



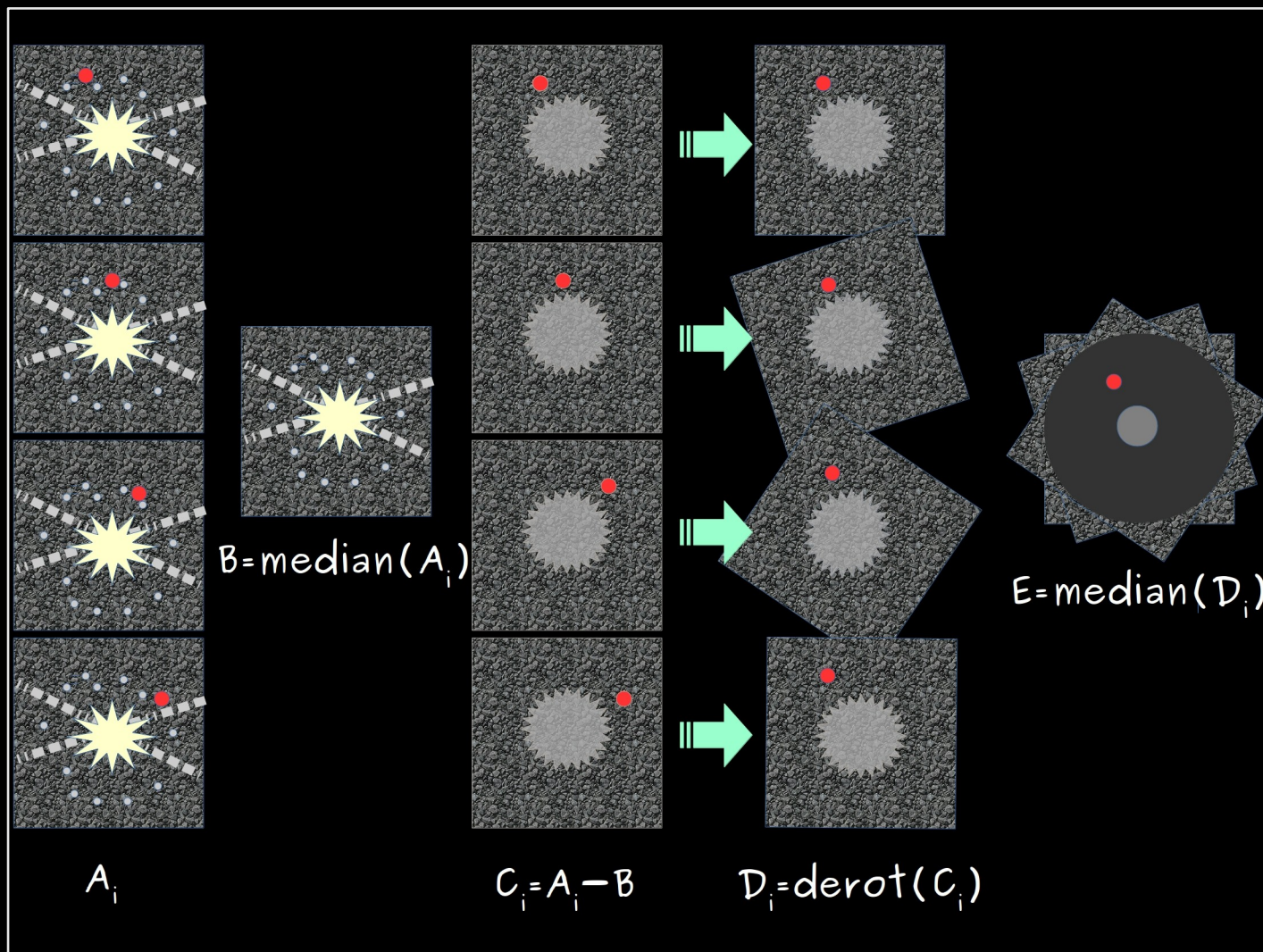
# “Data processing on simulated data for SHARK-NIR”

**Carolo E., Vassallo D. (TALK SIMULAZIONI - OGGI), Farinato J.(PI), Agapito G., Bergomi M., Carlotti A., D'Orazi V. (TALK CASI SCIENTIFICI - IERI), Greggio D. (TALK OVERVIEW SHARK - LUNEDI),**  
**Magrin D., Marafatto L., Mesa D., Pinna E., Puglisi A., Stangalini M., Verinaud C., Viotto V., Biondi F., Chinellato S., Dima M., Gullieuszik M., Portaluri E., Ragazzoni R., Umbriaco G.**

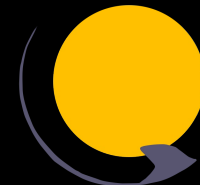




## ADI: ANGULAR DIFFERENTIAL IMAGING

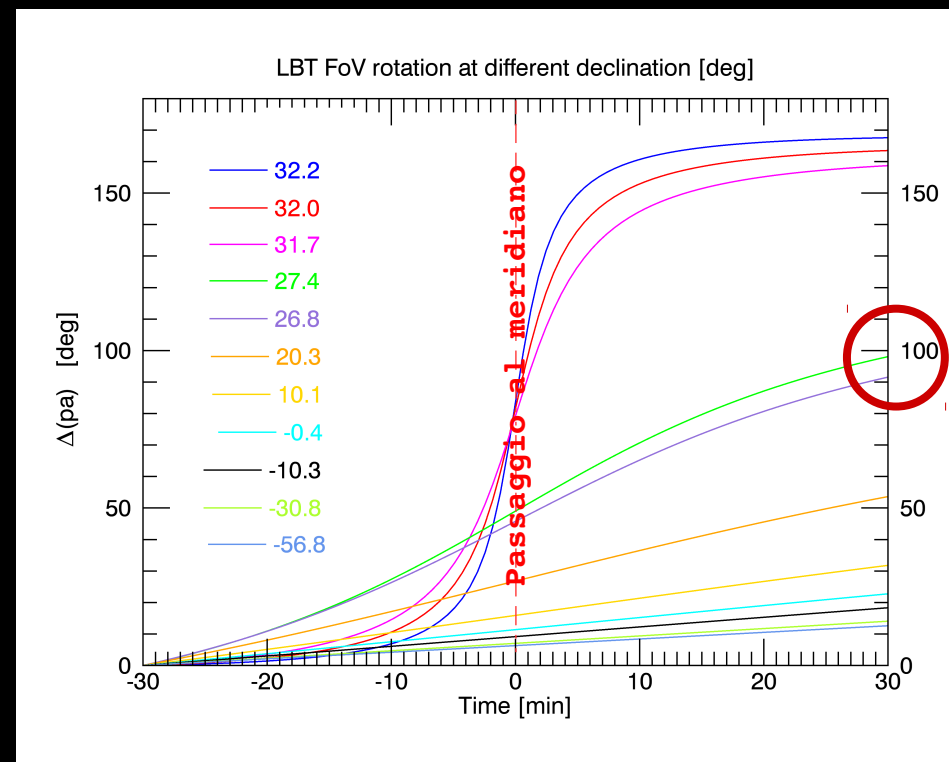
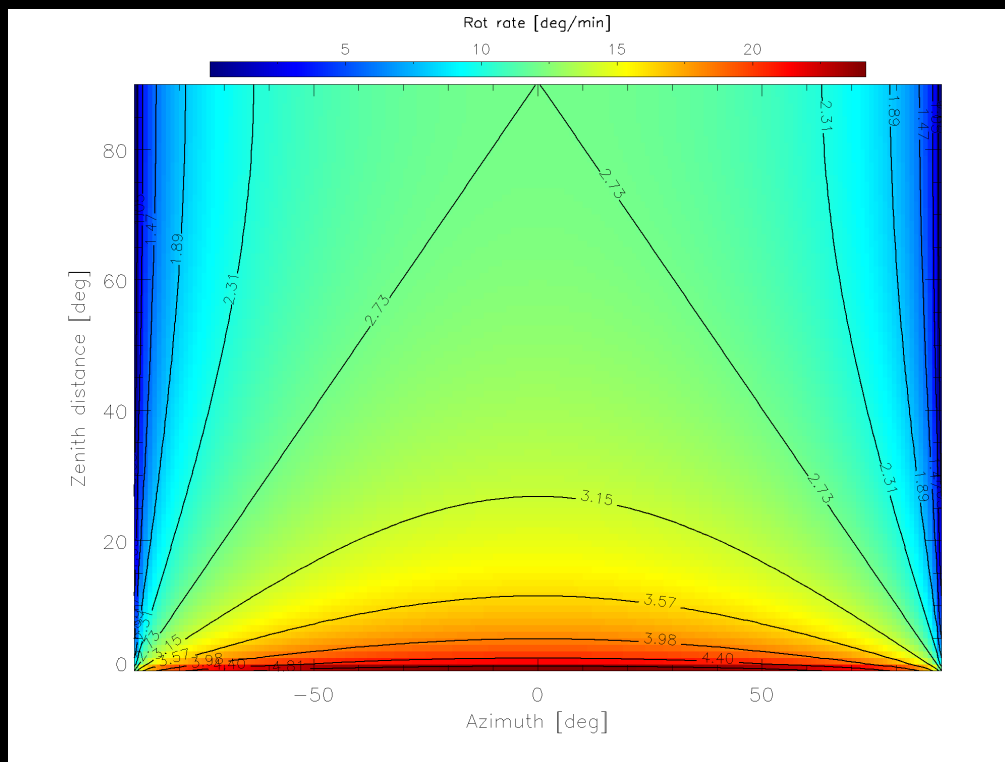


Effetto:  
Pianeta si muove  
Il pattern di speckle rimane "fisso"





# ROTAZIONE DI CAMPO A LBT



```
lat obs [deg]:      32.7013
min max rot [deg/min]:  0.0018      24.1644
min max dec [deg]:    -56.7953     32.6955
```

```
dec [deg]:  32.24 tot rot [deg]: 167.578
dec [deg]:  32.01 tot rot [deg]: 163.515
dec [deg]:  31.74 tot rot [deg]: 158.717
dec [deg]:  27.42 tot rot [deg]:  98.074
dec [deg]:  26.75 tot rot [deg]:  91.560
dec [deg]:  20.30 tot rot [deg]:  53.632
dec [deg]:  10.09 tot rot [deg]:  31.794
dec [deg]:  -0.39 tot rot [deg]:  22.750
dec [deg]: -10.32 tot rot [deg]:  18.326
dec [deg]: -30.76 tot rot [deg]:  14.055
dec [deg]: -56.80 tot rot [deg]:  12.612
```

