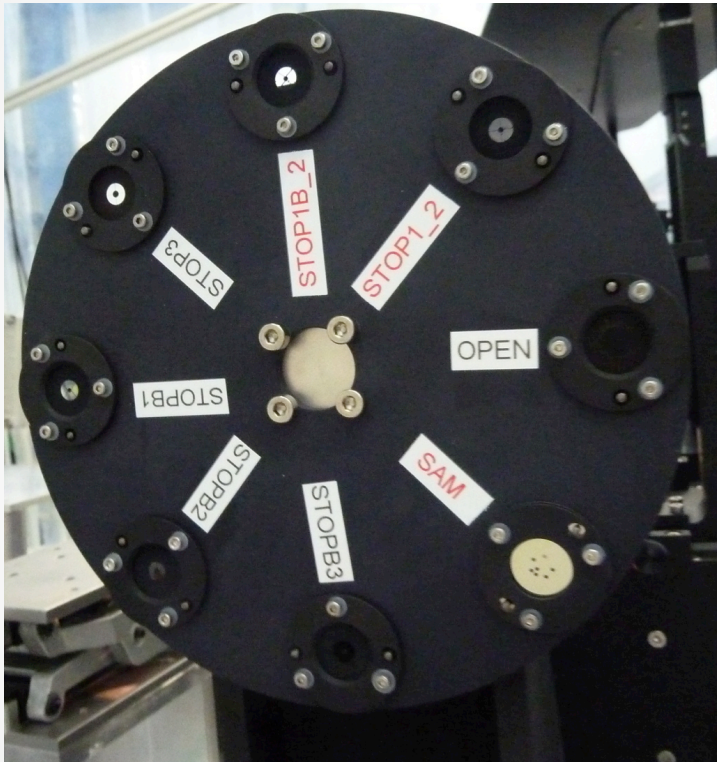


# Aperture masking ( and planet formation ?)

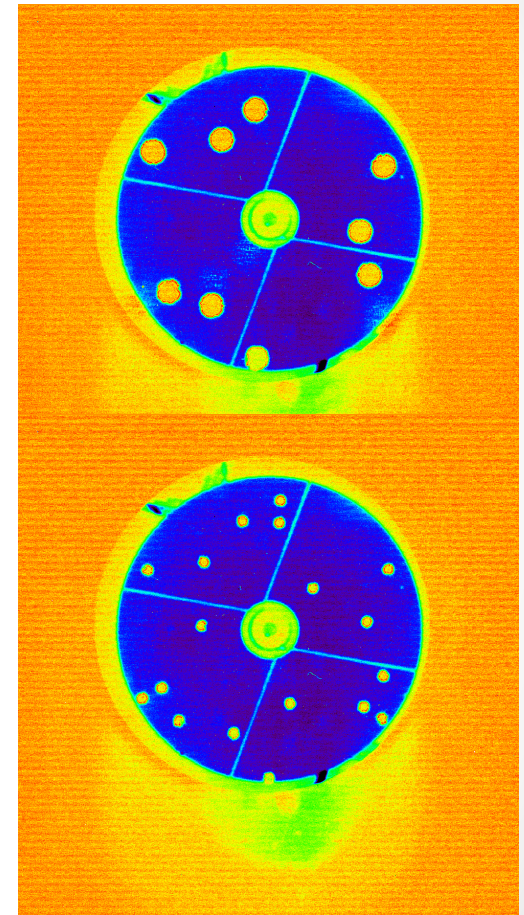
Sylvestre Lacour

# Aperture Masking



Pupil wheel on SPHERE

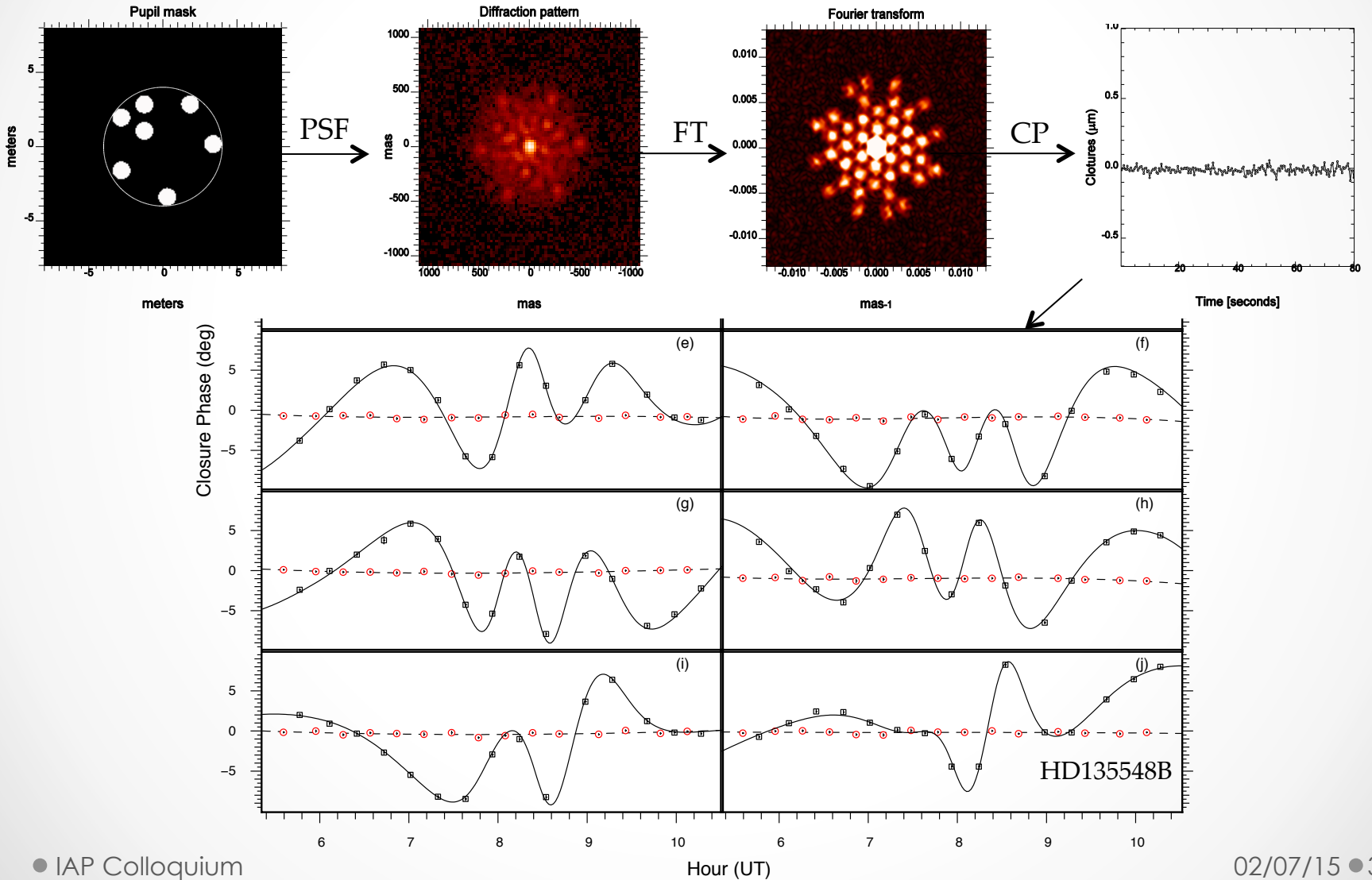
- PALOMAR
- KECK
- GEMINI
- SUBARU
- VLT
- LBT
- JWST
- E-ELT



