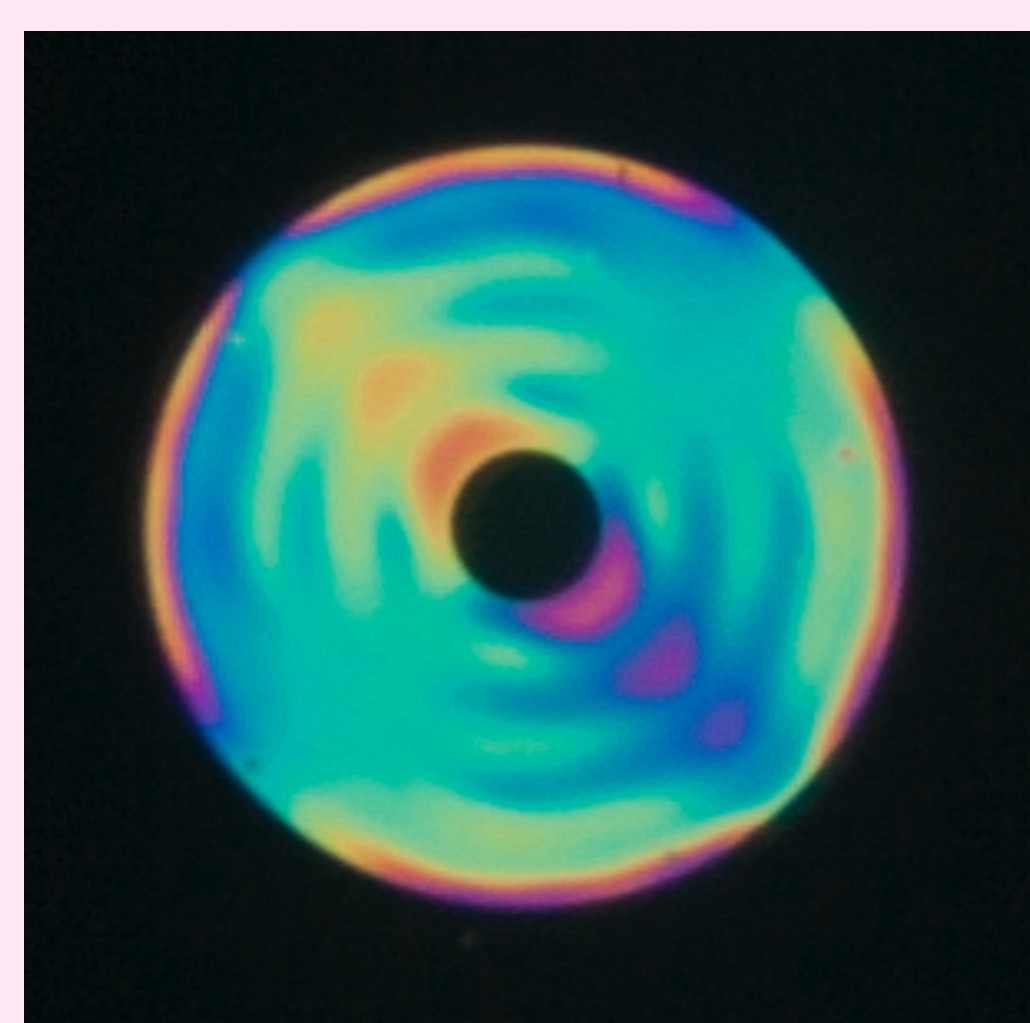
8 stars at VLT



More massive stars should host more massive planets – beta Pic b (Lagrange 2010; Quanz 2010) and HD 100546b (Quanz 2013)

## Broadband APP Coronagraphs (Otten and Snik et al. 2014; in prep)

Laboratory measurements in the optical demonstrate the broadband performance of the new Vector APP coronagraph based on liquid crystal polymer technology that yields two simultaneous and complementary PSFs. In the future, we can design optics for thermal infrared instruments such as ERIS and METIS.



Vector APP between crossed polarisers

Measured contrast in Vector APP dark sectors

