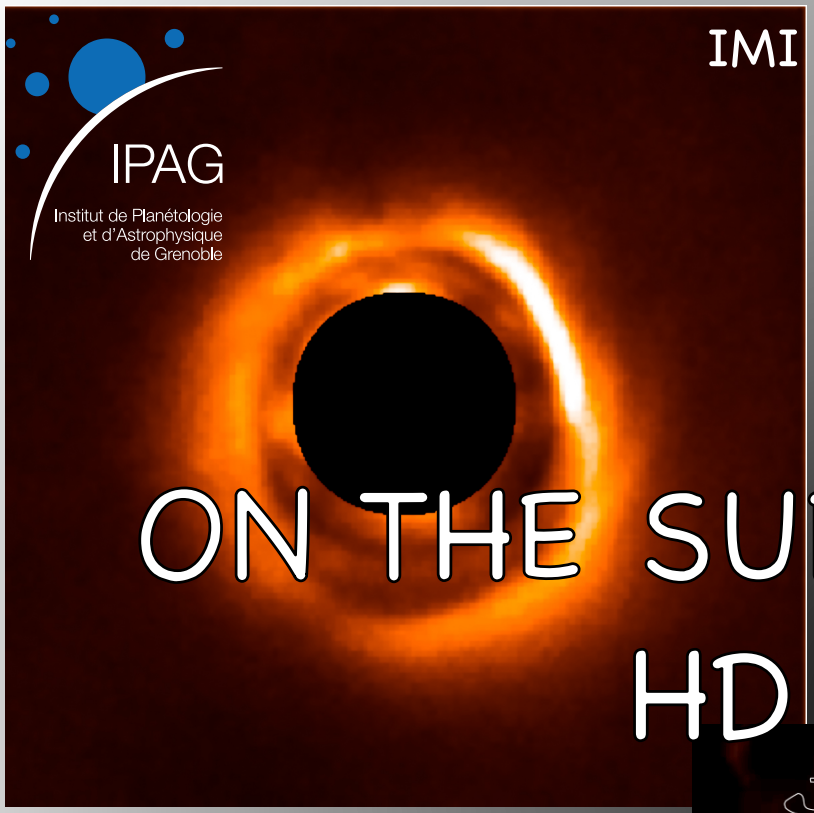
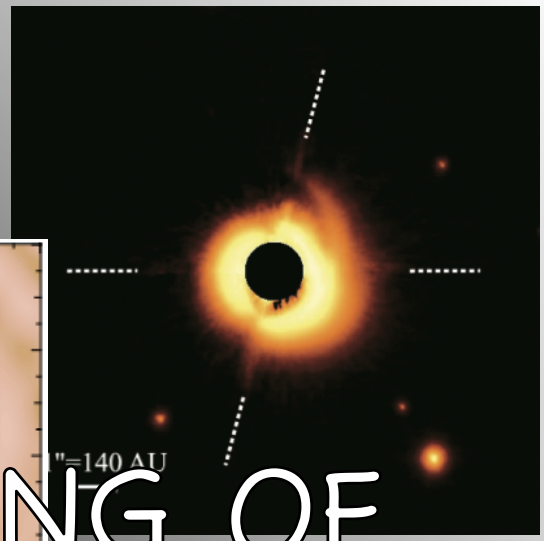
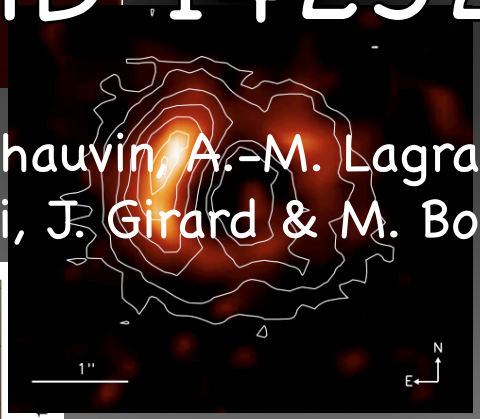
IMI 2012 - October

