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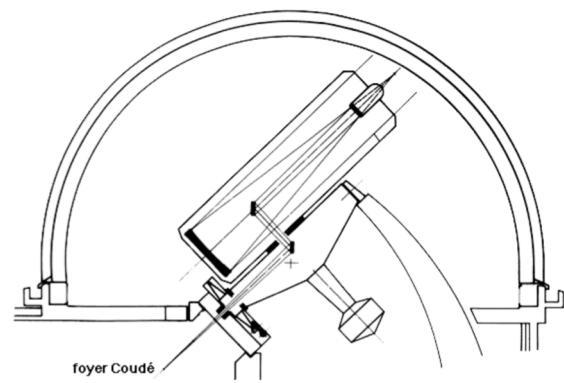


Provence Adaptive-optics PYramid RUn System

# First on-sky results

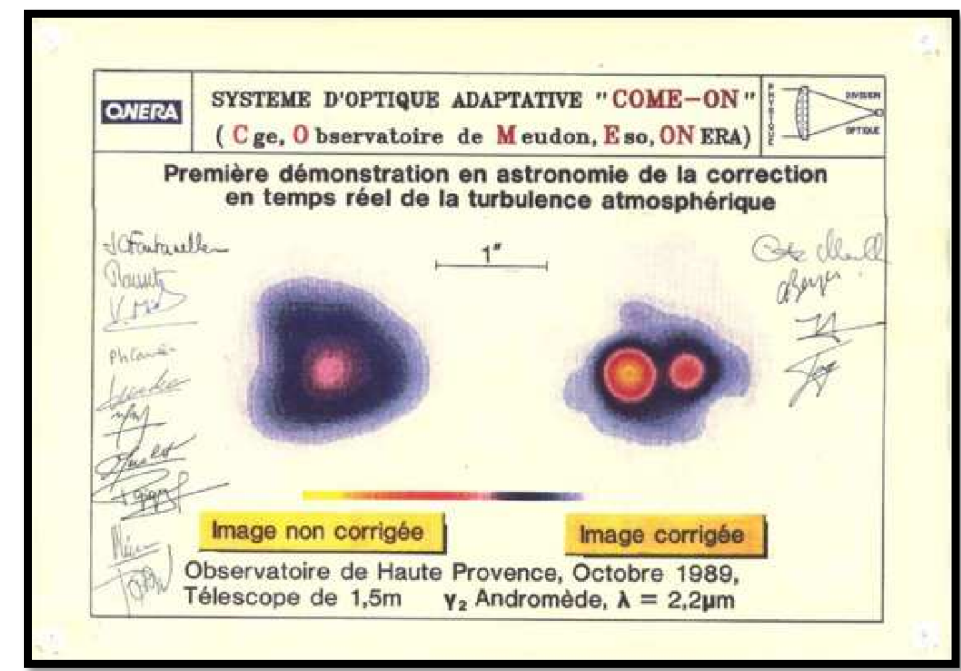


# Adaptive optics system on the T-152 at OHP



- ### T-152
- Coudé Focus
  - $f/D = 28$
  - Availability = 200 night / years
  - Median seeing: 2''

