

# Prototype of a laser guide star wavefront sensor for the ELT



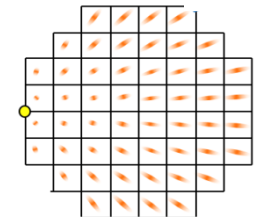
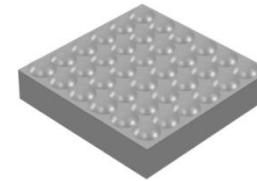
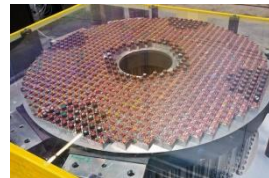
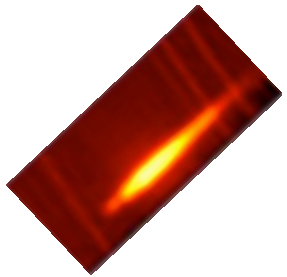
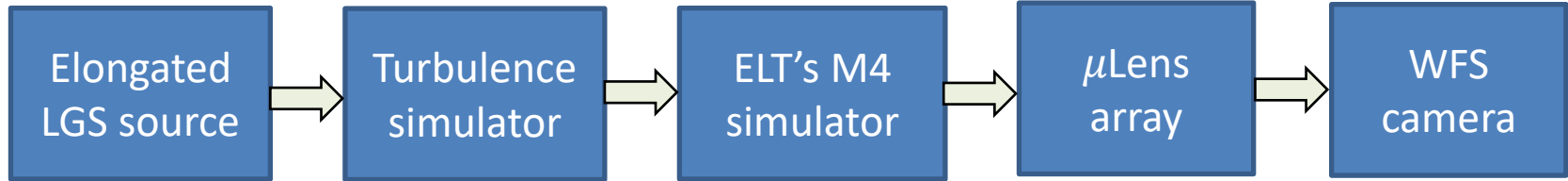
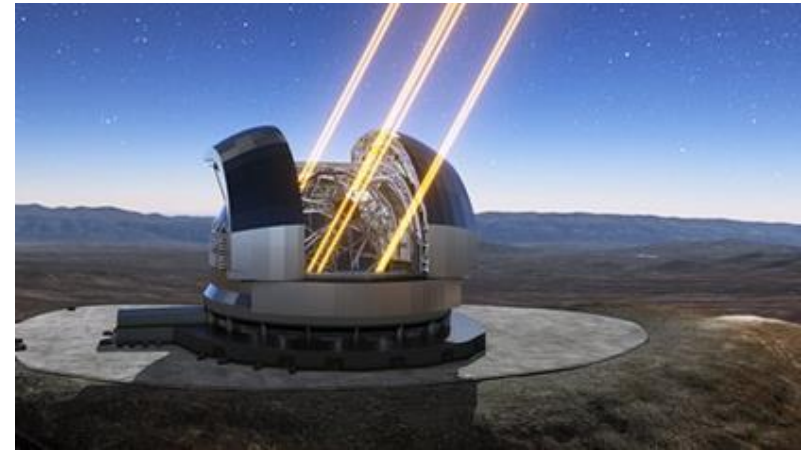
Zibo KE – PhD candidate

14/10/2020    zibo.ke@lam.fr

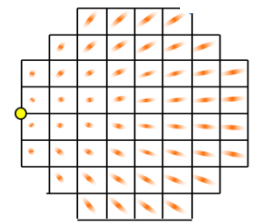
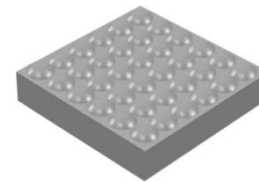
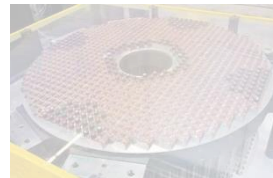
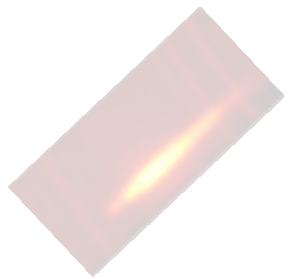
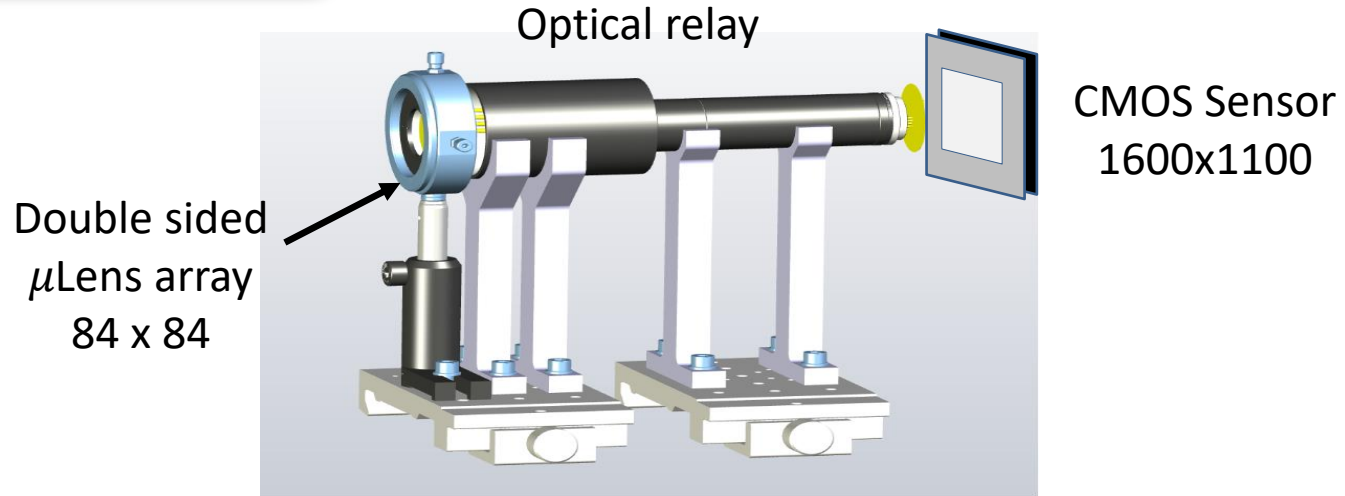
A. Costille, K. Dohlen, K. El Hadi, T. Fusco, J.L. Gach, B. Neichel, F. Pedreros