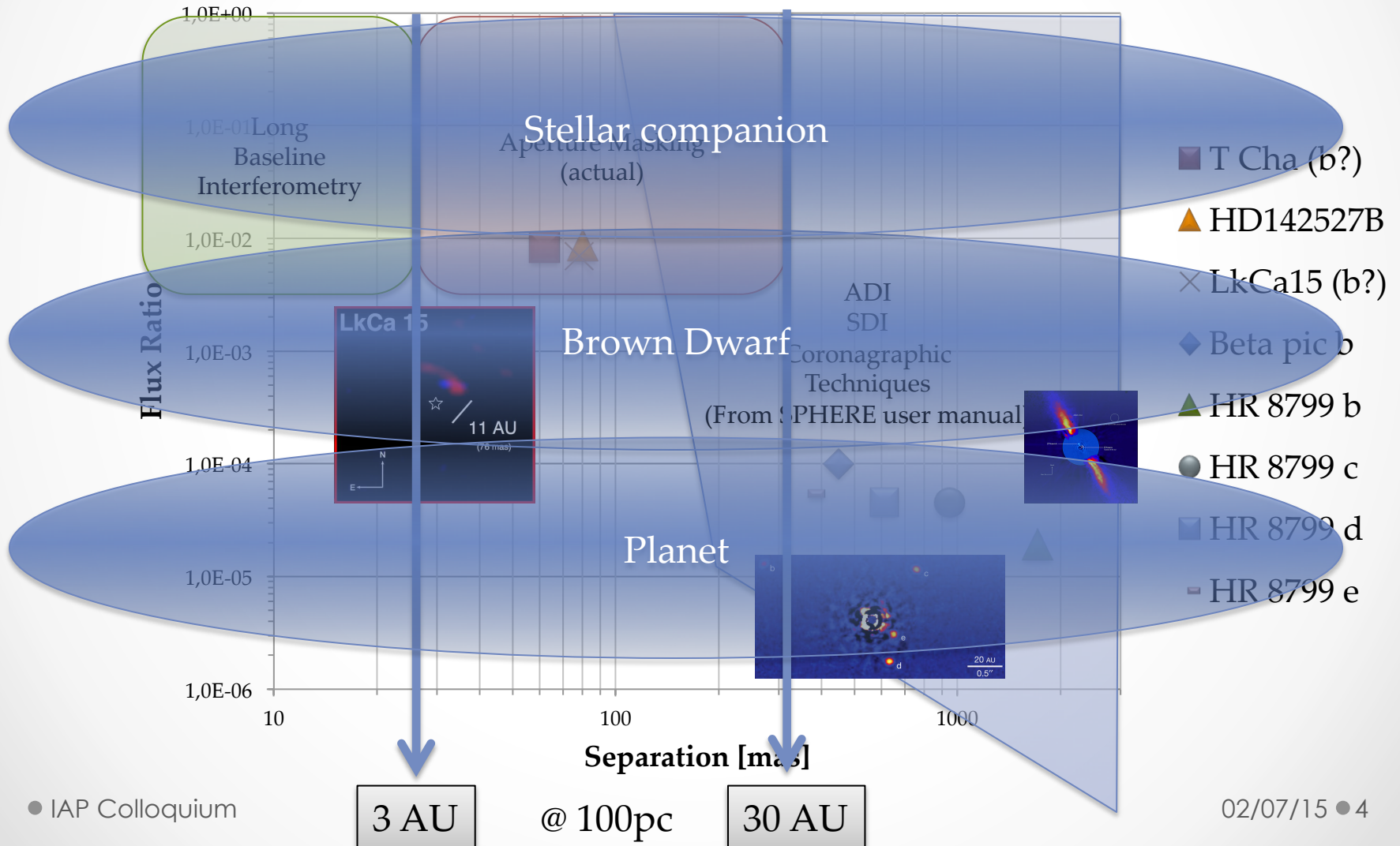
Pupil images from NACO



# Principle

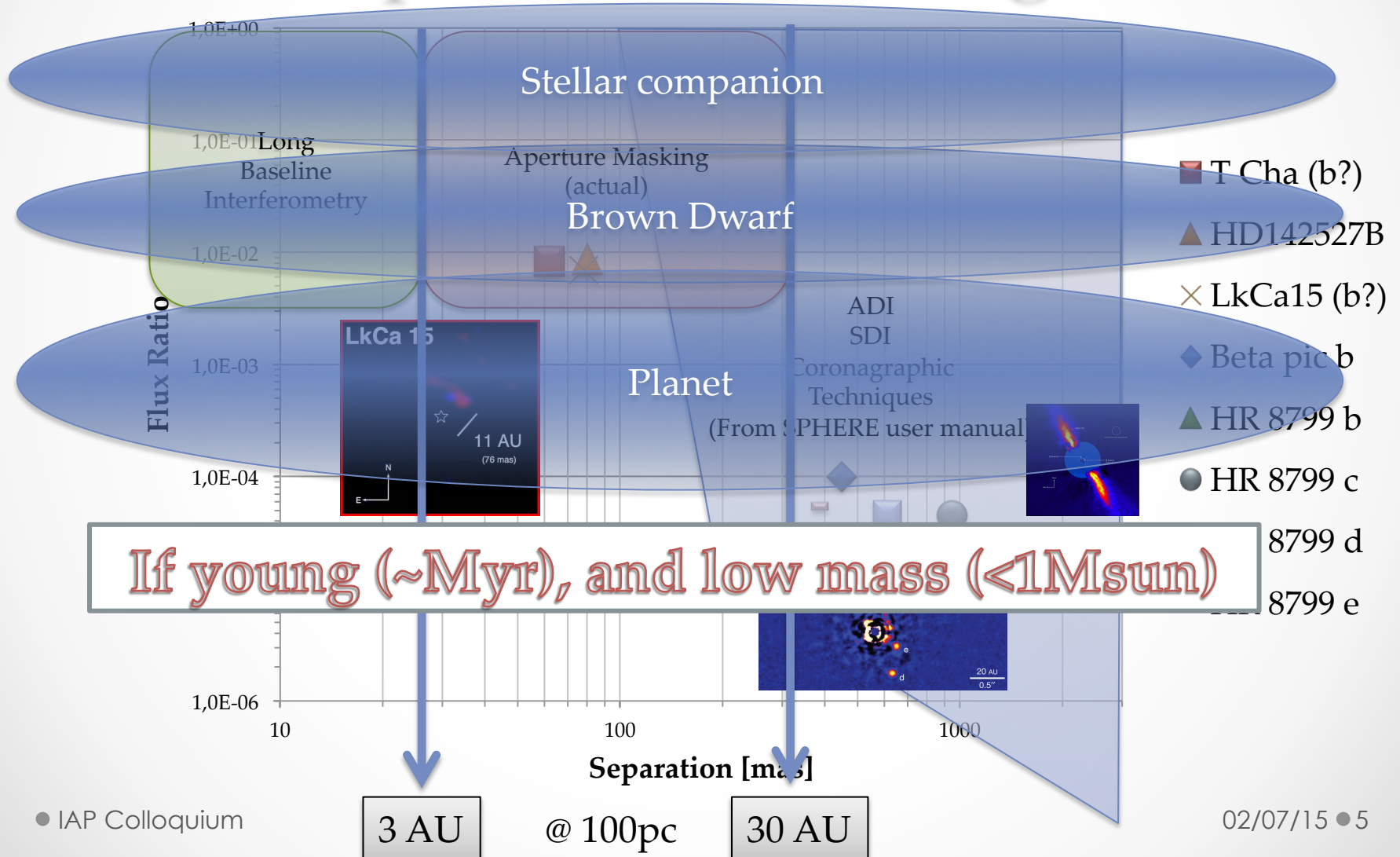


# The observational window of aperture masking

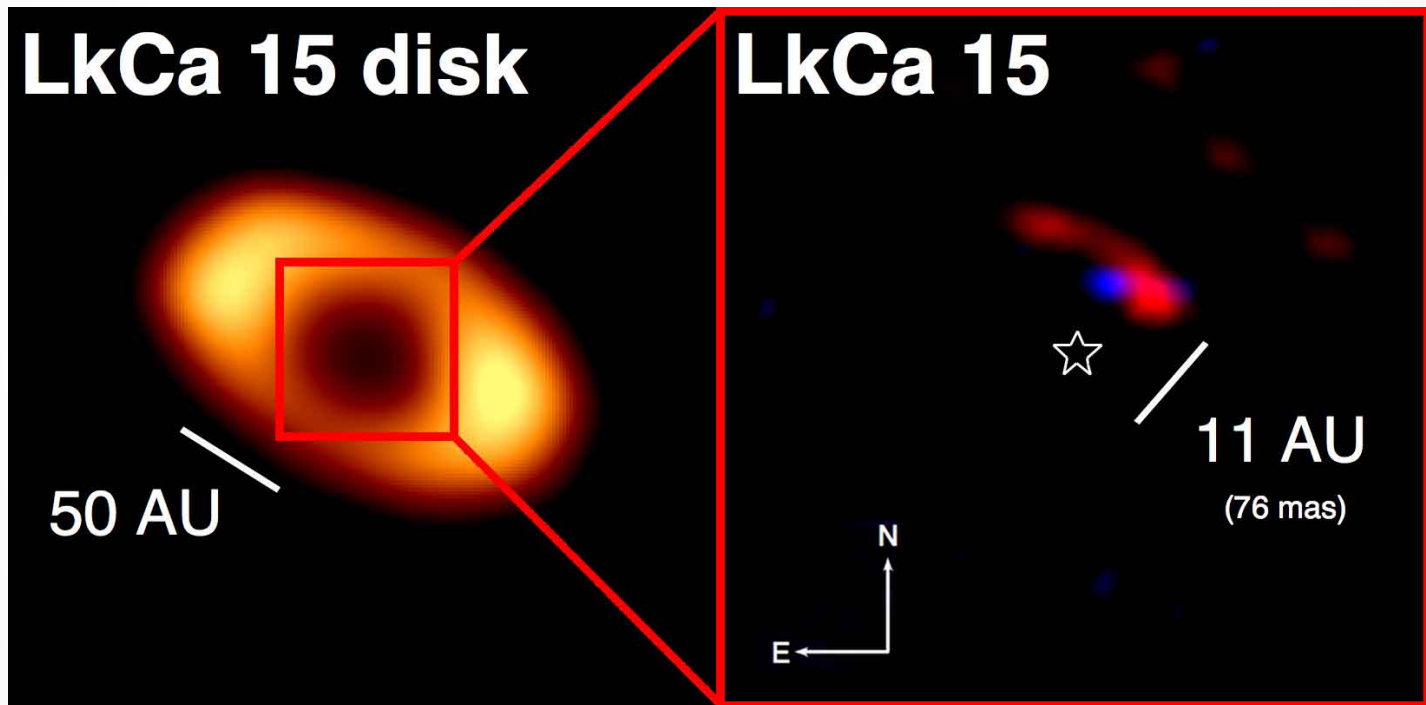