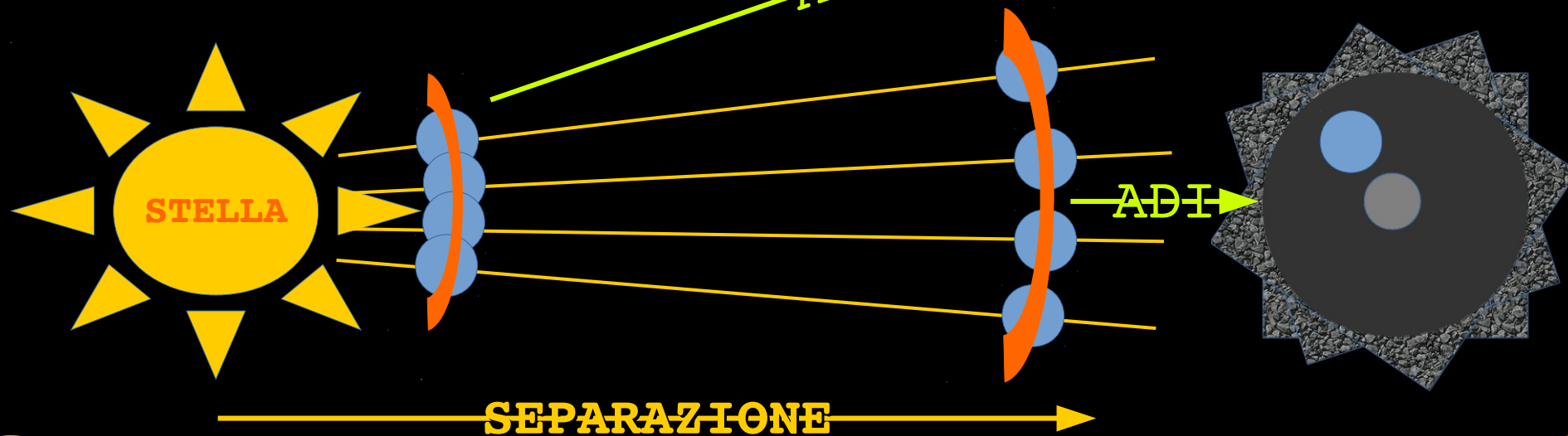
Taurus – Auriga  
star forming region





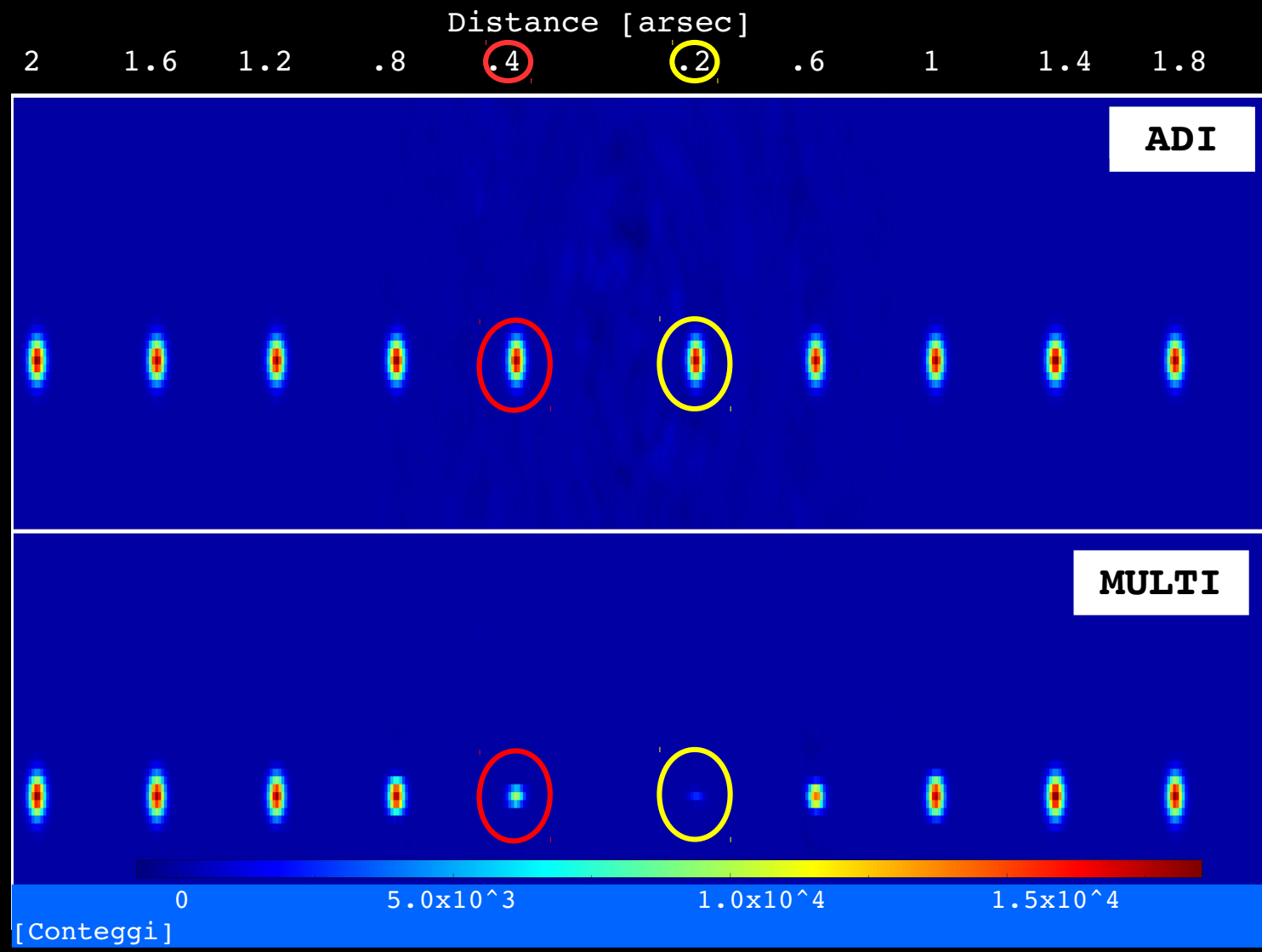
# CANCELLAZIONE DEL PIANETA

- x TECNICHE DI RIDUZIONE → CANCELLAZIONE DELLA LUCE DEL PIANETA (OLTRE CHE SPECKLES)
- x PIU' VICINO PIU' CANCELLAZIONE
- x MENO ROT PIU' CANCELLAZIONE





