

# A giant planet around HD 95086 ?



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## 1/ The star

### HD 95086:

- Age: **10-17 Myr** (LCC)
- Distance: 90.4 pc
- Dust:** IR excess at 24  $\mu\text{m}$ ;  $L_d/L_* = 10^{-3}$
- Mass: **1.7  $M_\odot$**  (A8)
- Proper motion: 41 mas/yr

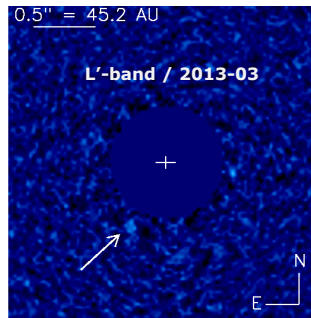
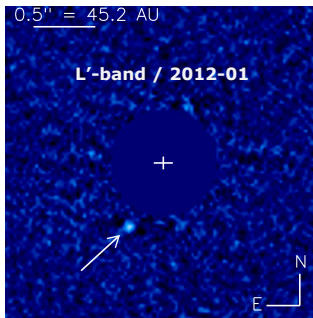
## 2/ AO observations

### Discovery in 2012-01:

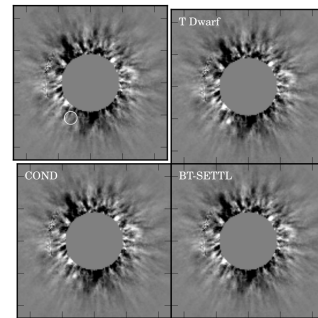
- VLT/NaCo at **L'-band** (3.4  $\mu\text{m}$ ); **detection at signal-to-noise (S/N) = 9**
- separation  $624 \pm 8$  mas,  $\Delta L' = 9.79 \pm 0.4$  mag

### Follow-up:

- 2012-03; GS/NICI at H-band (1.5  $\mu\text{m}$ ); no detection
- 2013-02; VLT/NaCo at Ks-band (2.18  $\mu\text{m}$ ); no detection
- 2013-03; VLT/NaCo at **L'-band**; **detection at S/N=3**



NaCo images of the planet around HD 95086. Left: S/N=9. Right: S/N=3.



NICI images at H-band (2012) showing the non-detection. Contrast of the artificial companions: 11.6 mag for the T dwarf, 12.0 mag for the COND model, and 12.5 mag for the BT-SETTL model.

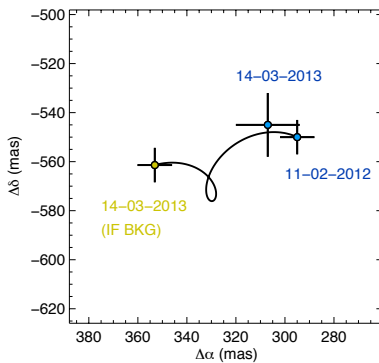
## 3/ Astrometry

Precision assessed with a 4.5'' background star

### Status:

- Background hypothesis for the probable planet rejected with a probability of  $1e-3$
- Likely comoving with the star**

Projected separation of the planet: **56 ± 7 AU**



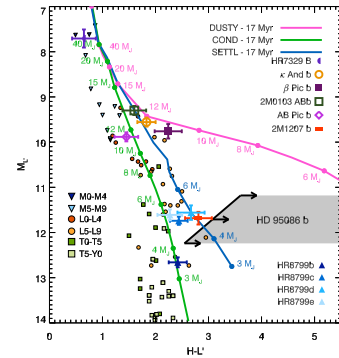
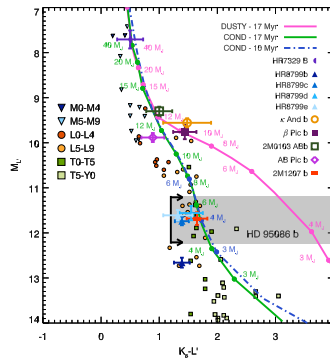
## 4/ Photometry

Apparent magnitude  $L' = 15.8 \pm 0.4$  mag

**Absolute magnitude  $M_L = 11.7 \pm 0.5$  mag**

### Lower limits:

- $K_s - L' > 1.2$  mag **additional rejection of a background contamination**
- $H - L' > 3.1$  mag **rejection of a foreground contamination**
- inconsistent with COND models at 10-17 Myr**
- rejection of massive planets from BT-SETTL models**



## 5/ Characteristics and formation history

- Mass from L' photometry **4-5  $M_{\text{jup}}$**  from COND model  
**3.6-4.6  $M_{\text{jup}}$**  from BT-SETTL model
- Atmosphere **Very red object**  
Dusty  
Low surface gravity
- Formation **In-situ core-accretion very improbable**  
**Gravitational instability possible but mechanism preferentially forming massive objects**  
**Migration? Planet-planet or planet-disk interaction**