# Motivation

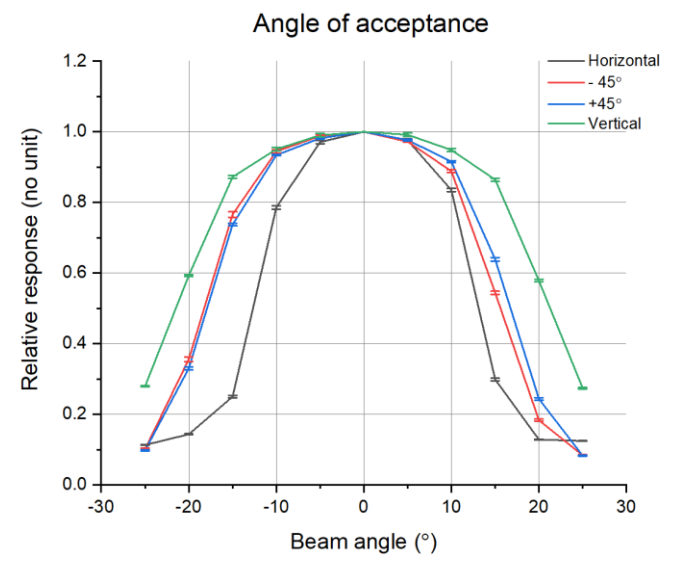
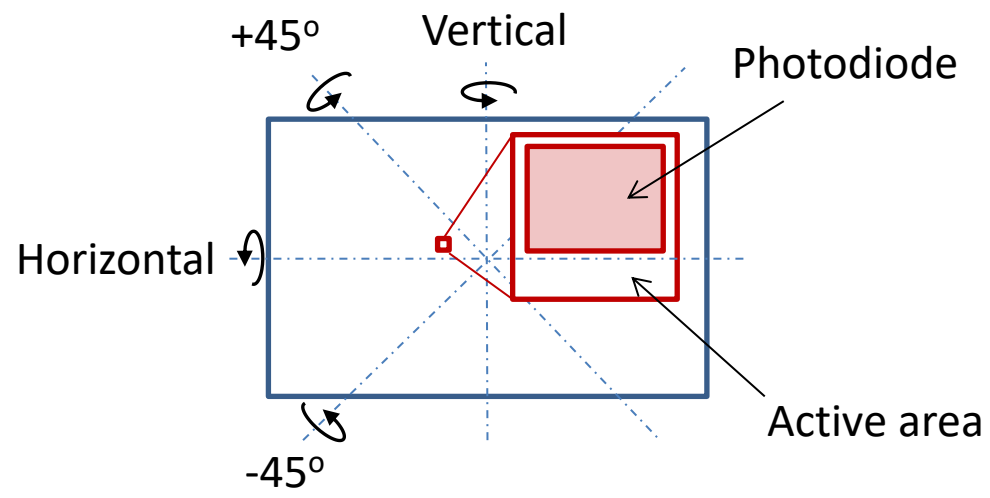
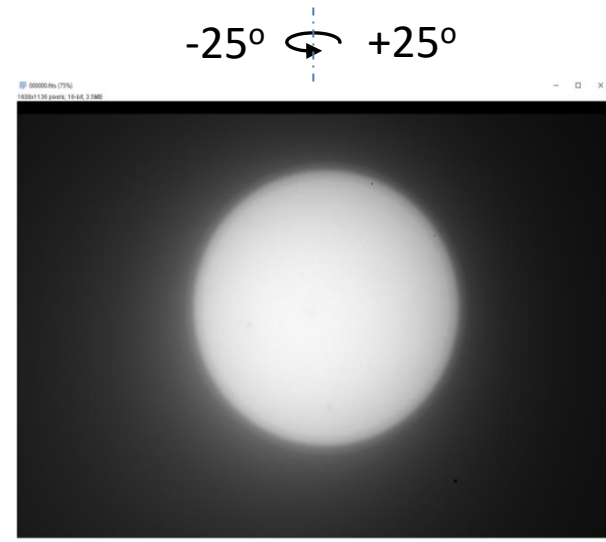
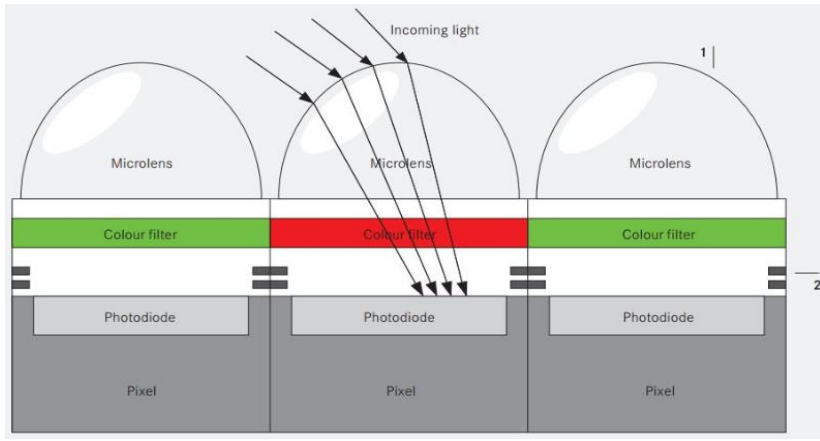
- ❑ Develop a prototype to experimentally validate a full-scale version of a LGSWFS for the ELT