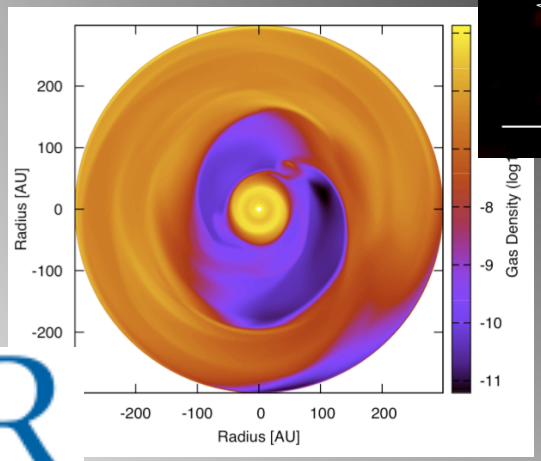




ON THE SURROUNDING OF HD 142527



J. Rameau, G. Chauvin, A.-M. Lagrange, P. Thébault, J. Milli, J. Girard & M. Bonnefoy



From the beginning up to now
OUTLINE

I. First high-contrast IR image

II. Modelling the geometry

III. A possible companion ?

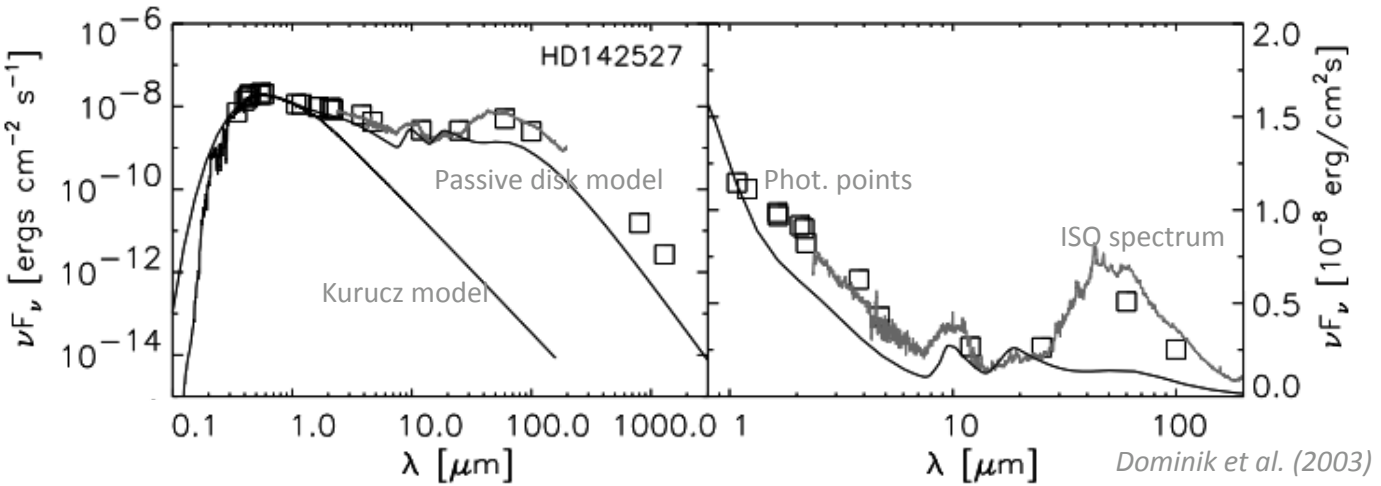
IV. Spirals, asymmetries and gaps

V. An embedded forming planet ?

Into the past
HD 142527

Herbig Ae
F6IIIe
d = 145 ± 15 pc *De Zeeuw et al. (1999)*
V mag = 8.34
K mag = 4.98
Age = 2 – 20 Myr
Member of Up. Cen. Lup. *De Zeeuw et al. (1999)*