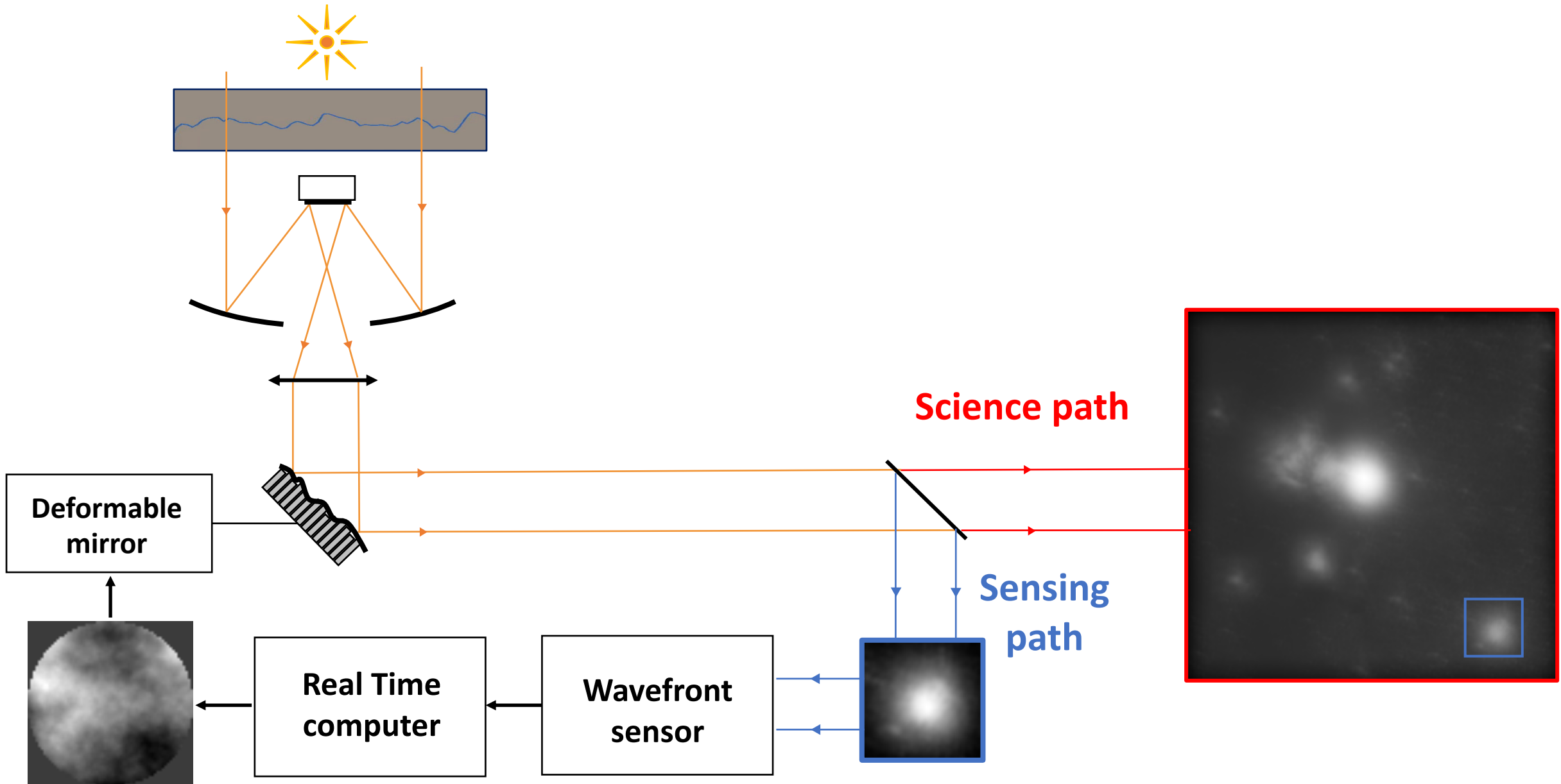
## 1989 : COME-ON



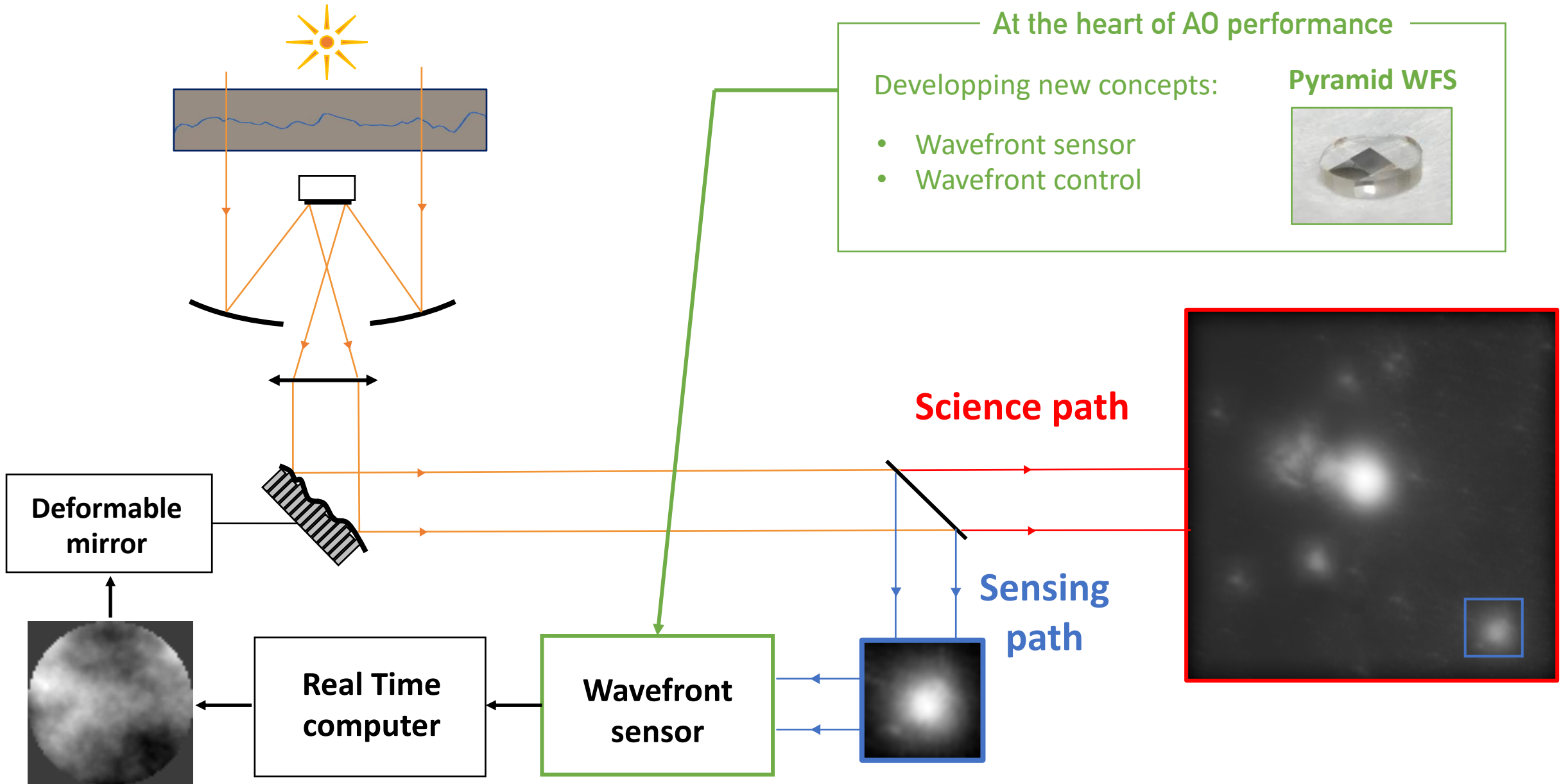
First astronomical AO corrected images !