# EFFETTO DELLA CANCELLAZIONE

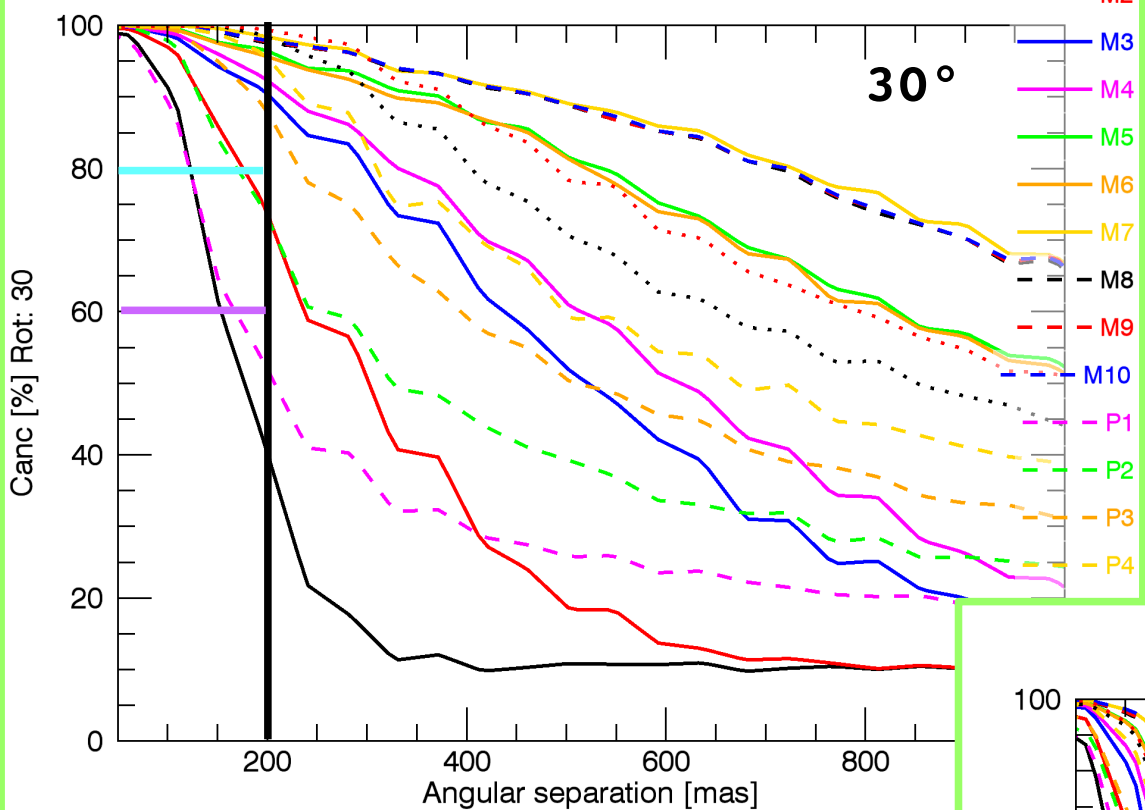




# PERCENTUALE DELLA CANCELLAZIONE DEL PIANETA

S0.4" - H6 - R8

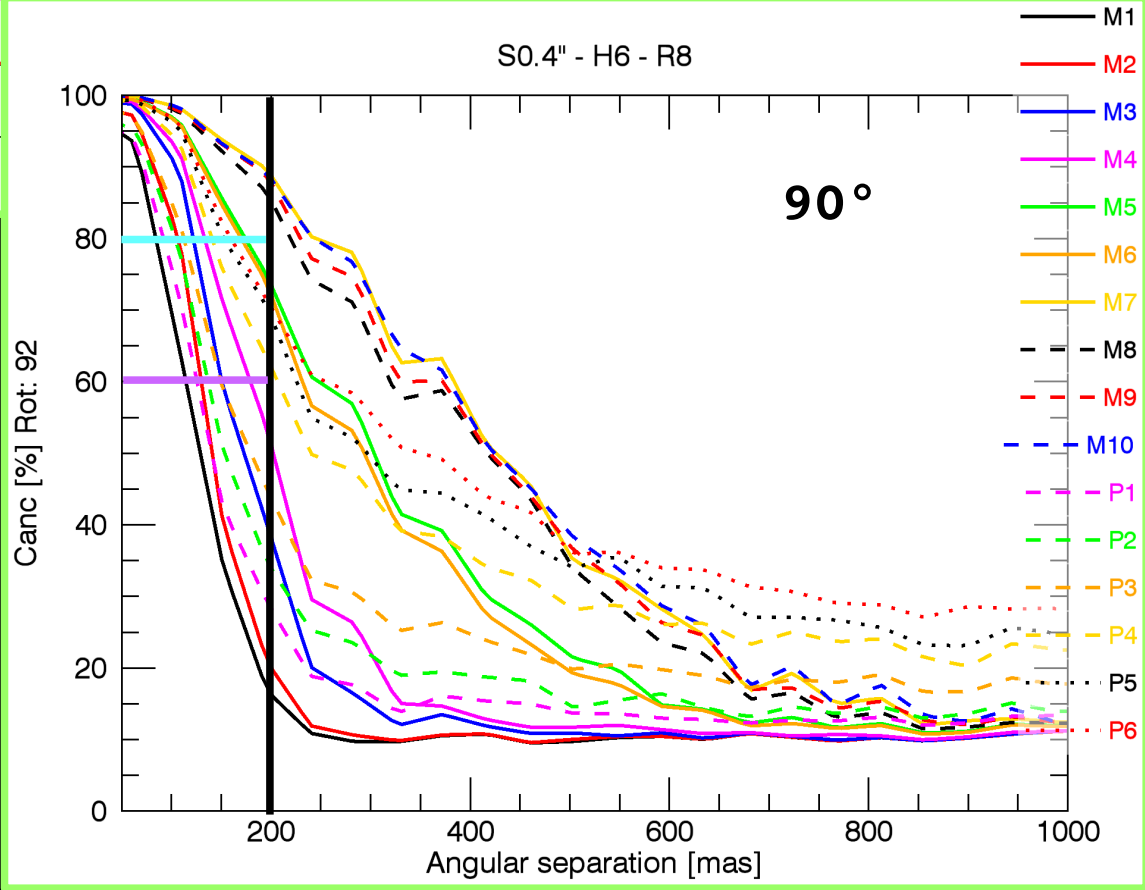
30°



- M1
- M2
- M3
- M4
- M5
- M6
- M7
- - M8
- - M9
- - M10
- - P1
- - P2
- - P3
- - P4

S0.4" - H6 - R8

90°



- M1
- M2
- M3
- M4
- M5
- M6
- M7
- - M8
- - M9
- - M10
- - P1
- - P2
- - P3
- - P4
- - P5
- - P6

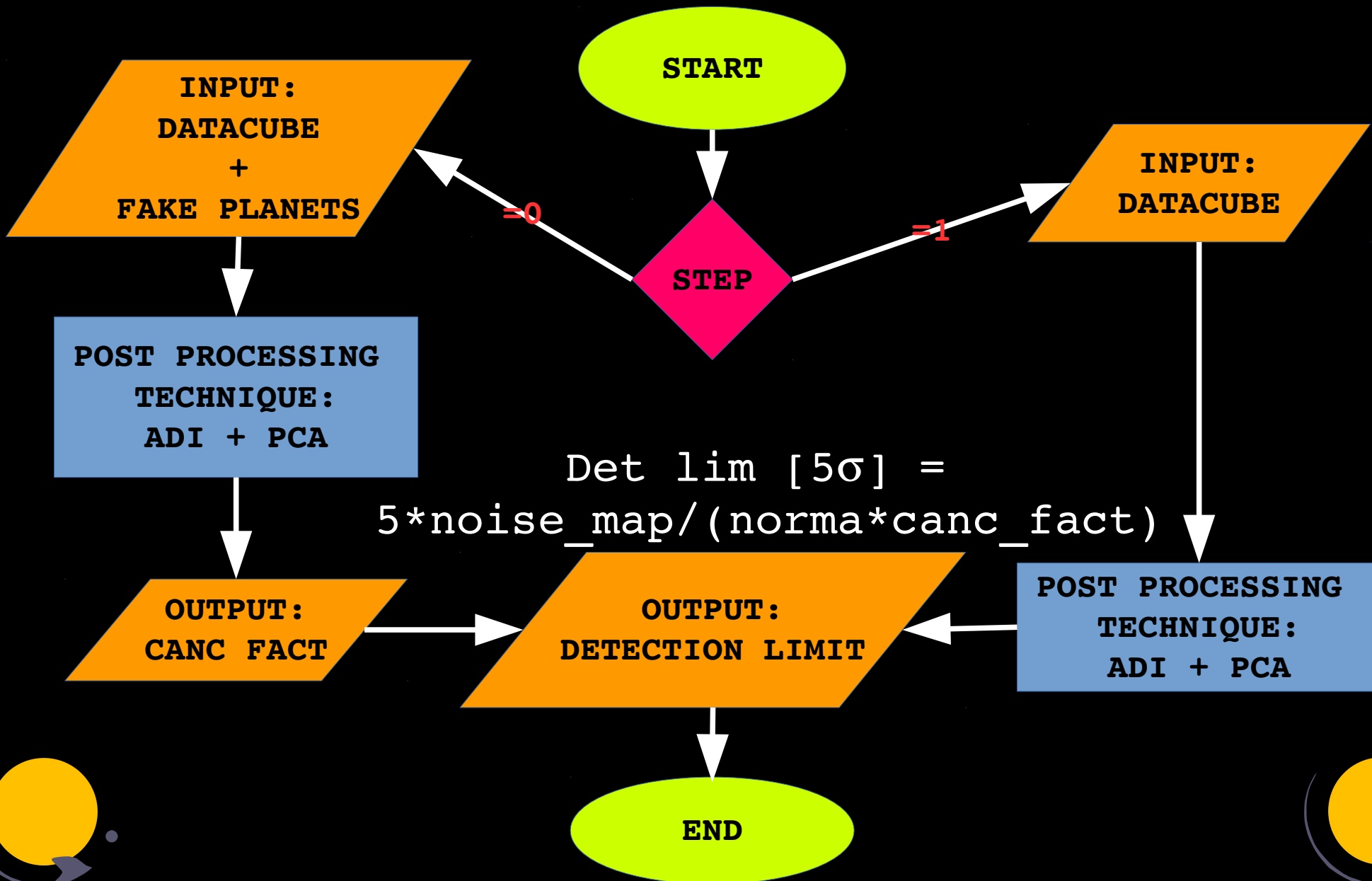
30° → 80% @200mas: M1, M2, P1, P2  
 90° → 80% @200mas: M1→M6, P1→P6

30° → 60% @200mas: M1, P1  
 90° → 60% @200mas: M1→M4, P1→P3





# CODICE RIDUZIONE DATI



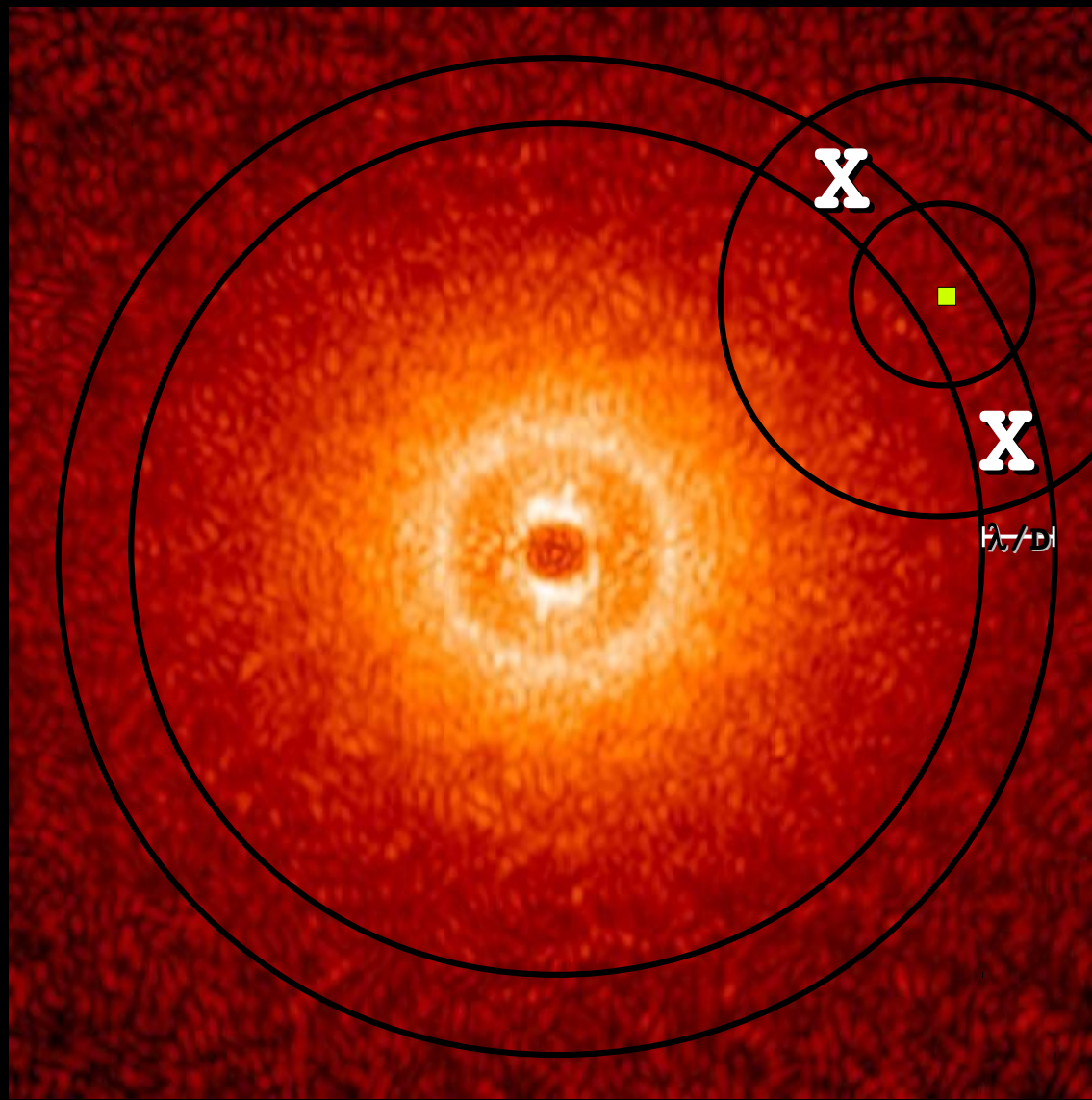


**CALCOLO MAPPA NOISE**  
[STDV zona XX in Fig.]

**NORMALIZZAZIONE PSF**  
**FUORI CORONOGRFO**

**NORMALIZZAZIONE PER**  
**FATTORE DI**  
**CANCELLAZIONE**

**TUTTO X 5 →**  
**DET LIM A 5σ**







x Simulazioni/analisi in banda H = 1.6  $\mu\text{m}$

x Quasi static speckle noise: 30 nm rms

x Jitter: 10 mas [...]