$F_{IR}/F_{\star}$ = 0.92 *Dominik et al. (2003)*



Dominik et al. (2003)

I. First HC-IR image

Fukagawa et al. (2006)

Subaru / CIAO at K & H
Coronographic & PSF reference star

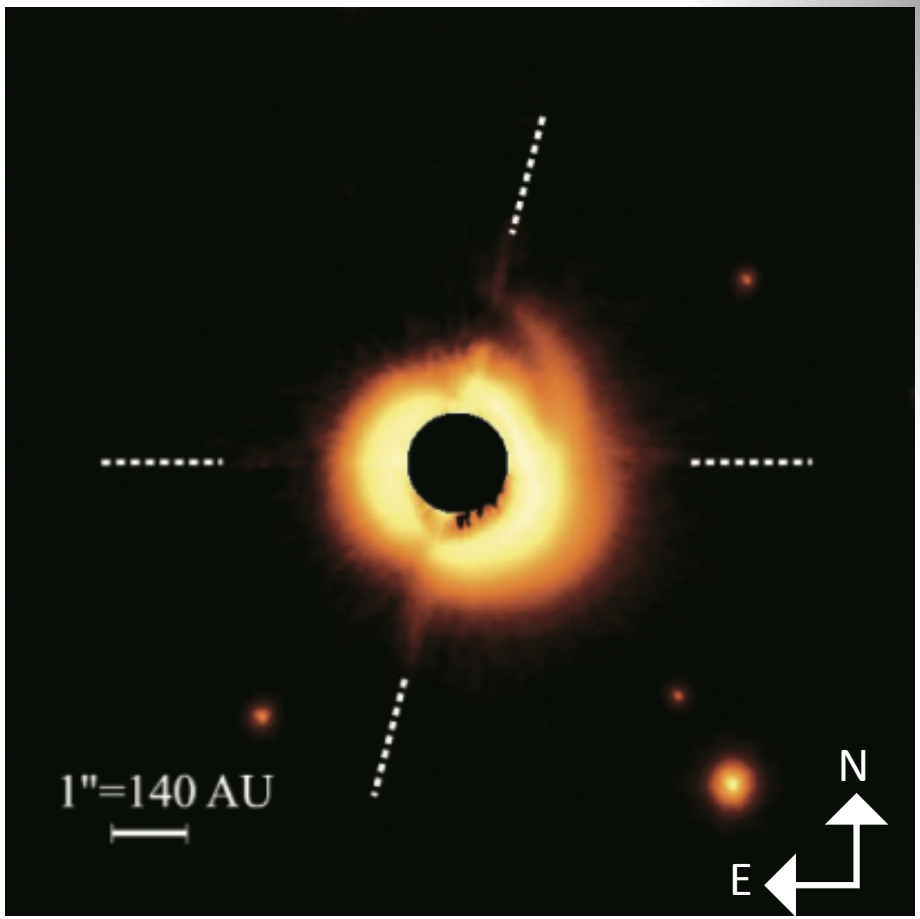
Offset of the center

Outer disk up to ~500 AU

'Banana split'

Brightness asymmetries

Central binary or recent stellar encounter ?