# The observational window of aperture masking



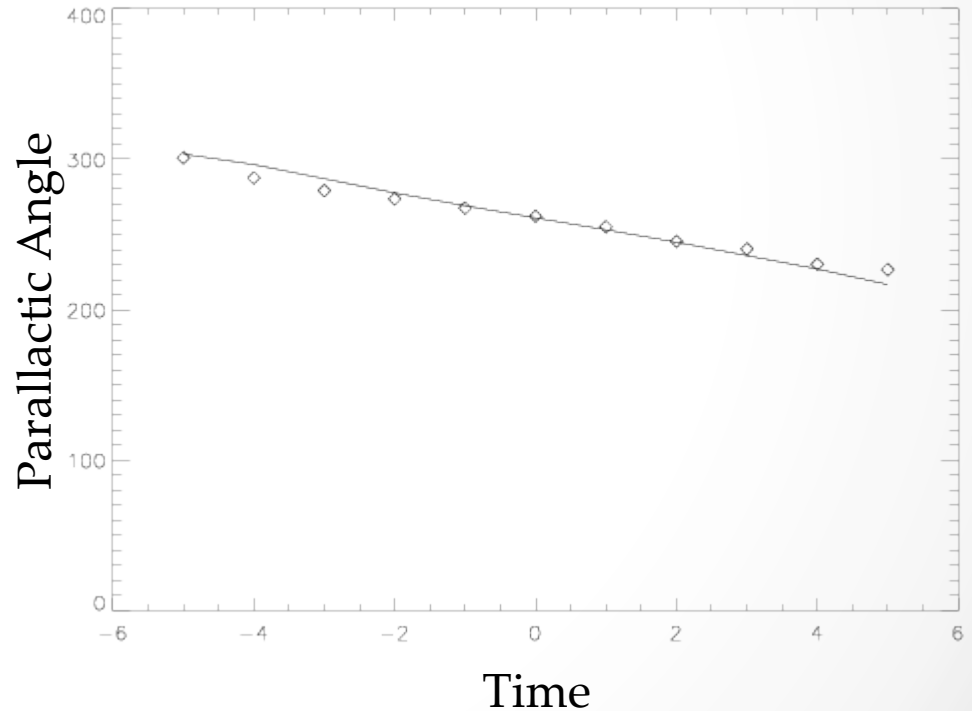
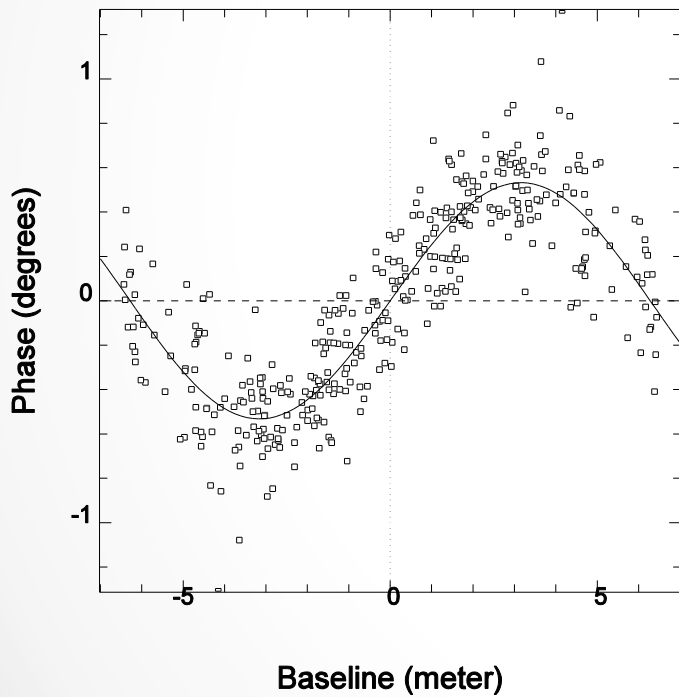
# LkCa 15



Kraus & Ireland, 2011