x Range seeing: 0.4" - 1.0"

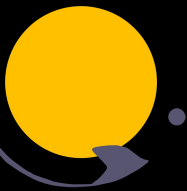
x Mag R: 8 [Mag H: 5,6,8], 10 [Mag H: 7,8,10], 12  
[Mag H: 9,10,12] [...]

→ tipo M, Late type, Early type (B/A)

x "T exp" tot: 60min

x # frames: 30

x Rot tot FoV: 30/90 deg





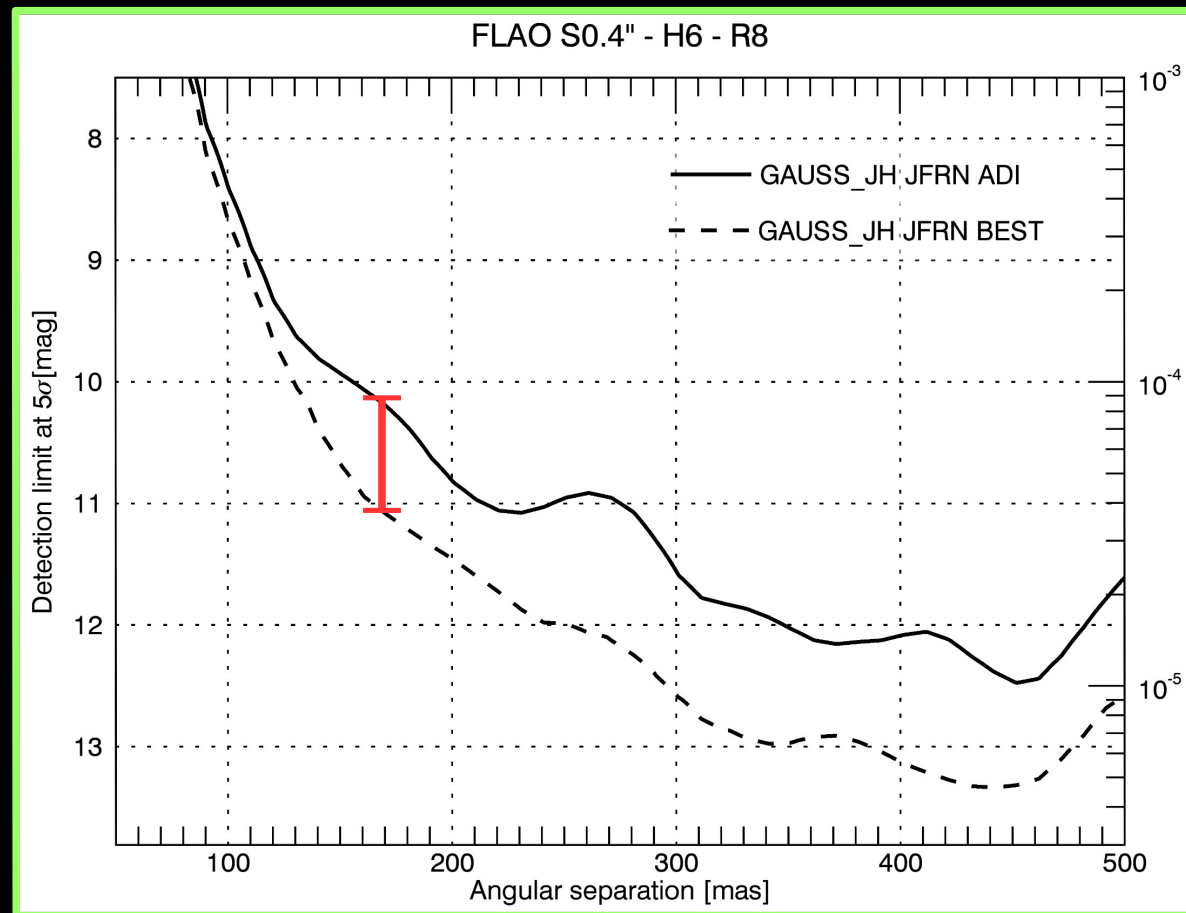
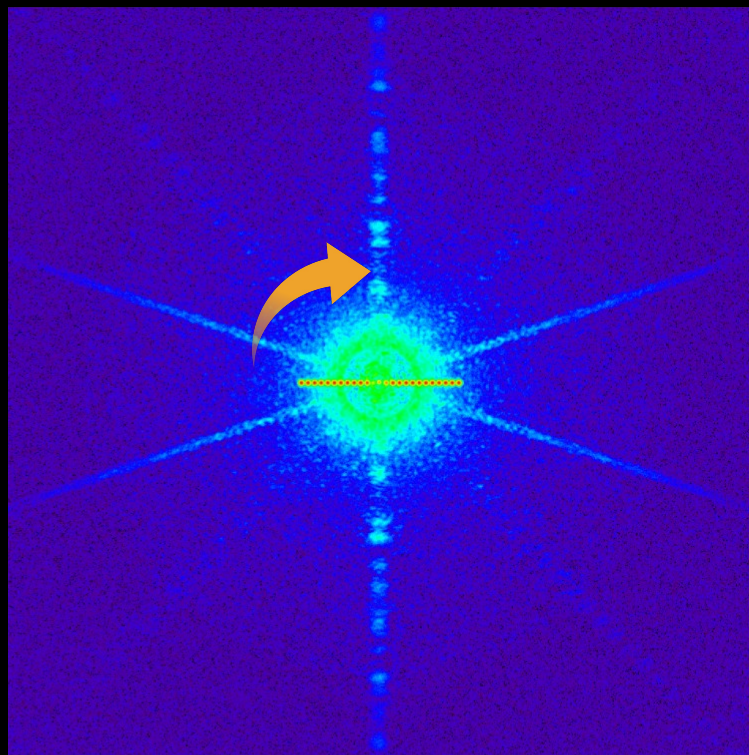
GAUSS

LABORATORIO  
NAZIONALE  
ADONI  
OTTICA  
ADATTIVA

GAUSS



IWA:  $2-2.5 \lambda/D$   
Nominal Contrast:  $10^{-5}$   
Strehl: 73%





SP1



SP1

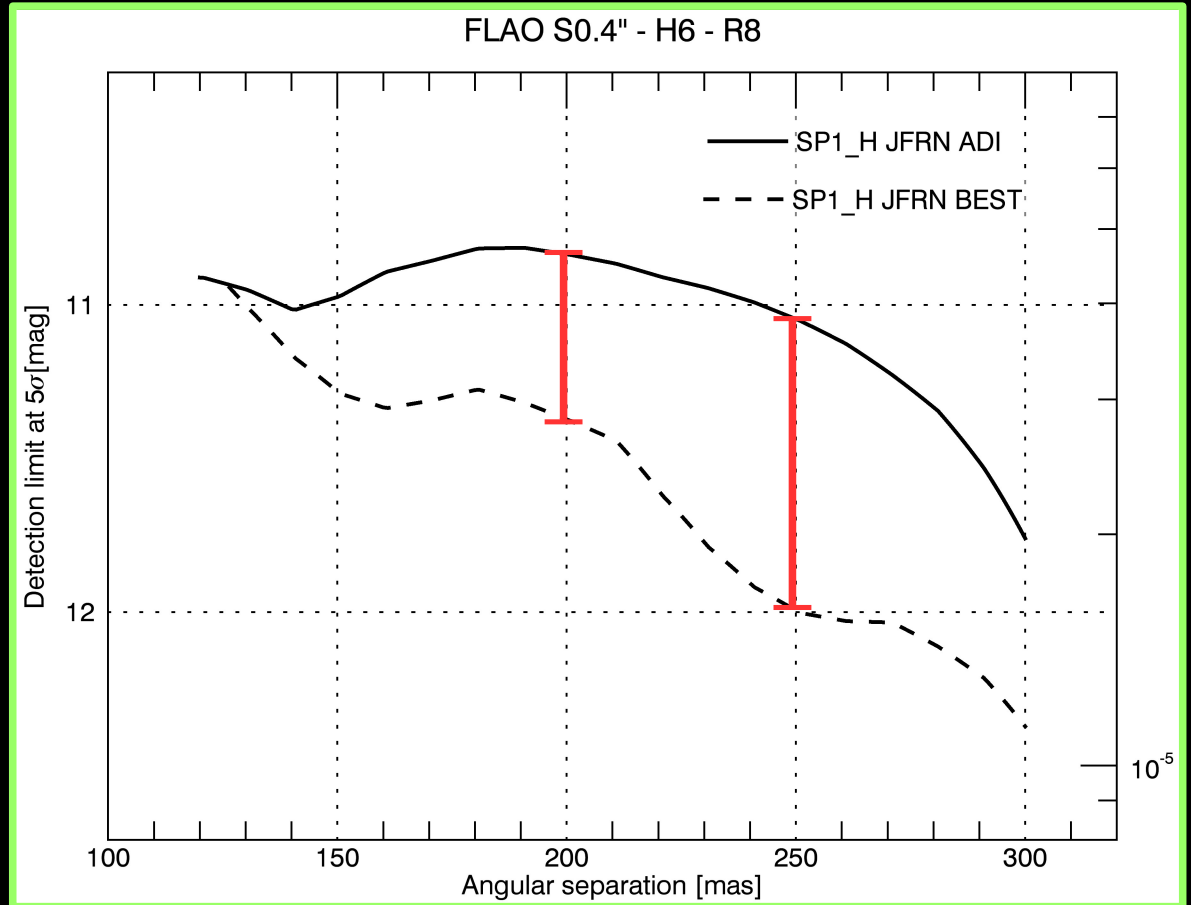
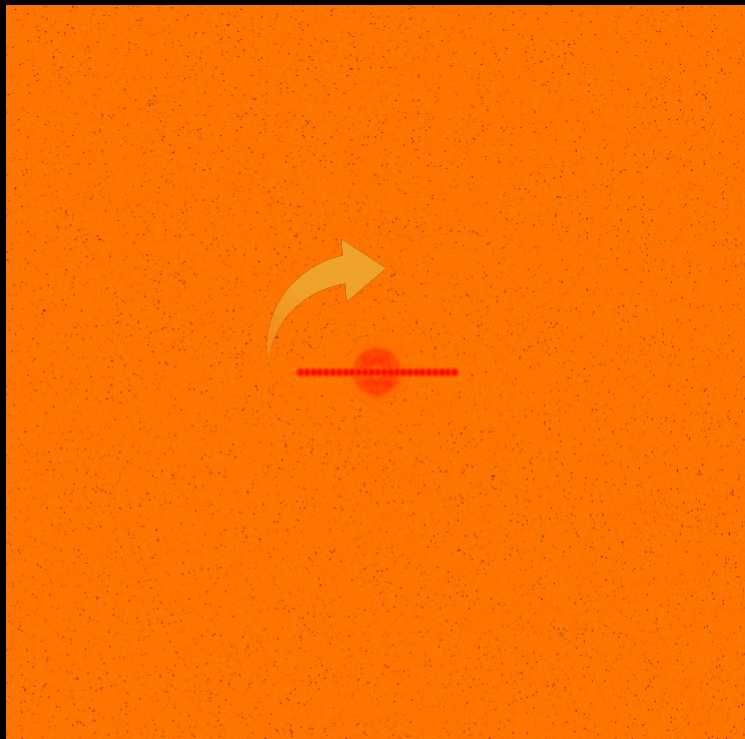