19 actuators  
5x5 Shack-Hartmann

# A pyramid wavefront sensor on sky

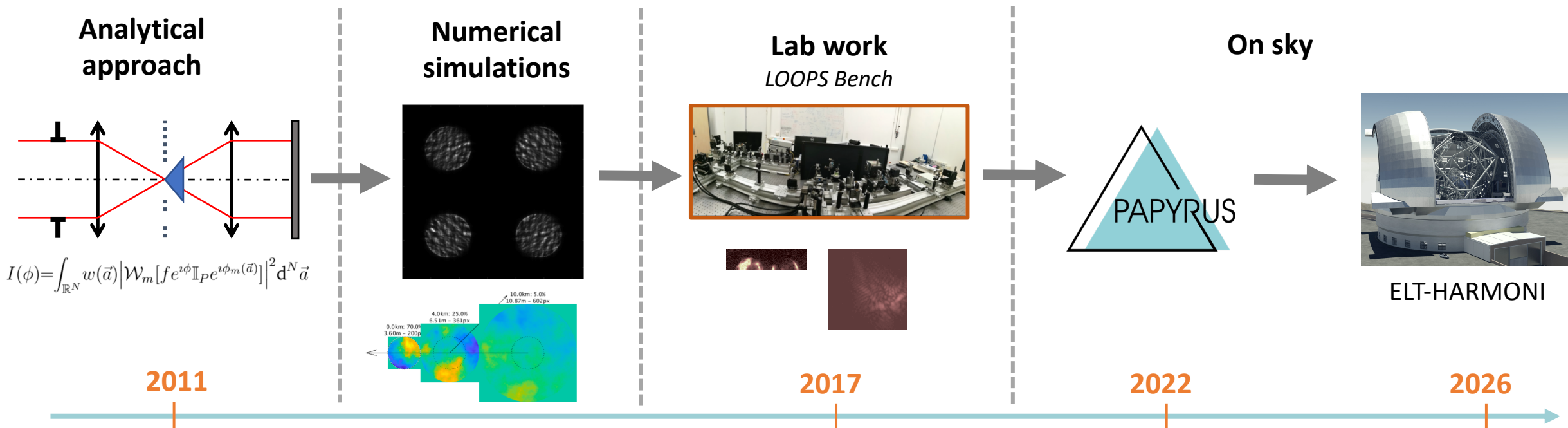


# A pyramid wavefront sensor on sky



## Instrumental R&D

- Test and demonstrate AO procedure with on-sky pyramid wavefront sensor
- Test new concepts of wavefront sensing and control
- Test new hardware : EMCCD camera, Deformable mirror, RTC, etc...



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## Educational

- Project developed and led by students: Ph.D., interns and Postdocs (kick-off: January 2020)
- Pedagogic purpose: to be used for summer school at OHP

*1<sup>st</sup> pedagogical Pyramid bench in the world*

## Astronomical

- High angular resolution back at OHP (80 mas in the visible)
- Possibility to add new instruments: coronagraph, spectrometer, etc...
- A lot of available nights: **PAPYRUS will be soon open to community !**