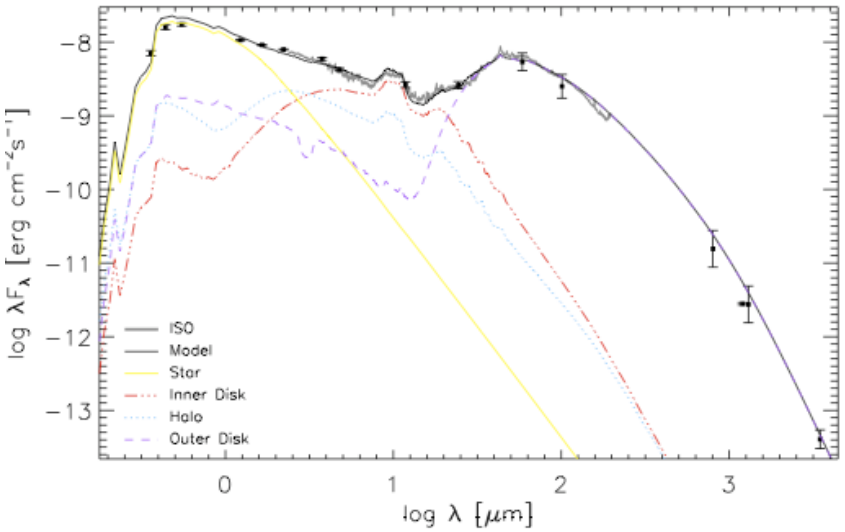


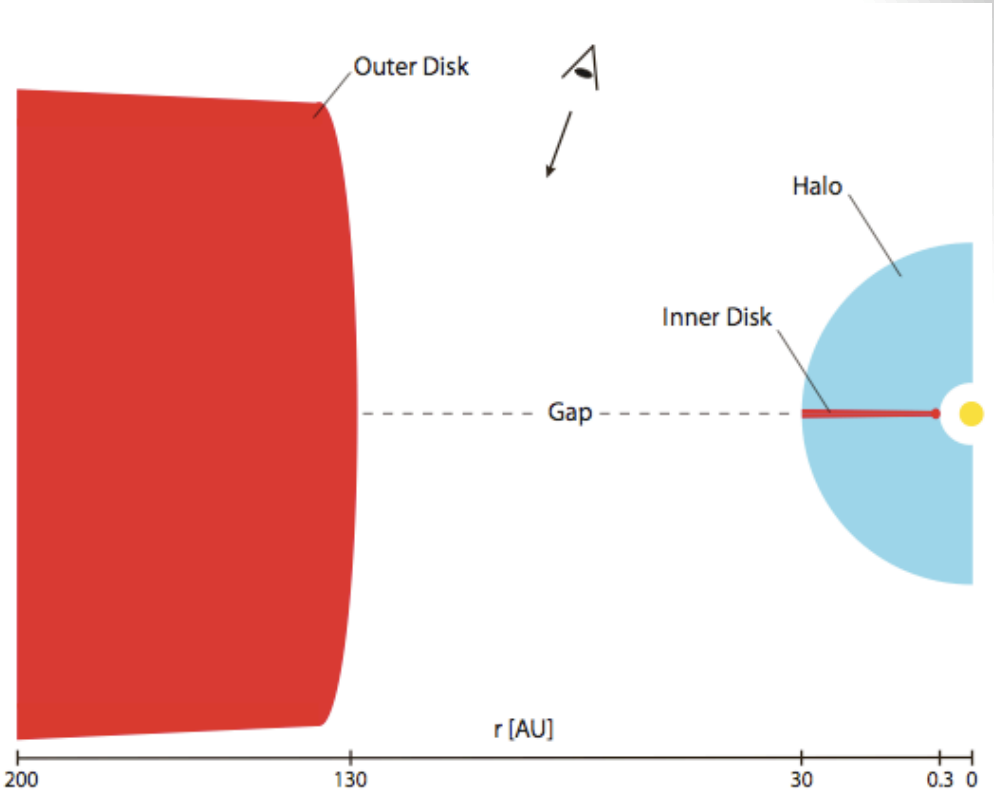
Fukagawa et al. (2006)

II. Modelling the geometry

Verhoeff et al. (2011)

Compilation of observations [mm => nm]
3 geometrically distinct components : inner disk (thick), halo (thin) & outer disk (thick)





Verhoeff et al. (2011)