IWA:  $2.6 \lambda/D$

OWA:  $8 \lambda/D$

NOMINAL CONTRAST:  $10^{-5}$

Strehl: 73%





SP2A+SP2B

[ASYM]

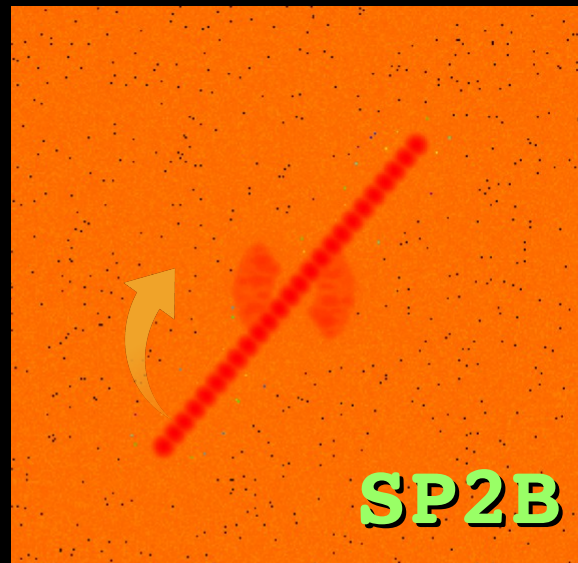
LABORATORIO NAZIONALE  
ADONI  
OTTICA ADATTIVA

SP2A+SP2B

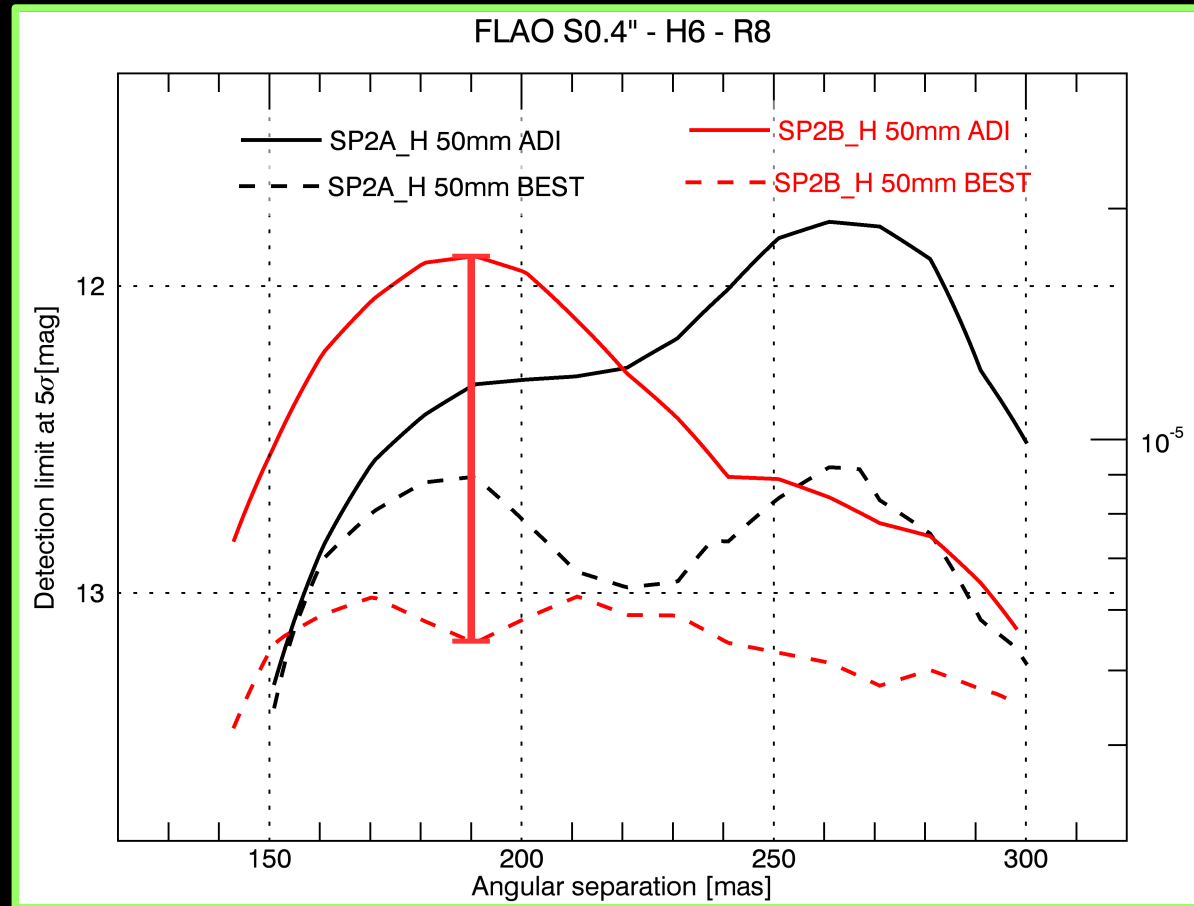
[ASYM]