# PAPYRUS optical layout

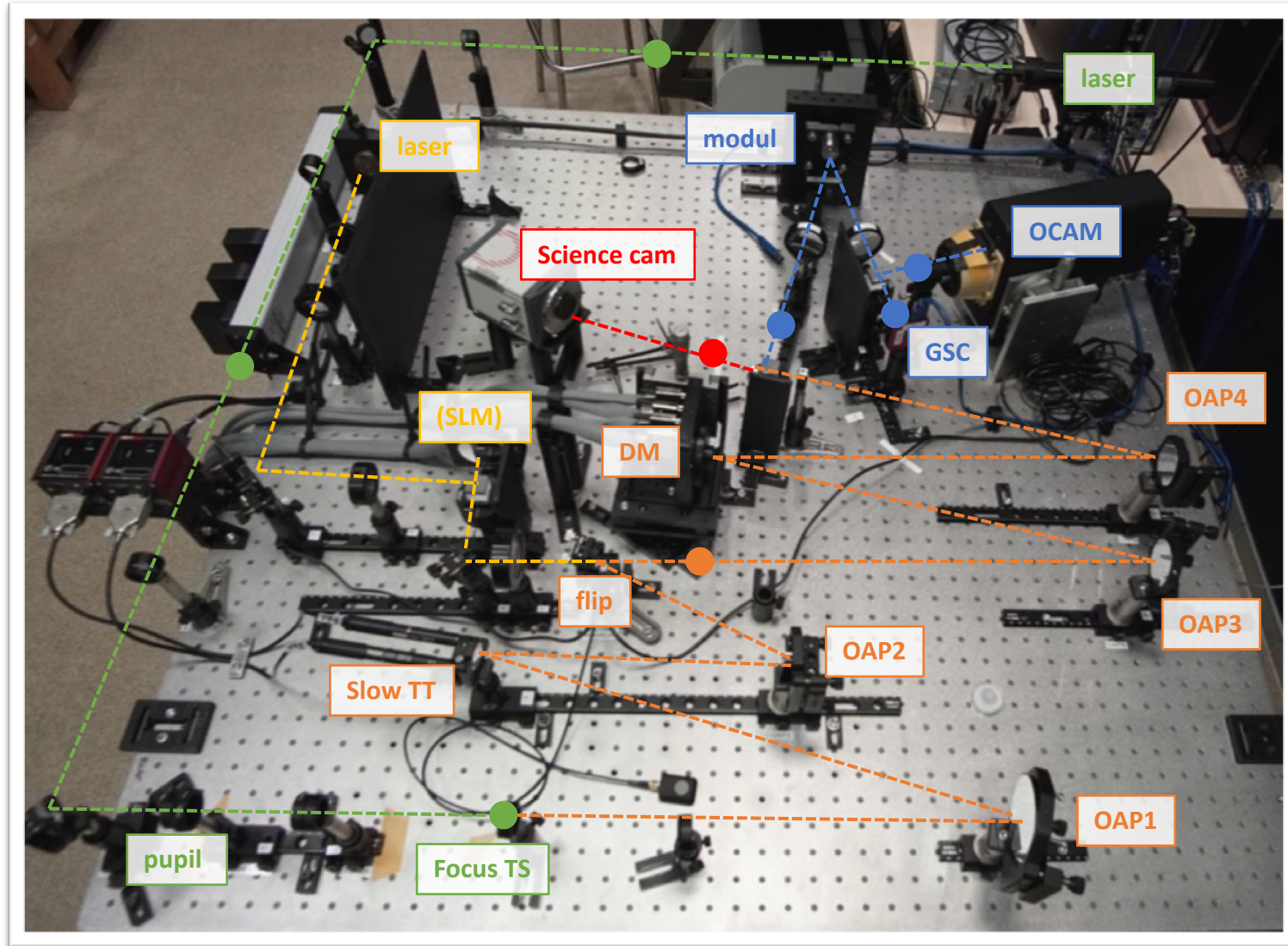


ALPAO - 17x17

Median  $r_0(550 \text{ nm}) = 5 \text{ cm}$



1 actuator for  $2 \times r_0$



FLI - EMCCD

### LEGEND

- Telescope simulator
- Common path
- Sensing path
- Science path
- Calibration unit