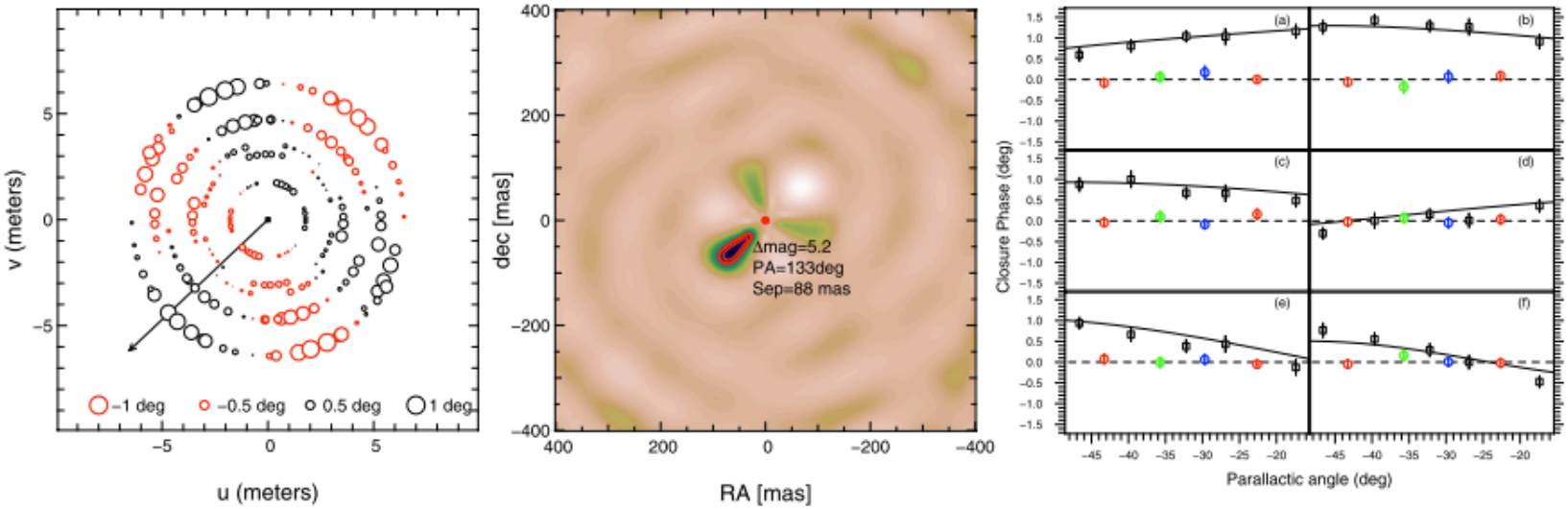
III. A possible companion ?

NACO/SAM at H, K & L'