SP2A



SP2B



IWA:  $3.5 - 3.3 \lambda/D$

OWA:  $8 \lambda/D$

NOMINAL CONTRAST:  $10^{-6}$

Strehl: 73%





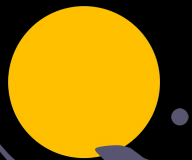
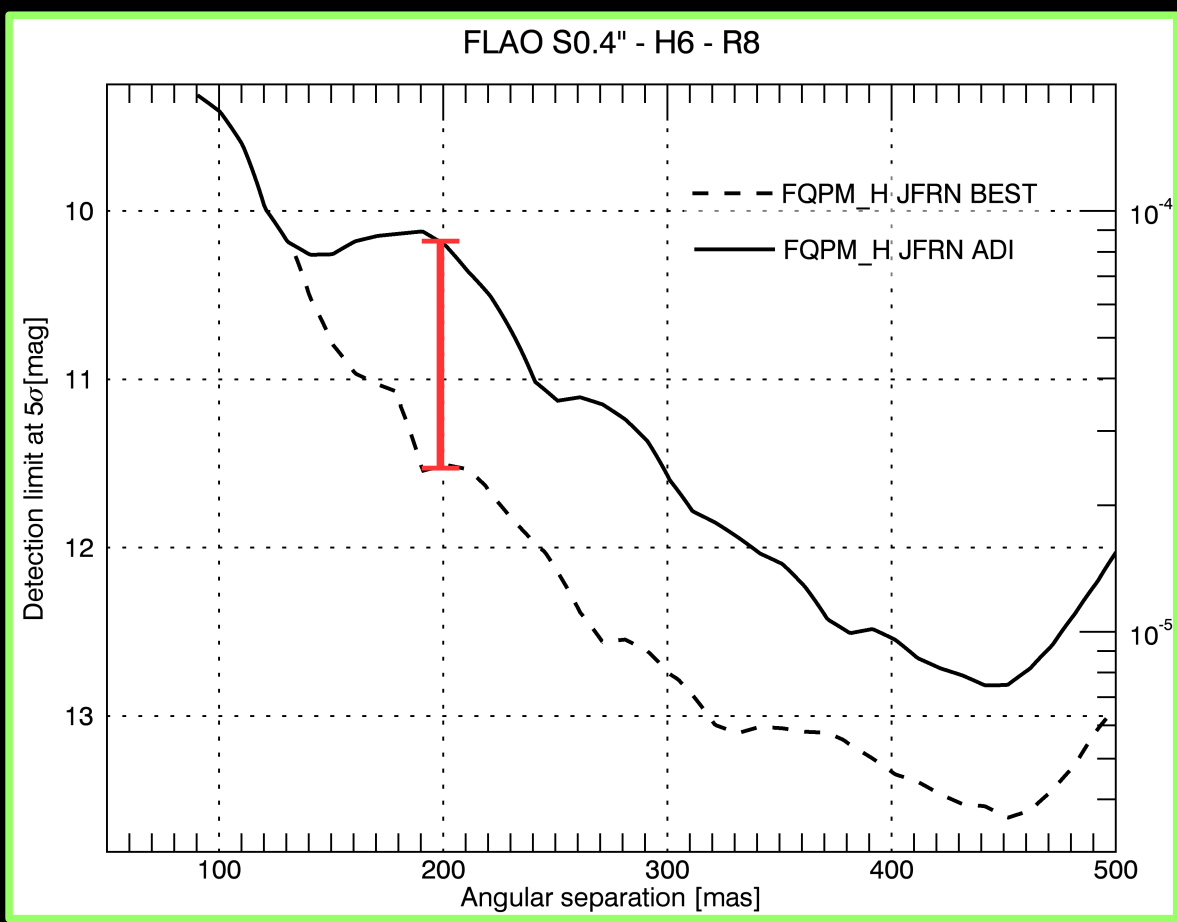
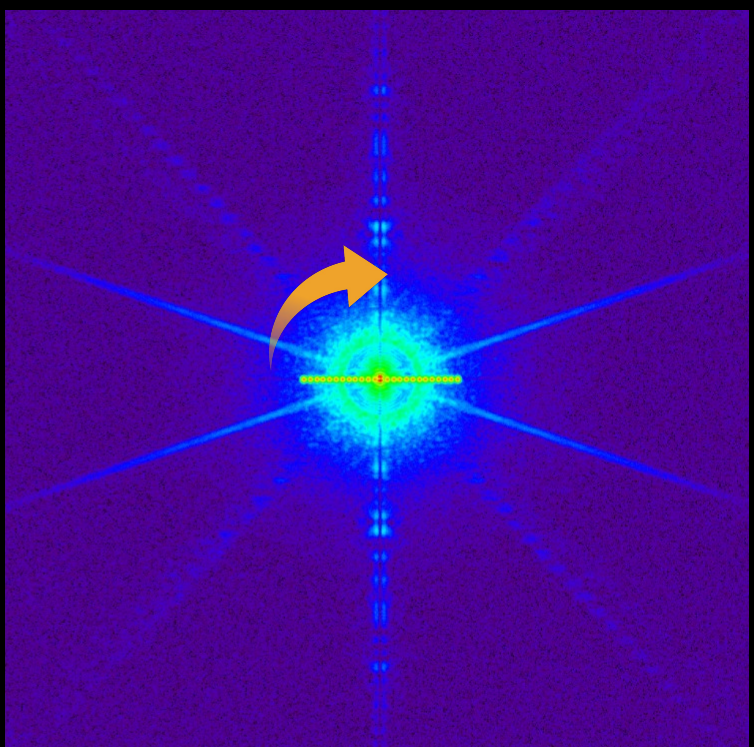
FQPM

LABORATORIO NAZIONALE  
ADONI  
OTTICA ADATTIVA

FQPM



IWA:  $2 - 2.5 \lambda/D$   
NOMINAL CONTRAST:  $5 \cdot 10^{-6}$   
Strehl: 73%





APP

LABORATORIO  
NAZIONALE  
**ADONI**  
OTTICA  
ADATTIVA

APP

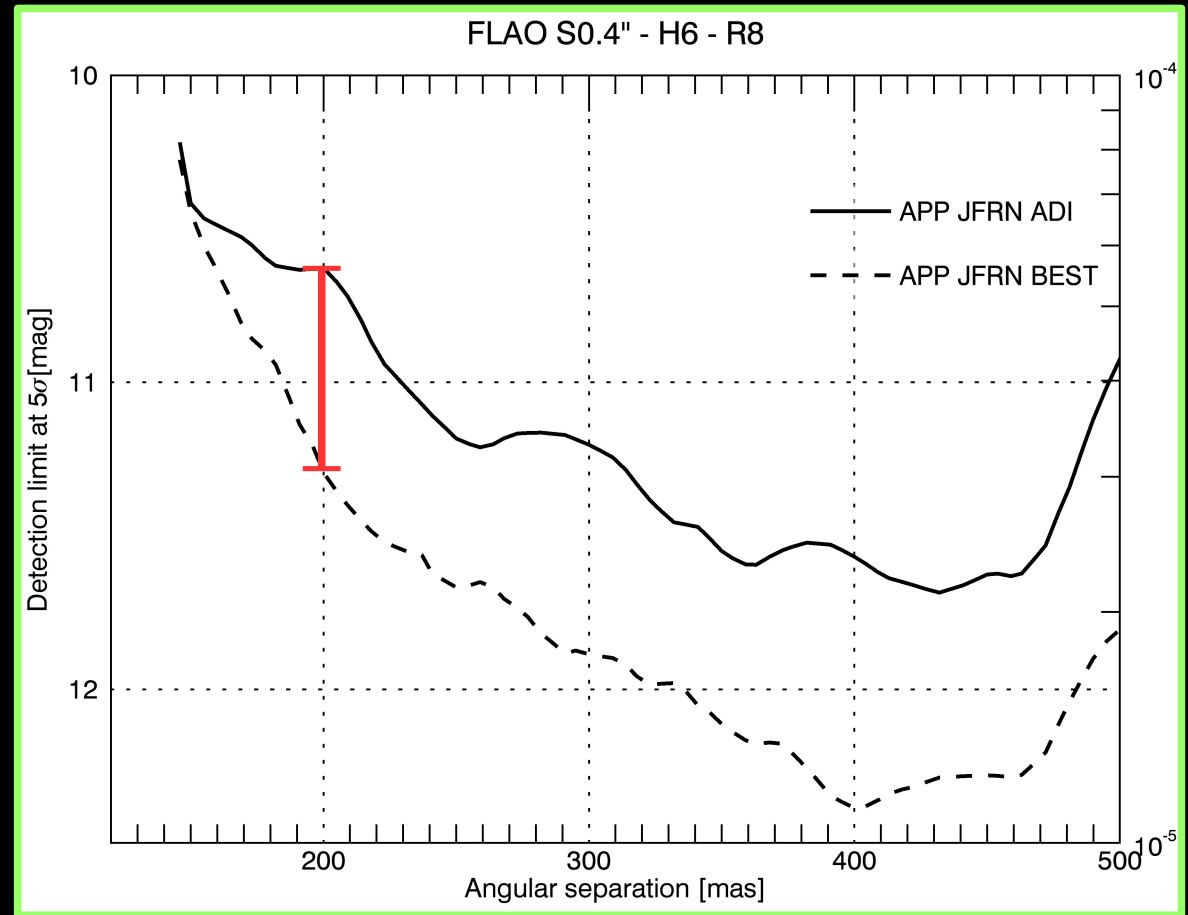
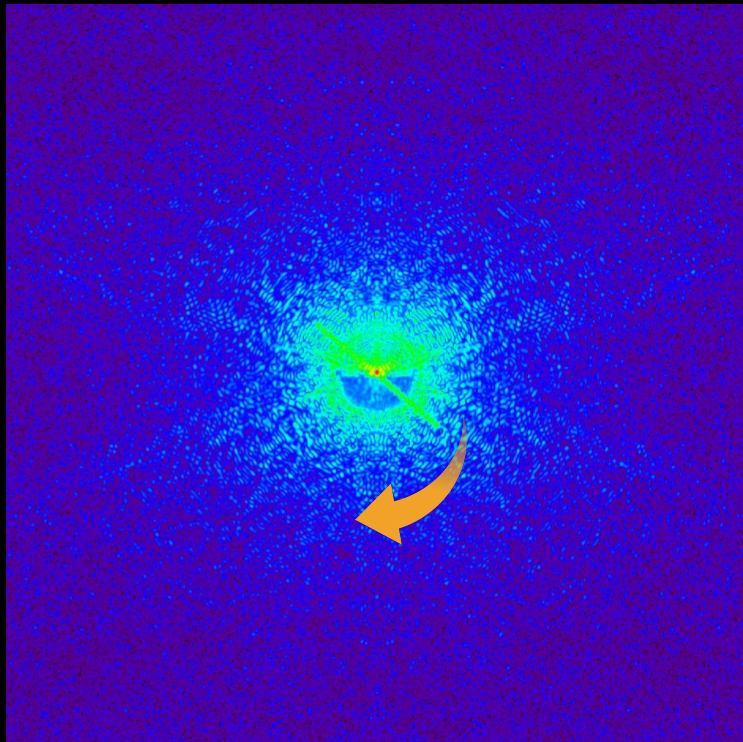