# T Cha

- 2011: Huelamo et al., discovery of non-stellar emission close to the star



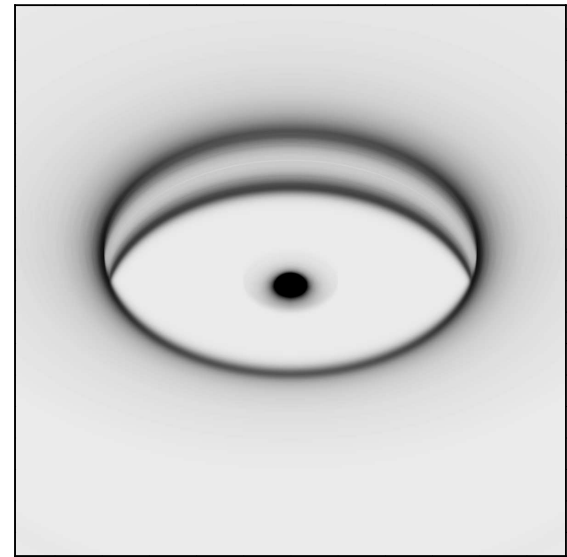
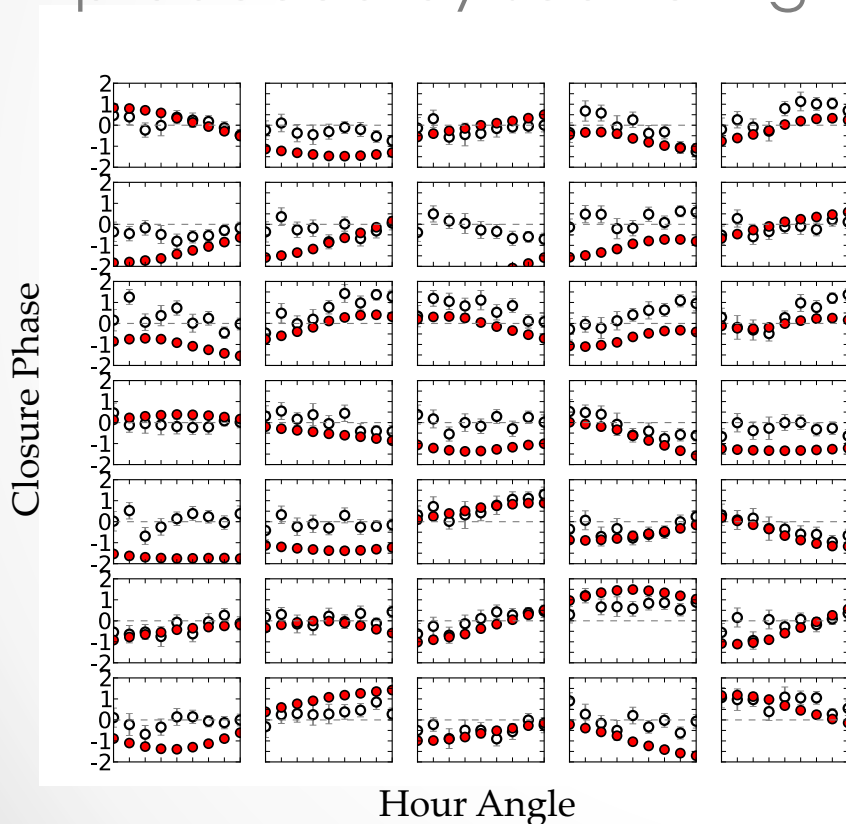
Separation:  $62 \pm 7.3 \text{ mas}$