120 cm



—— First light at OHP: June, 07th – June, 17th ——



Papyteam at the end of the mission



PAPYRUS re-alignment



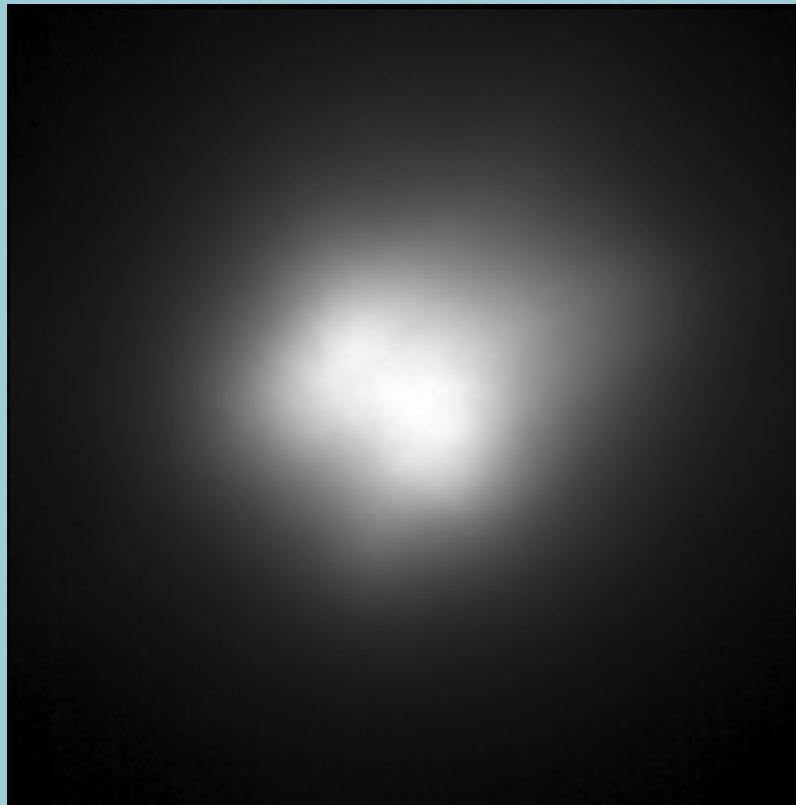
Unmounting  
PAPYRUS at LAM





—— First light at OHP: June, 07th – June, 17th ——

Strehl Ratio = 0.3%



Strehl Ratio = 15%



Véga  
—  
mag = 0

Loop frequency = 500 Hz

$\lambda = 635 \text{ nm} - \Delta\lambda = 40 \text{ nm}$