Fit the closure phase with a binary model

ΔL' = 5-6.5 mag
M ~ 0.1-0.4 $M_\odot$ at 12.8±1.5 AU

Biller et al. (2012)
MPIA/IPAG collaboration

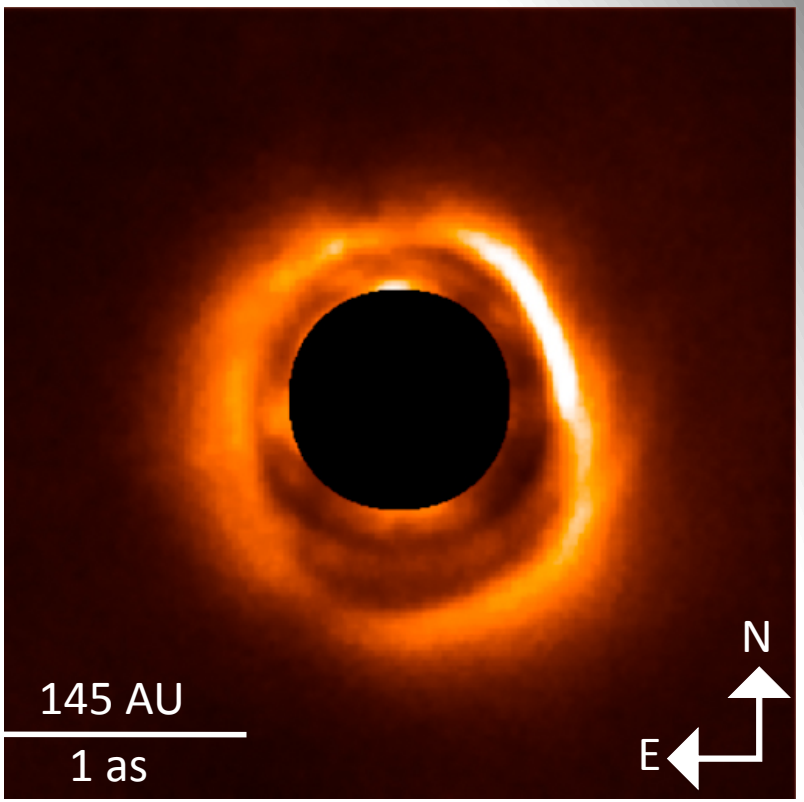


Biller et al. (2012)

IV. Gaps, spirals and asymmetries

Rameau et al. (2012)

VLT/NACO at L'
ADI & PSF reference subtraction



Rameau et al. (2012)

Casassus et al. (2012)

Casassus et al. (2012)

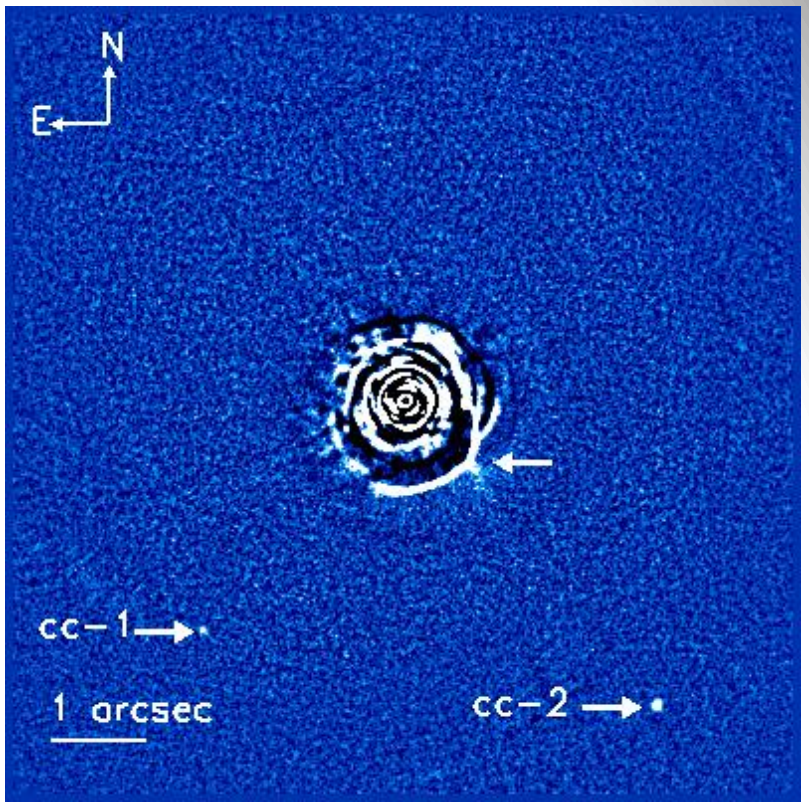
GEMINI/NICI at H, Ks & L'
PSF reference subtraction