Contrast ratio  $0.92 \pm 0.2\%$



# T Cha

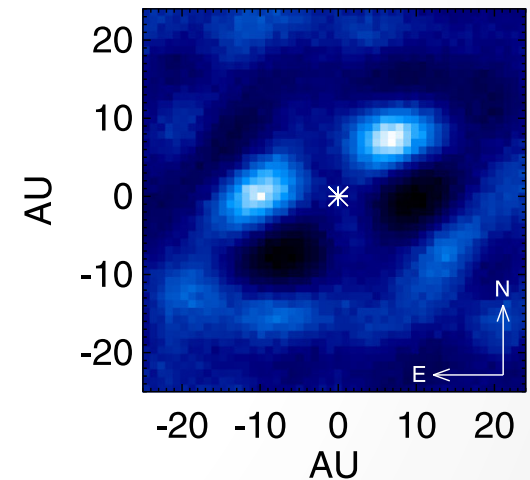
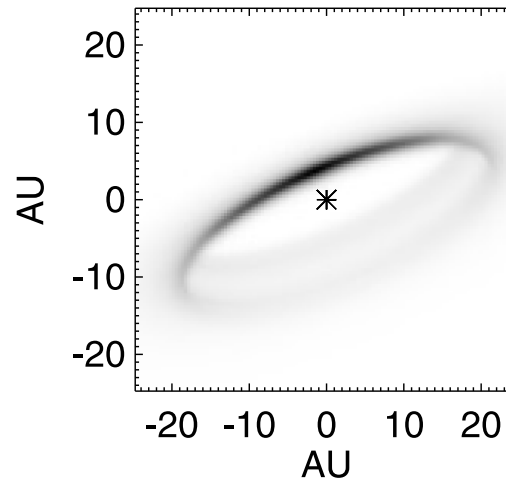
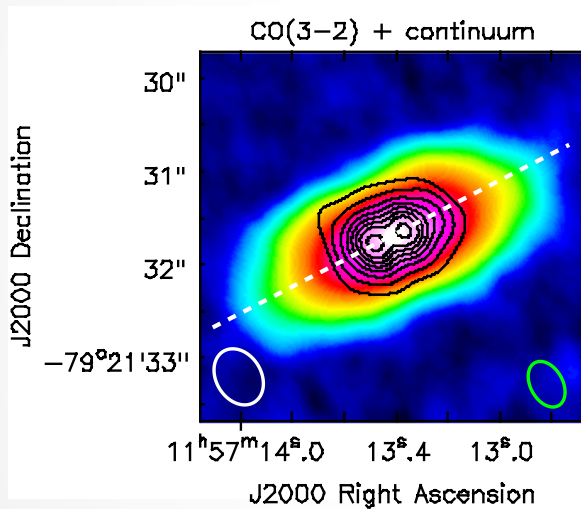
- 2013: Olofsson et al. show that the signal can be produced by scattering of the outer disk:



**Fig. 6.** Color-inverted raytraced image of the best-fit model, in the *H*-band, including a self-shadow disk extending up to 3 AU. The field of view is  $250 \times 250 \text{ mas}^2$ .

# T Cha

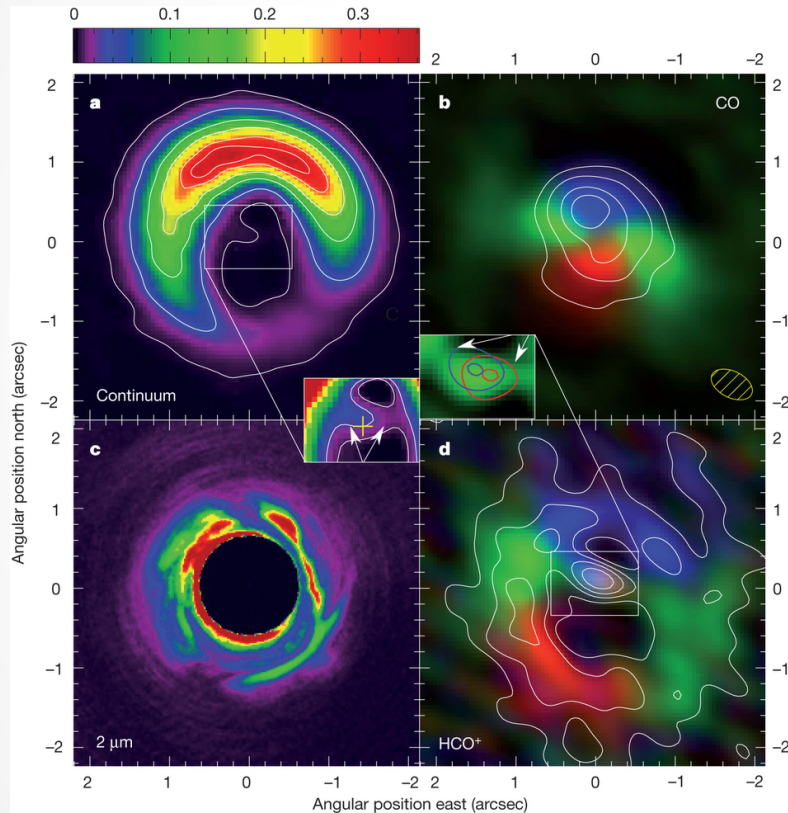
- 2015: Cheetham et al. shows that image reconstruction favour the disk hypothesis



ALMA data (Huelamo et al. 2015)

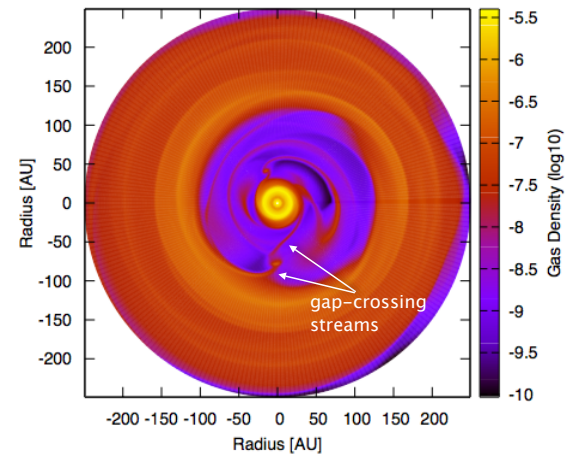
K-band image reconstruction  
from SAM data