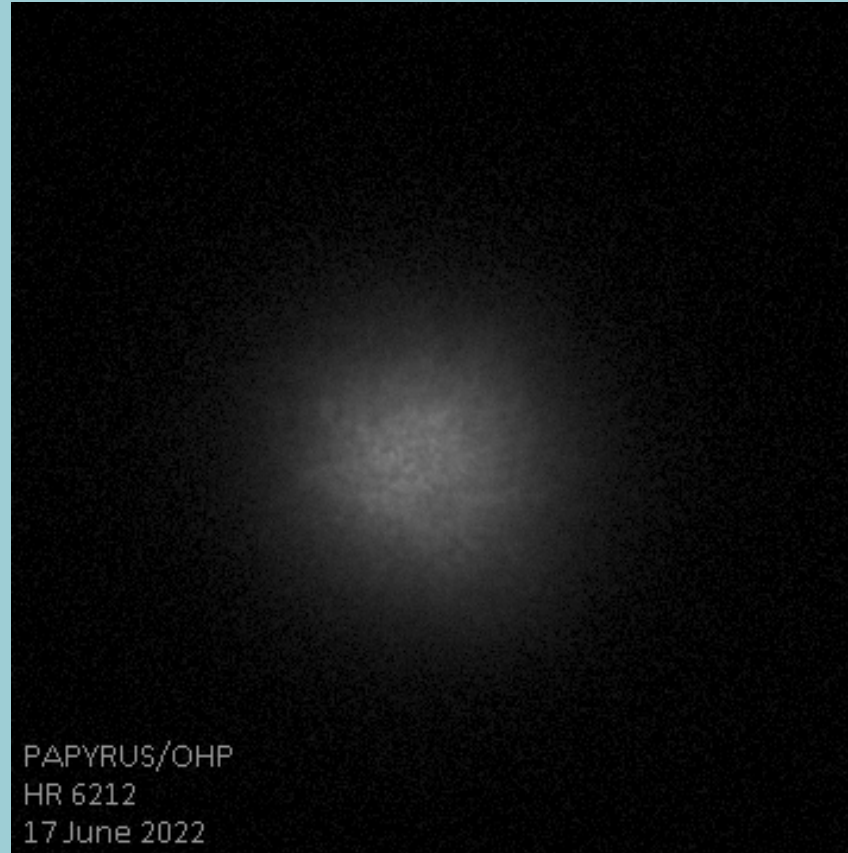


# First light at OHP: June, 07th – June, 17th

Close loop on Binary star

HR 6212

- mag1 = 2.95
- mag2 = 5.4
- separation = 1.6"



Loop frequency = 500 Hz

$$\lambda = 635 \text{ nm} - \Delta\lambda = 40 \text{ nm}$$

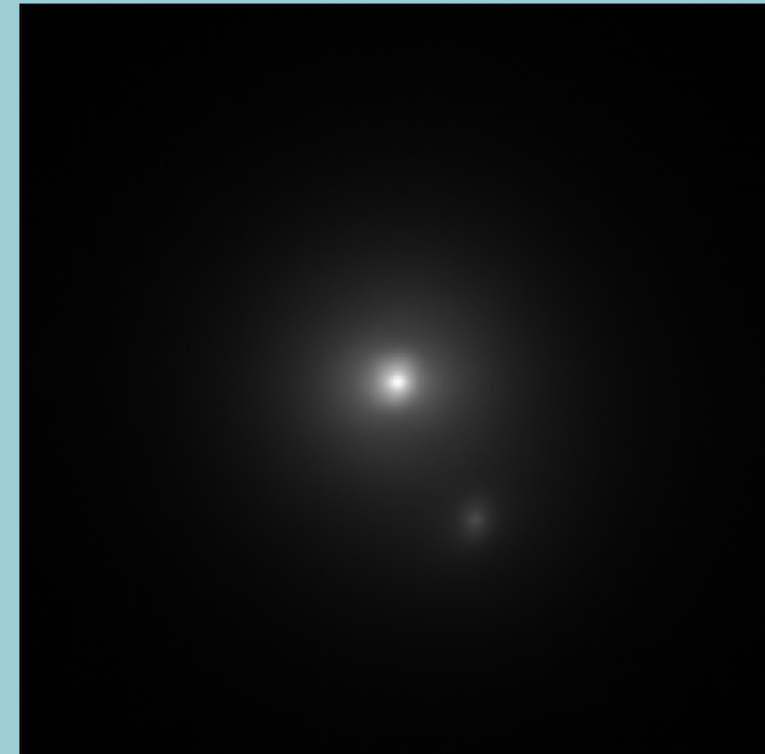
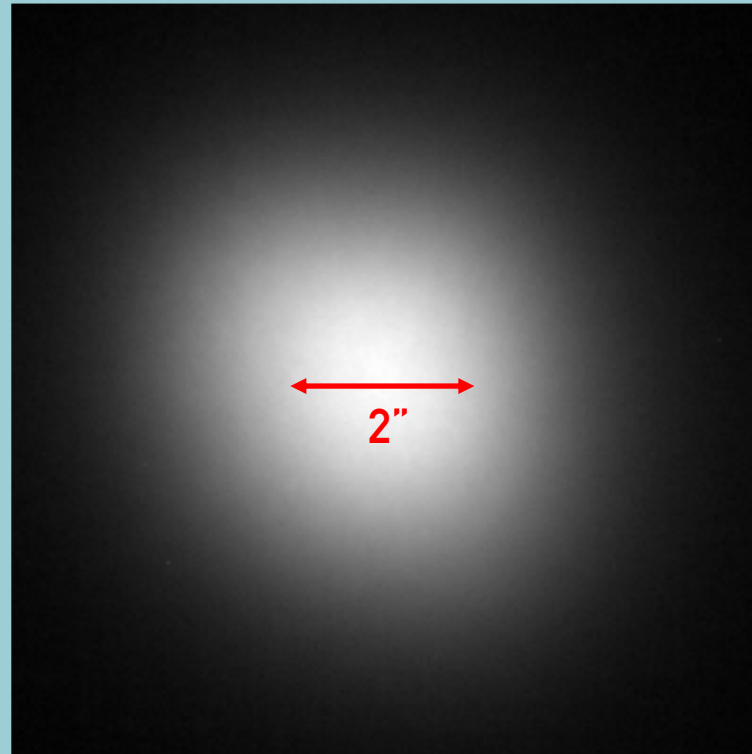