IV. Gaps, spirals and asymmetries

ADI processing

Artifacts *(Milli et al. 2012)*

2 background sources



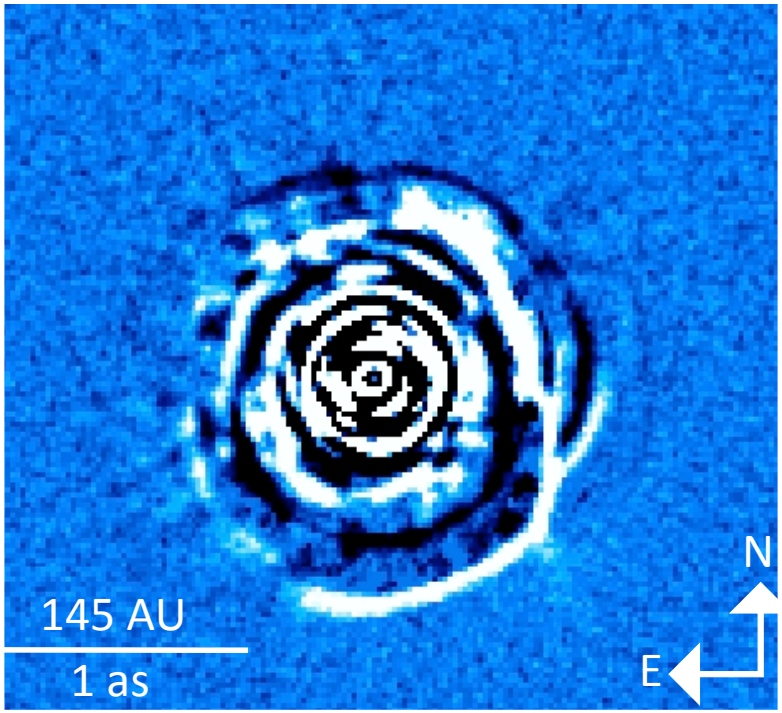
Rameau et al. (2012)

IV. Gaps, spirals and asymmetries

ADI processing

Artifacts *(Milli et al. 2012)*

2 background sources



Rameau et al. (2012)

V. An embedded forming planet ?

Scenario of planet formation

Casassus et al. (2012)

FARGO *(Masset 2000)* simulation

10 M_J at 90 AU

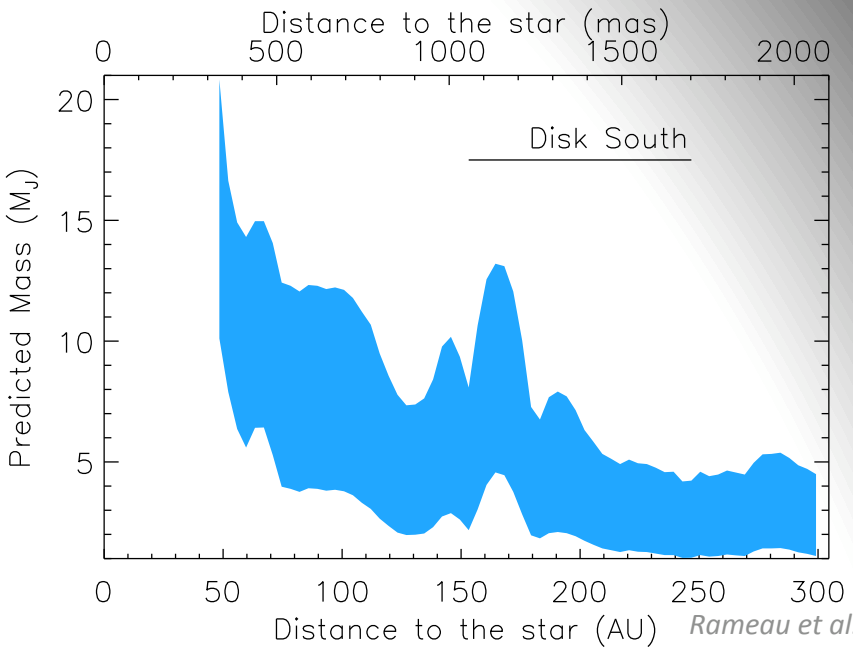
Rameau et al. (2012)