# HD142527



ALMA, Casassus et al. 2013

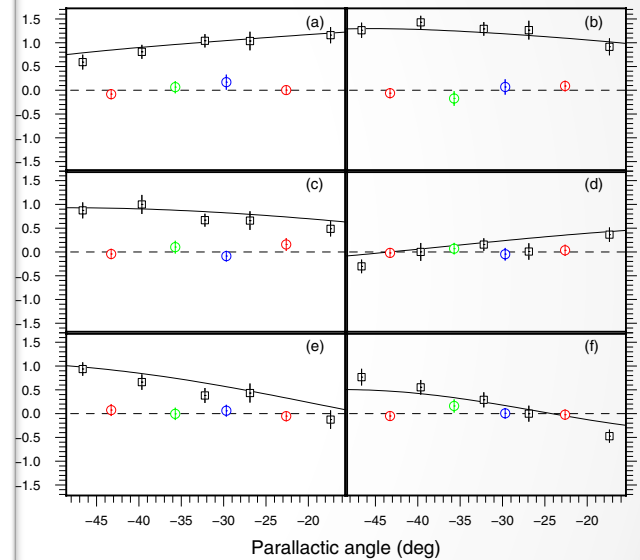
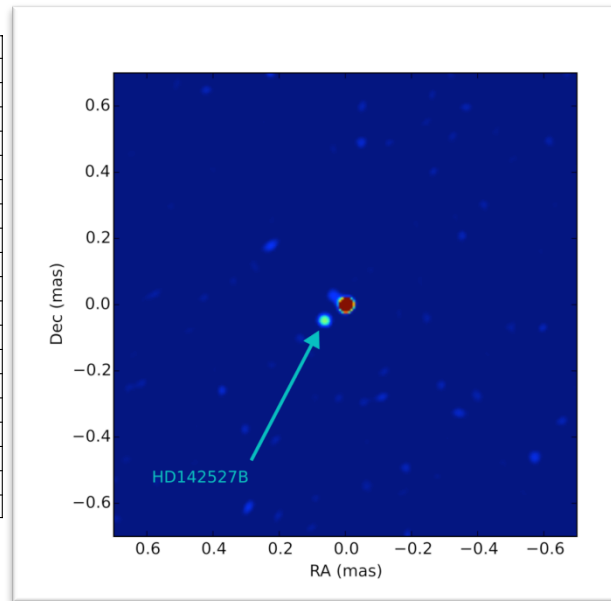
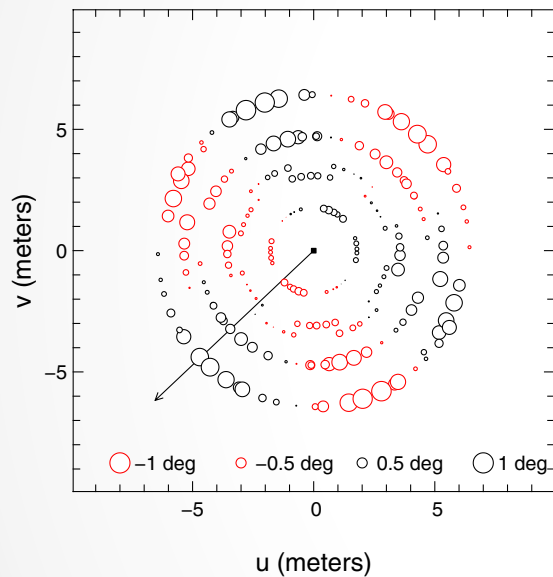
- Core accretion ?  
Or
- Gravitational instabilities ?  
Or
- A mixture of both ?



Simulation of accreting planets

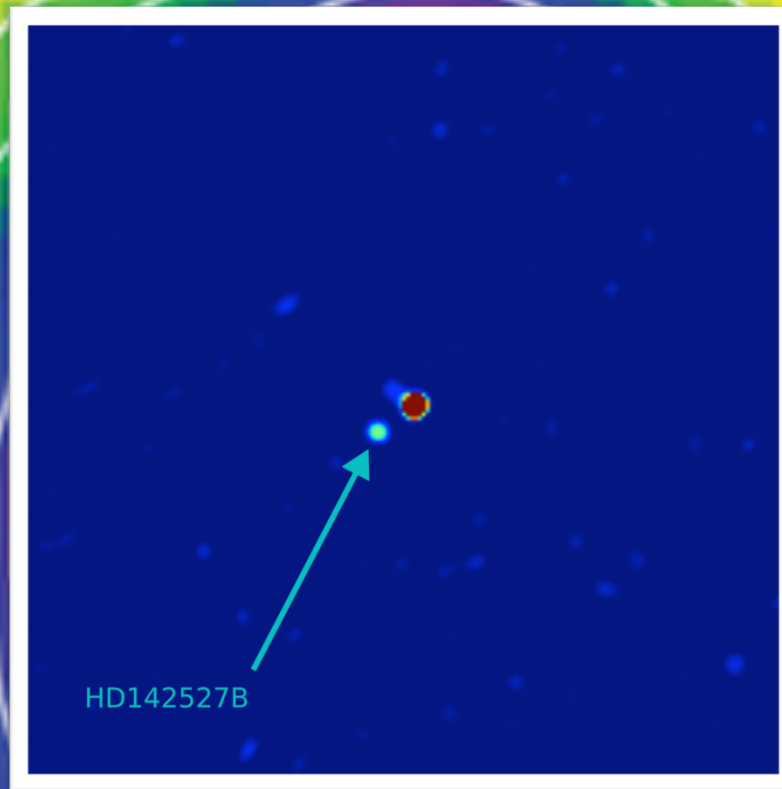


# HD142527



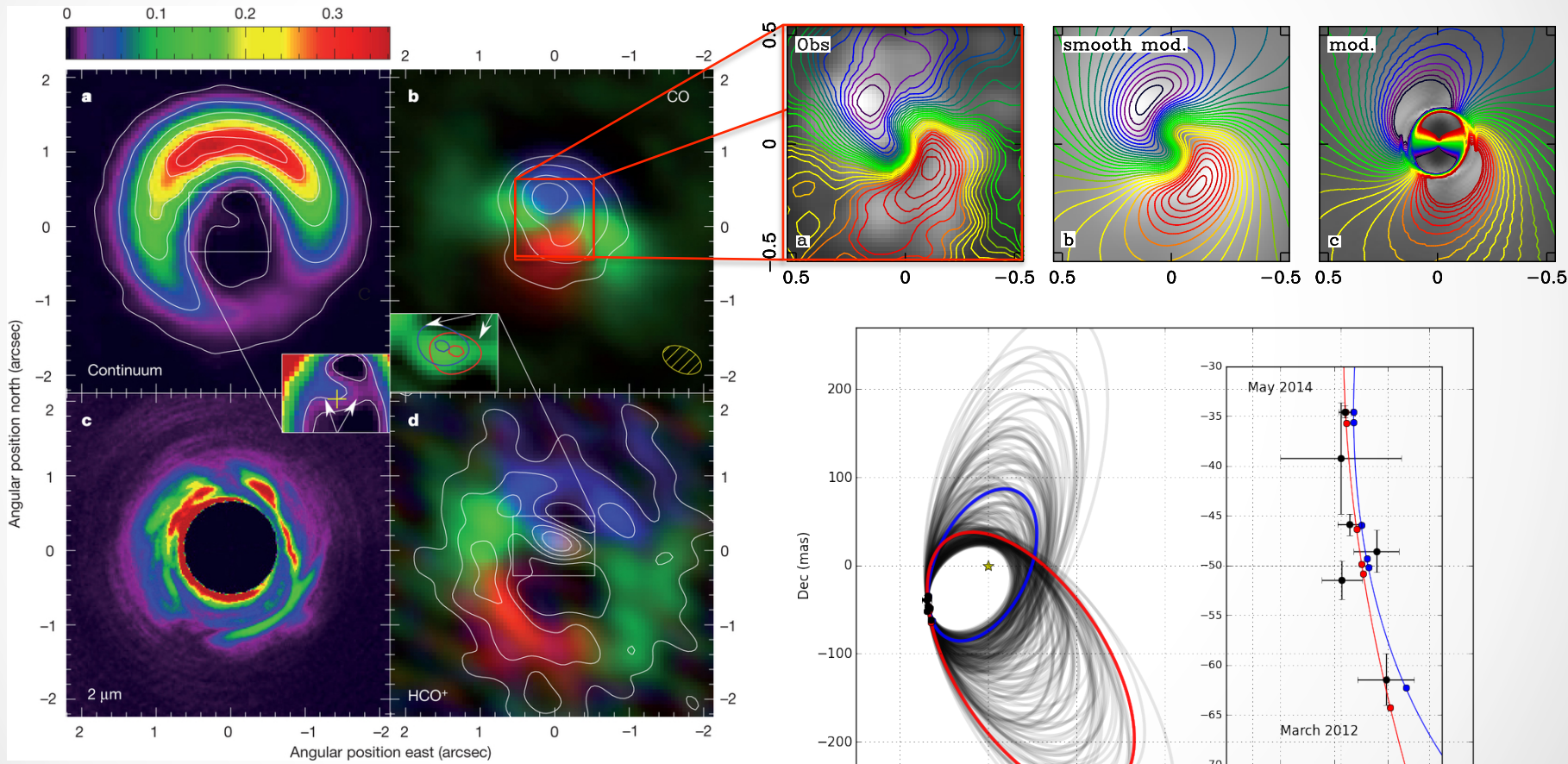
HD142527 Dataset (Biller et al. 2012)