IWA:  $2.1 \lambda/D$

OWA:  $12 \lambda/D$

NOMINAL CONTRAST:  $10^{-5.8}$

Strehl: 73%





GAUSS

LABORATORIO  
NAZIONALE  
**ADONI**  
OTTICA  
ADATTIVA

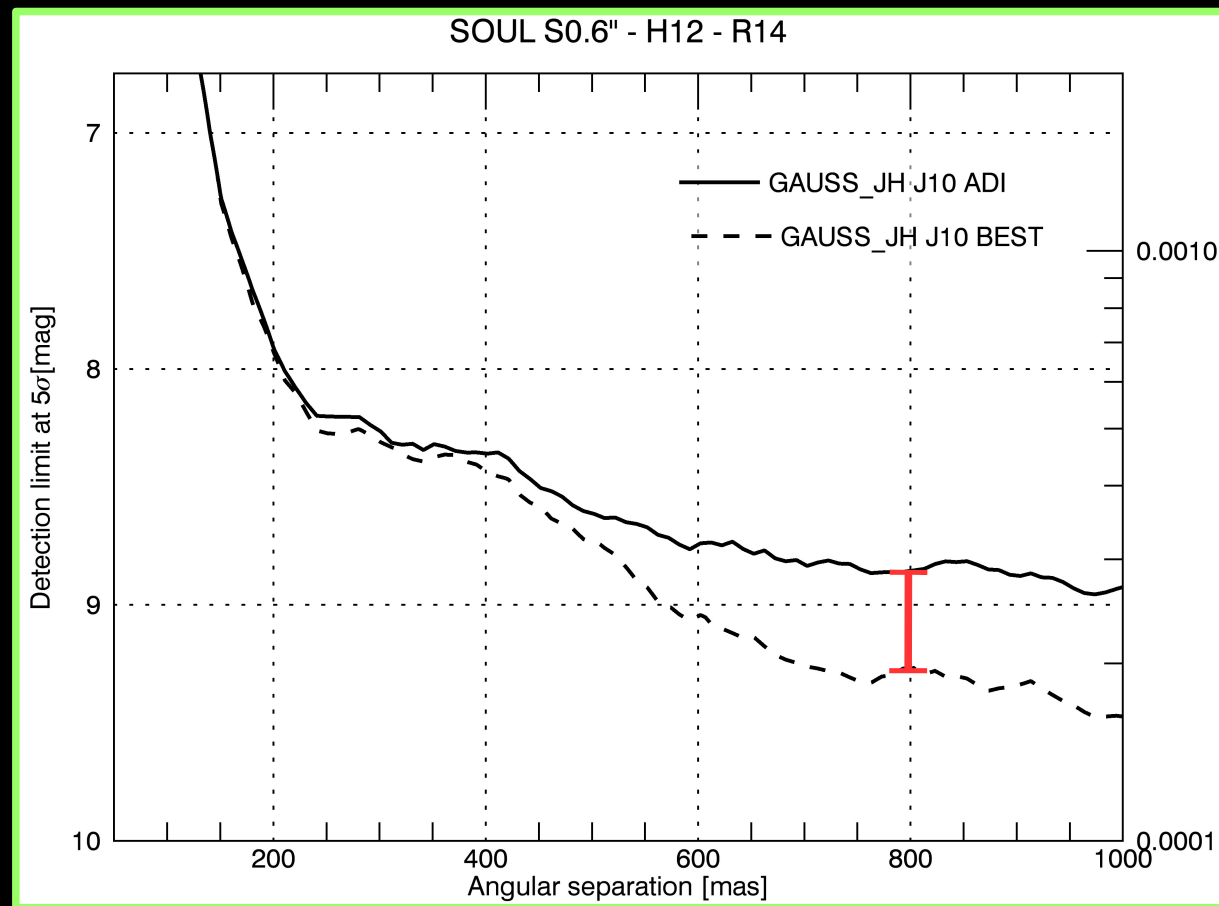
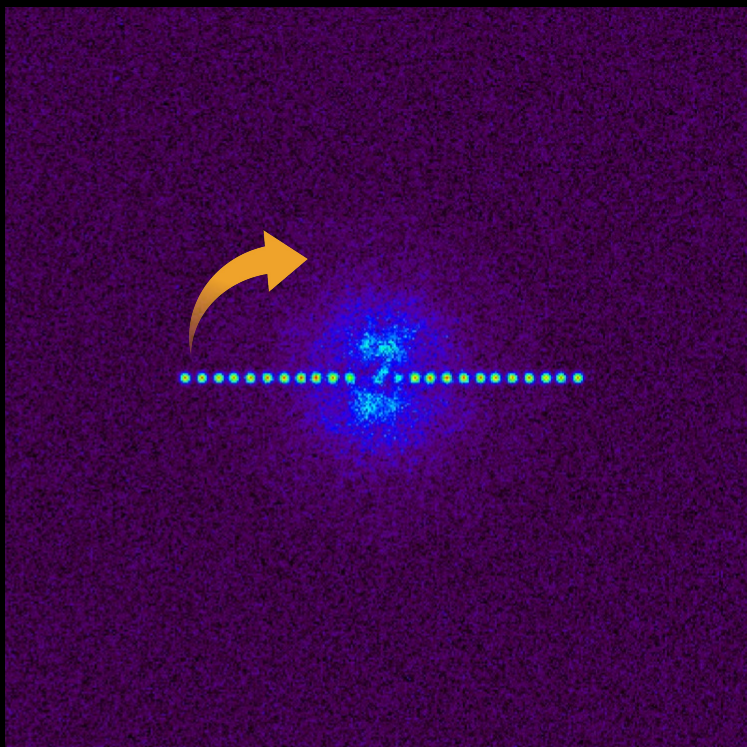
GAUSS



IWA:  $2-2.5 \lambda/D$

Nominal Contrast:  $10^{-5}$

Strehl: 50%





SP1

LABORATORIO  
NAZIONALE  
**ADONI**  
OTTICA  
ADATTIVA

SP1

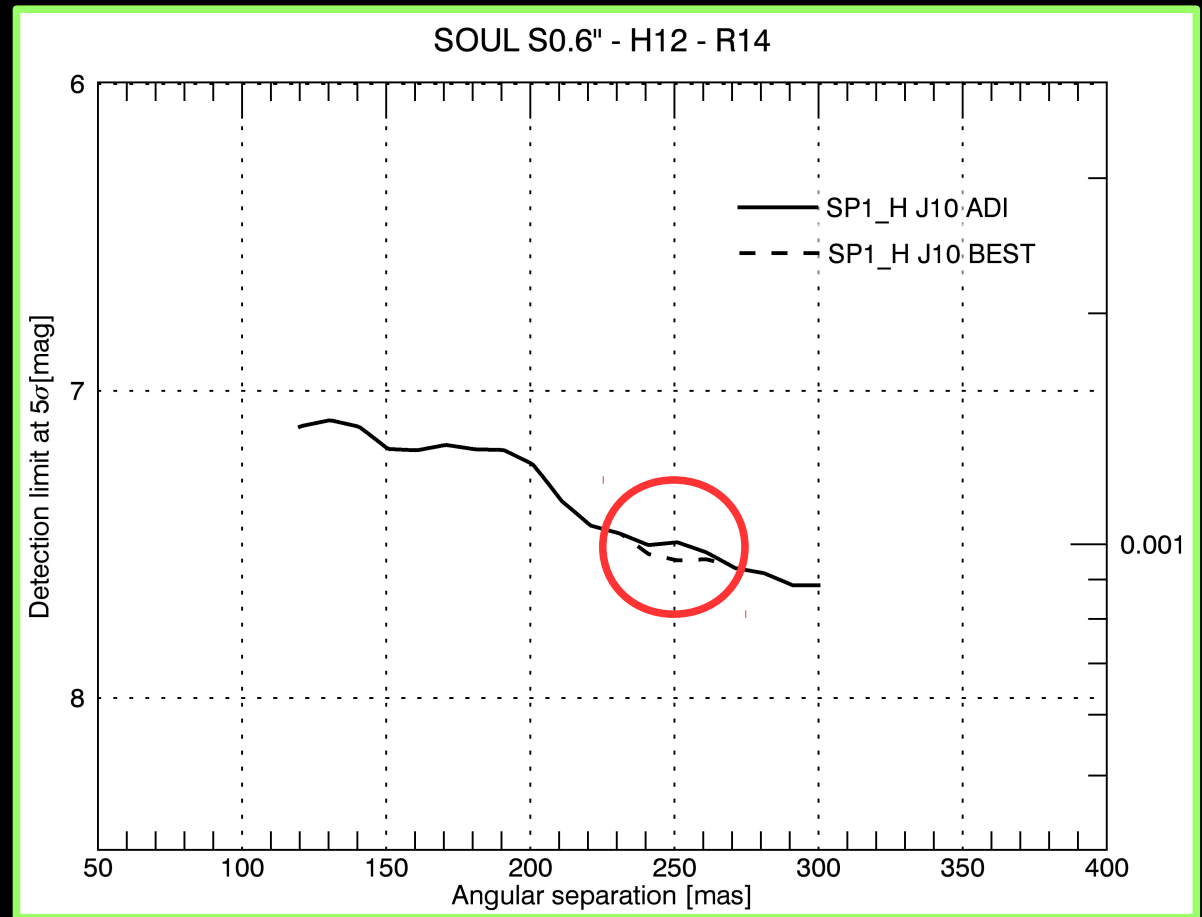
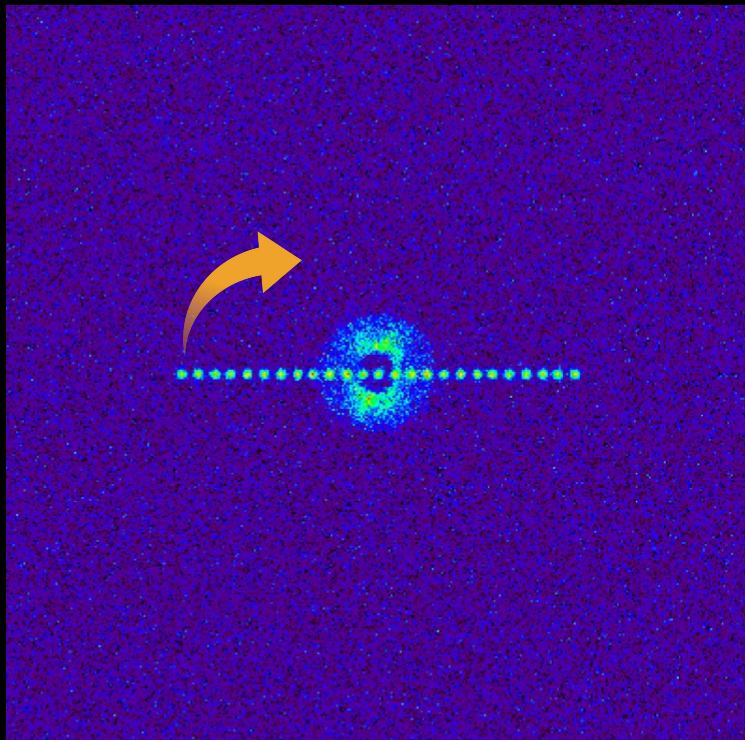