=> Rule out by our detection limits

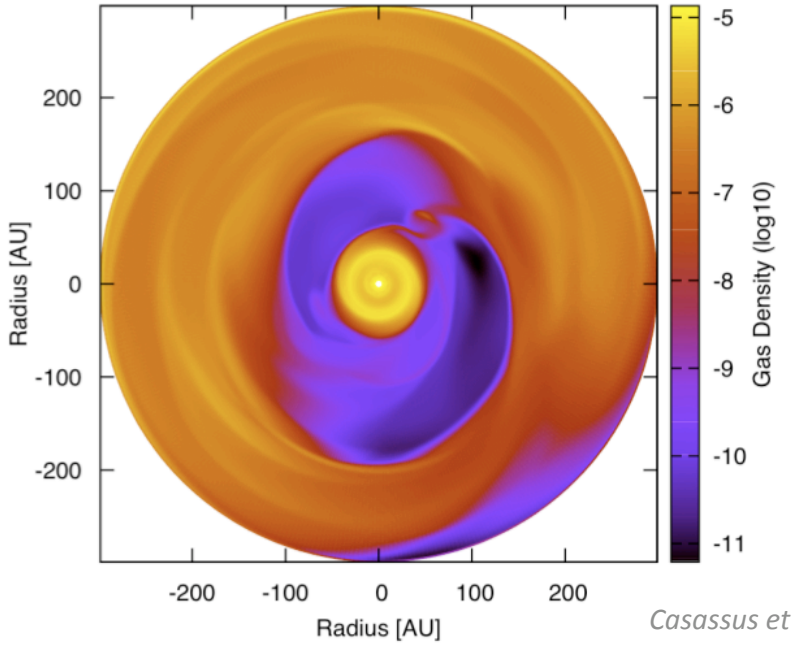
Spirals : OK

Asymmetric gap : OK

Extended inner disk : No



Rameau et al. (2012)

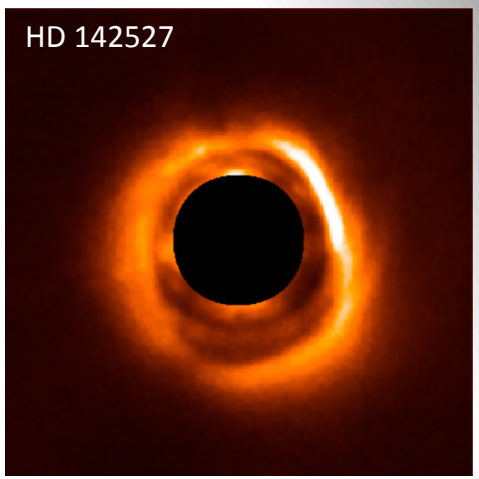


Casassus et al. (2012)

Going farther…

Need characterizations :

- Inner disk (VLTI/PIONIER, SPHERE)
- Gas mass and distribution (ALMA, HERSCHEL)



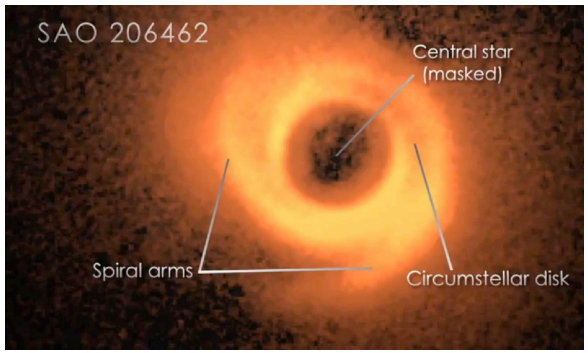
Rameau et al. (2012)

SAM candidate companion confirmation

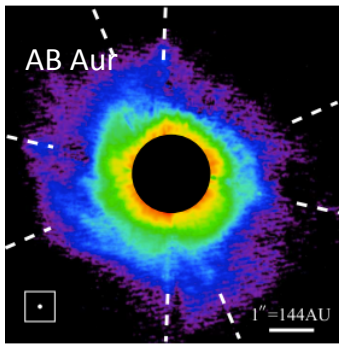
Advanced hydro. Simulations

(2 planets ? 1 binary + 1 planet ?)

Unique case



Muto et al. (2011)



Hashimoto et al. (2011)