# HD142527

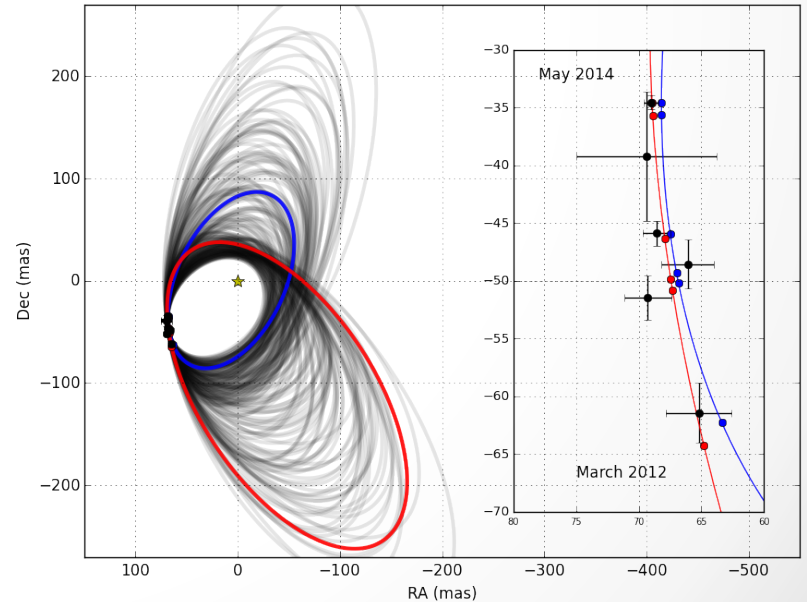


# HD142527

HD142527, ALMA data, 2014



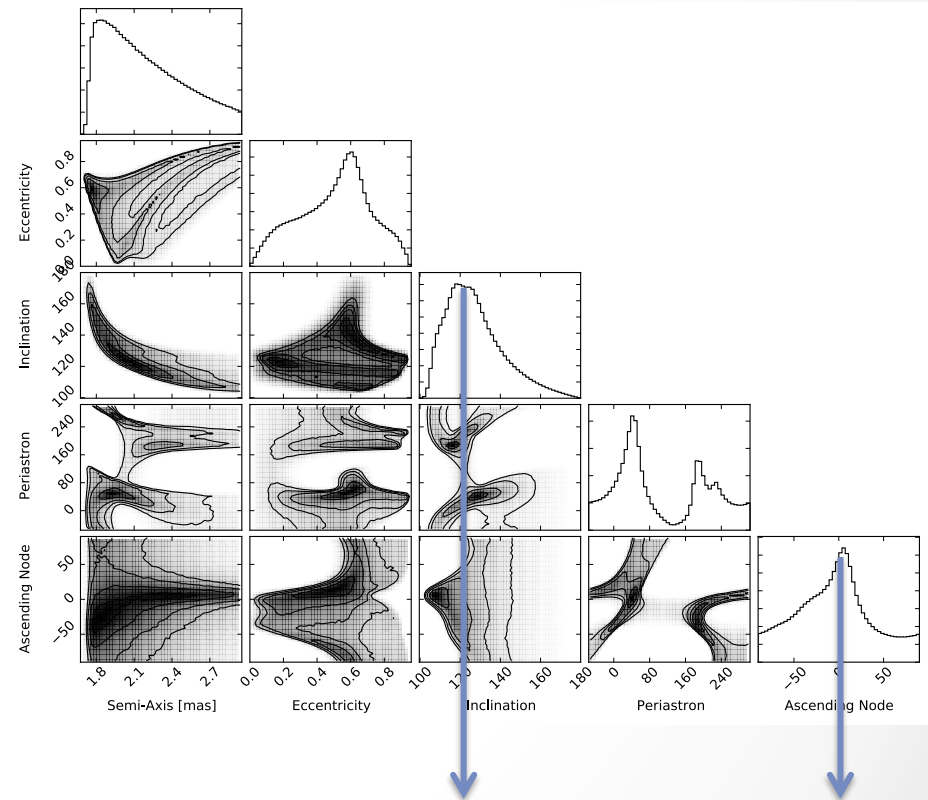
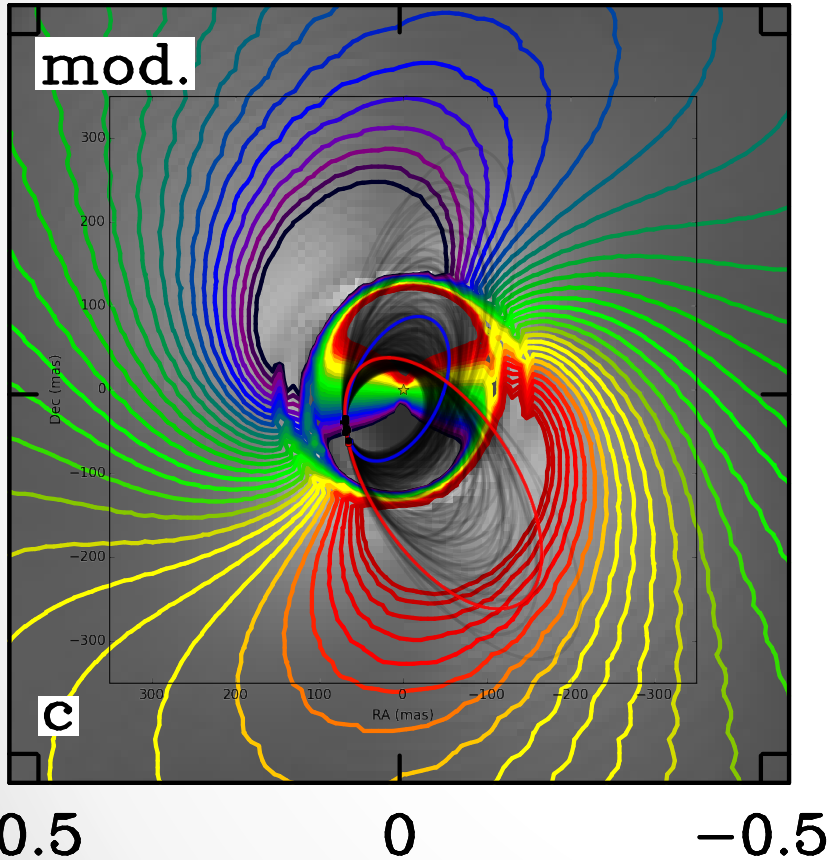
HD142527, ALMA data, 2012