IWA:  $2.6 \lambda/D$

OWA:  $8 \lambda/D$

NOMINAL CONTRAST:  $10^{-5}$

Strehl: 50%







FQPM

LABORATORIO  
NAZIONALE  
**ADONI**  
OTTICA  
ADATTIVA

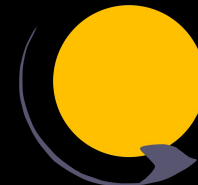
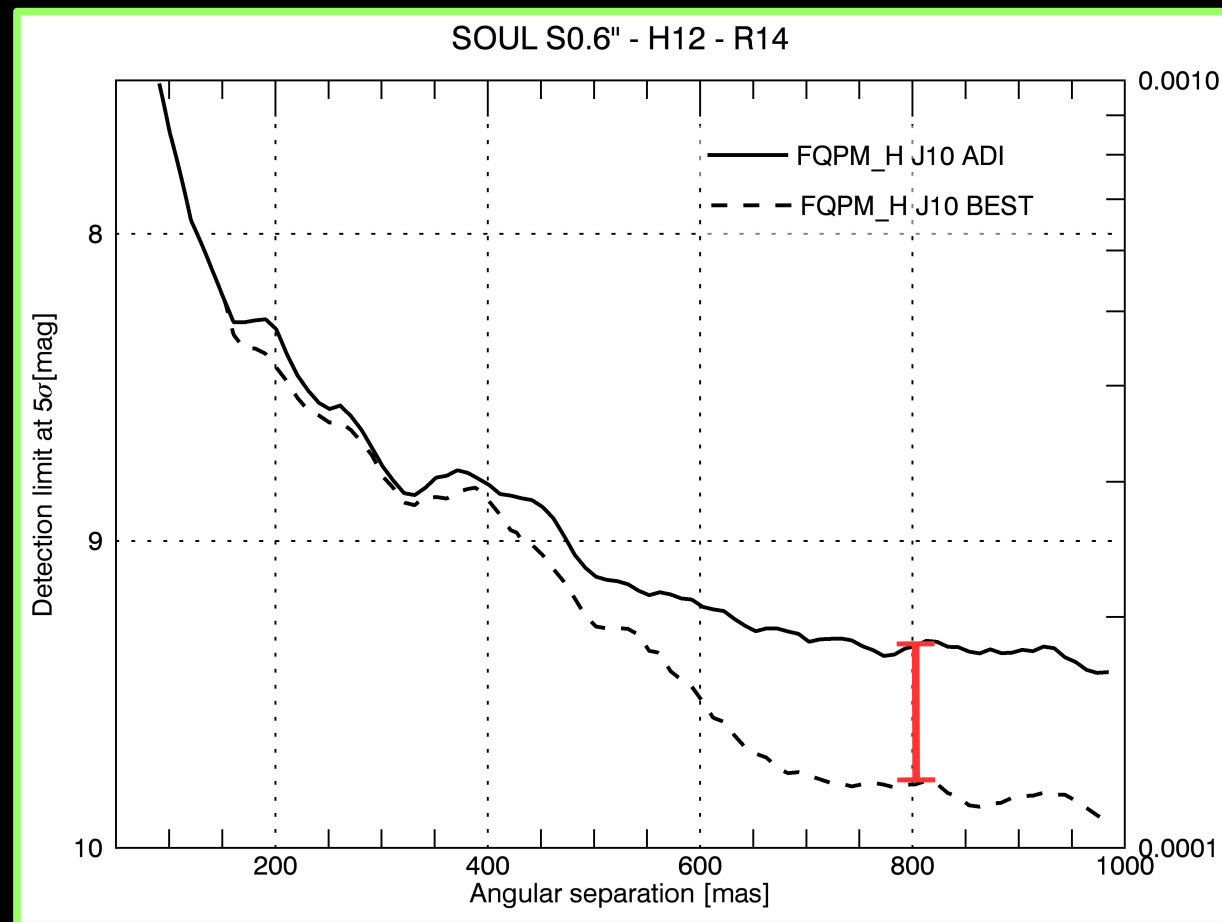
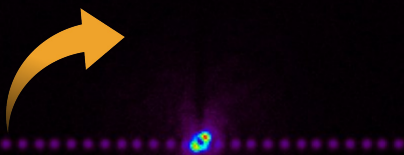
FQPM



IWA:  $2 - 2.5 \lambda/D$

NOMINAL CONTRAST:  $5 \cdot 10^{-6}$

Strehl: 50%





APP

LABORATORIO  
NAZIONALE  
**ADONI**  
OTTICA  
ADATTIVA

APP

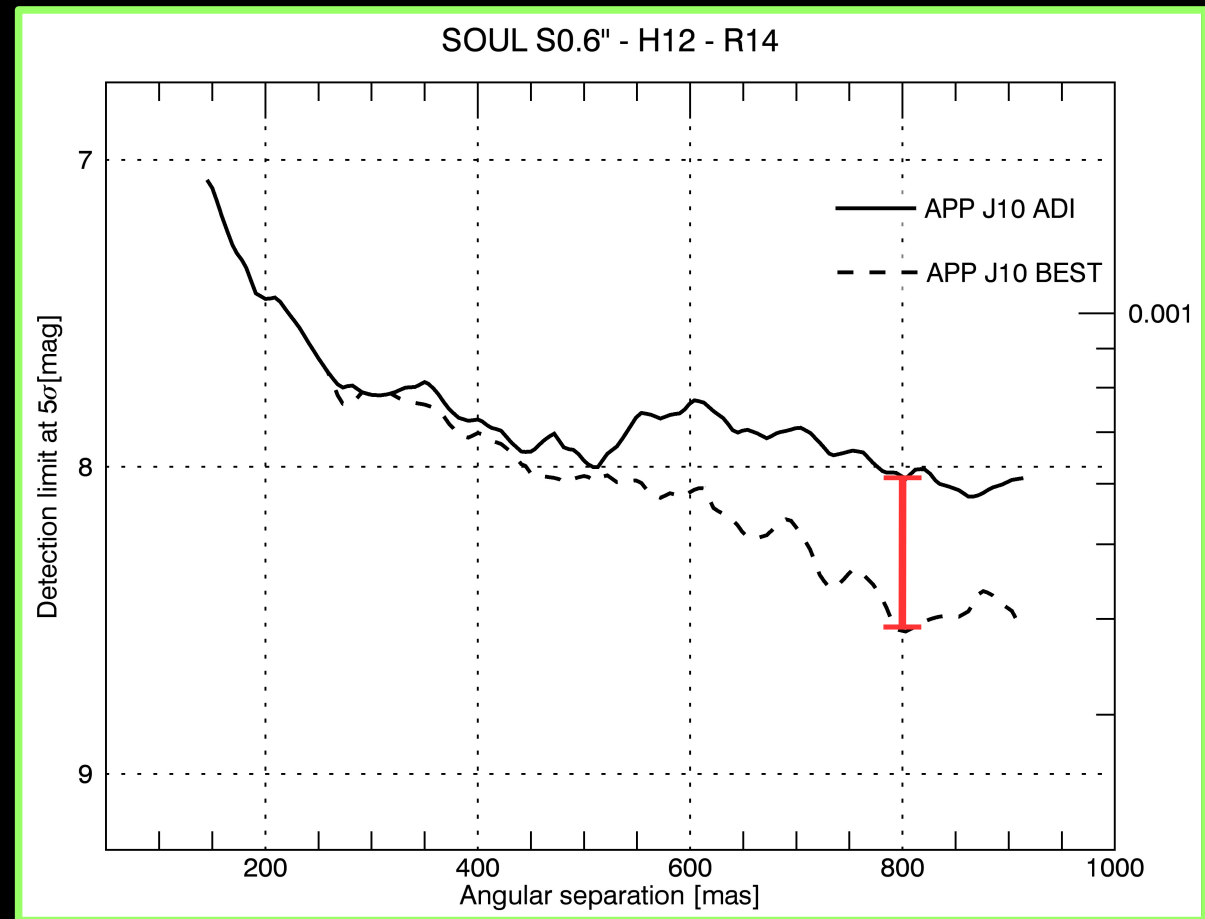
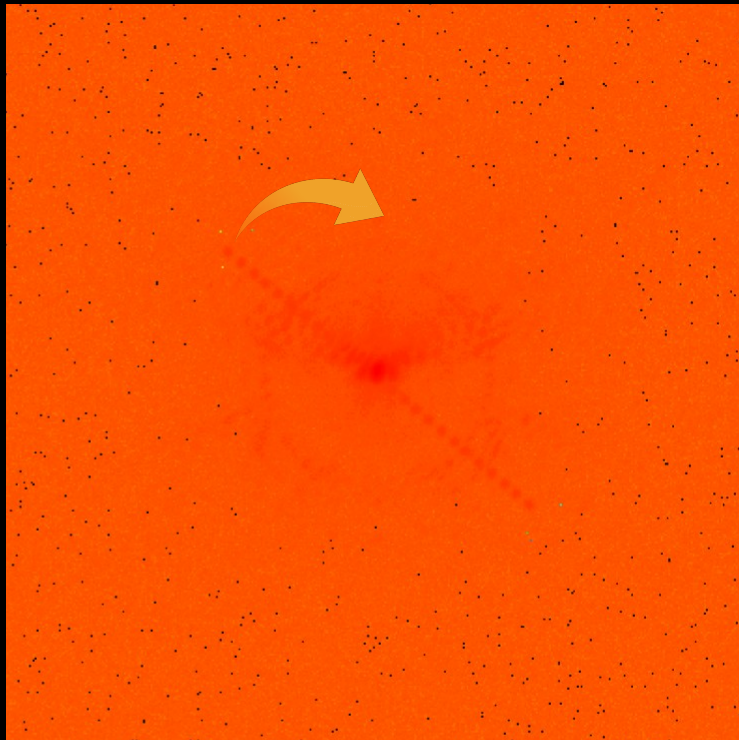


IWA:  $2.1 \lambda/D$

OWA:  $12 \lambda/D$

NOMINAL CONTRAST:  $10^{-5.8}$

Strehl: 50%





## CONCLUSIONI / WORK IN PROGRESS

- RISULTATI PIU' REALISTICI POSSIBILI!
- CANCELLAZIONE DELLA LUCE DEL PIANETA < 60%  
@200mas
- NUOVE MASCHERE DA TESTARE ... SEMPRE!! (v-APP ..)
- POST PROCESSING APP (E MASCHERE ASIMMETRICHE)  
→ DA PERFEZIONARE
- SIMULARE PIU' IMMAGINI / TESTARE SU IMMAGINI REALI
- DUAL BAND IMAGING .. SIM + POST PROCESSING!





LABORATORIO  
NAZIONALE  
**ADONI**  
OTTICA  
ADATTIVA



**GRAZIE A TUTTI!!**