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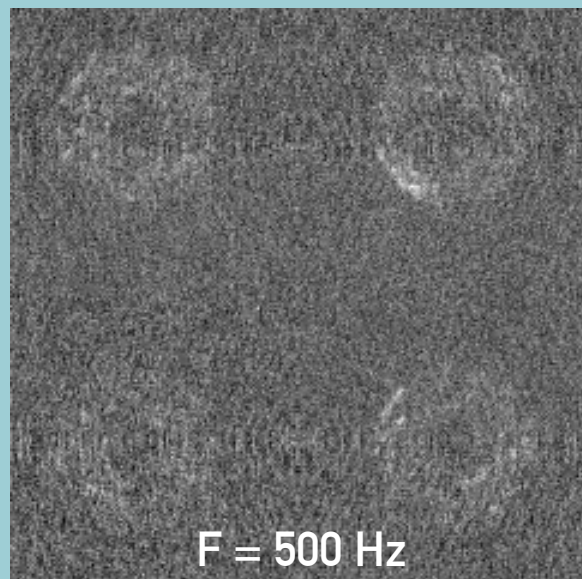
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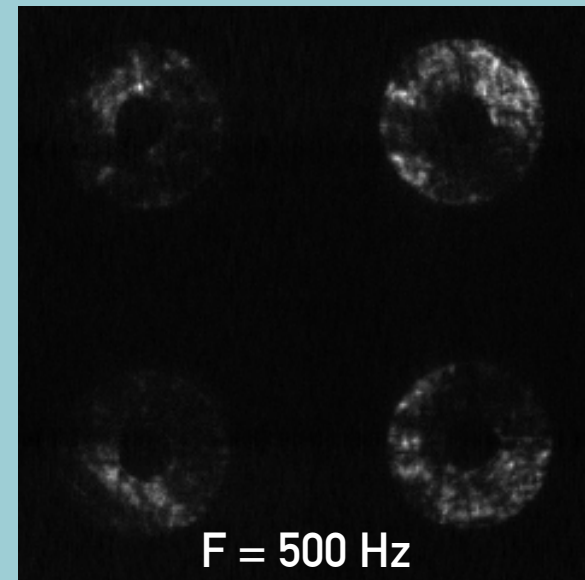
Arcturus  
mag = 0.86



F = 500 Hz



Electron  
multiplying ON



F = 500 Hz



Long exposure PSF



## Short-term

- Increase temporal performance: ALPAO RTC
- Turbulence generator (SLM) in Calibration Unit
- Improve instrument throughput

## Mid/long-term

- Test WFS control algorithms developed at LAM
- Add WFS branch: Shack-Hartmann
- Welcome new science instruments

ALPAO RTC

PAPYRUS





Thanks for listening