HD142527B, SAM Data (NACO+GPI)

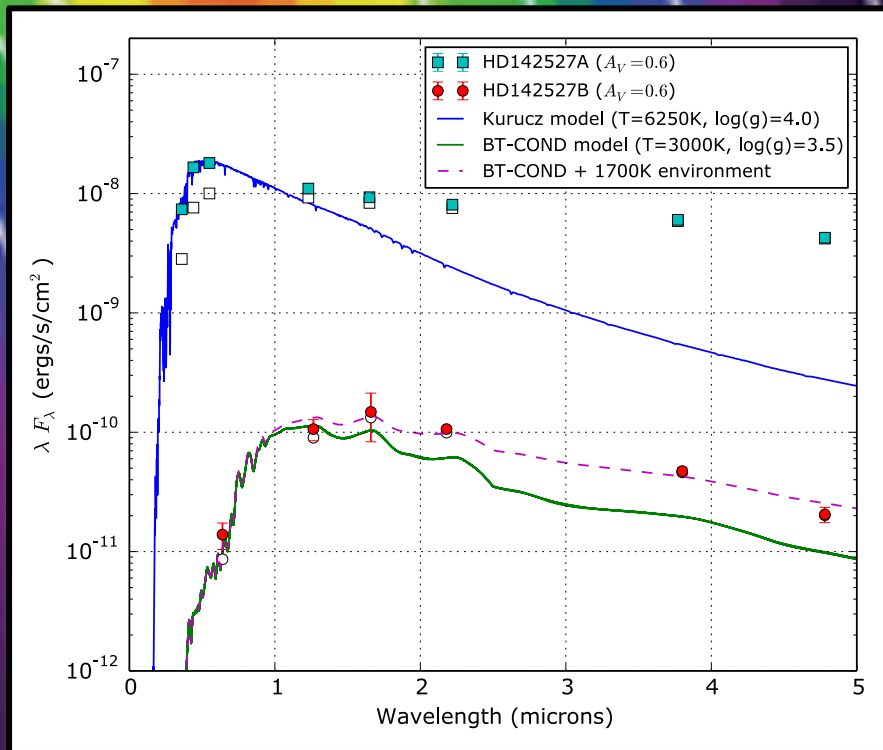
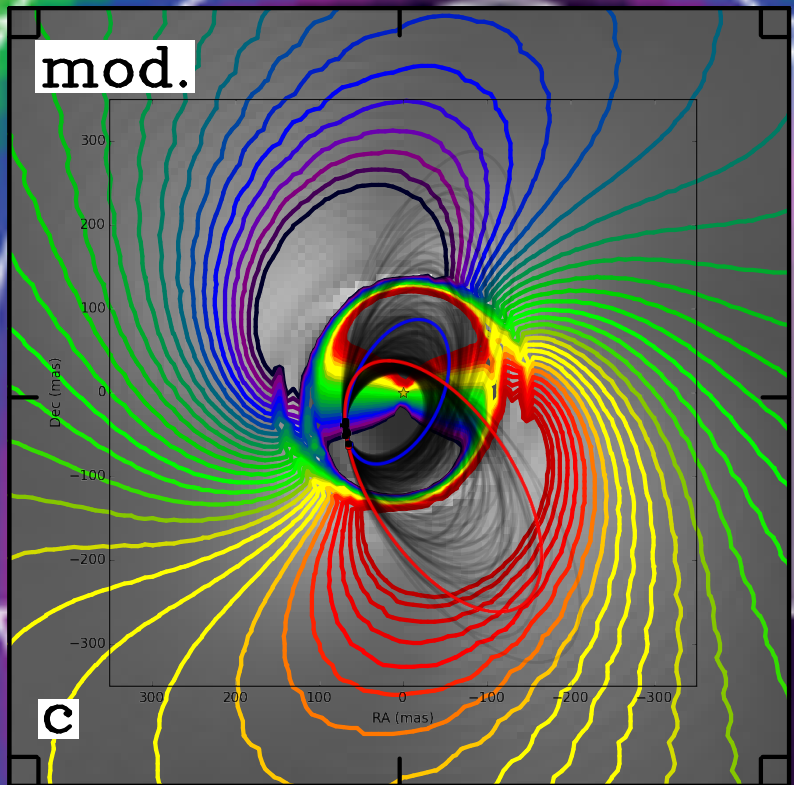


# HD142527



Inclination of inner disk  $47^\circ$  and PA of  $-8^\circ$   
(Casassus et al. 2015)

# HD142527



Age: 2-5Myr  
Temp: 3000K  
Radius: 1.2 R<sub>sun</sub>  
Accretion: 1.7Msun/yr

-----  
in agreement with a  $M=0.13$  Msun  
from evolutionary models (Baraffe et  
al. 1998)

# Conclusion

- Aperture Masking is remarkable to probe the 1-10AU zone for planet formation
- It will give you the little “+” in terms of dynamic range at small IWA compared to full pupil AO
- The motions observed by aperture masking is complementary to the dynamic observed by ALMA at longer wavelength
  
- It is available on NACO, GPI
- It is under commissioning for VISIR, SPHERE
- It will be available on the E-ELT, JWST