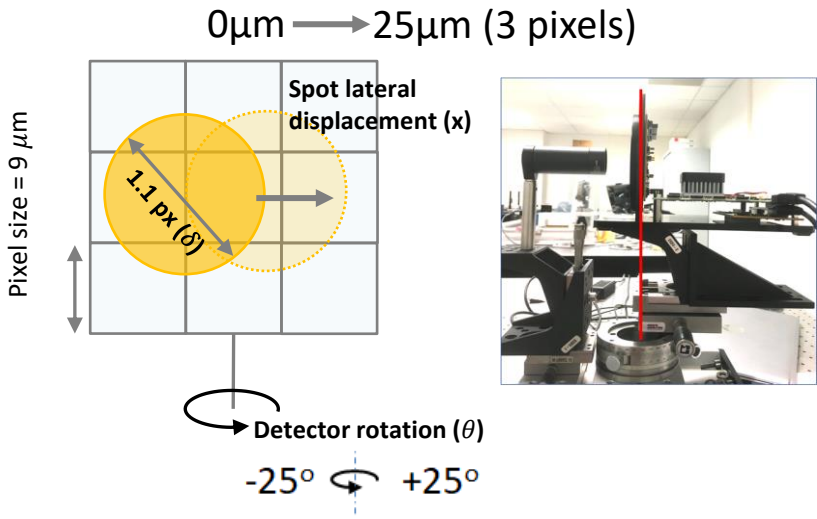
# Present status



# Angle of acceptance



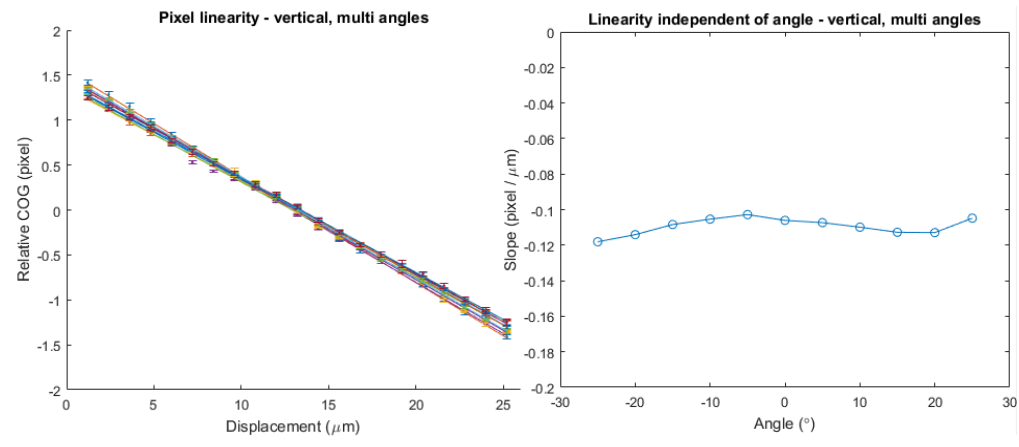
# Spot center of gravity



Measurement of Center of Gravity (CoG) as a function of spot lateral displacement (x), detector rotation (θ), and spot size (δ).

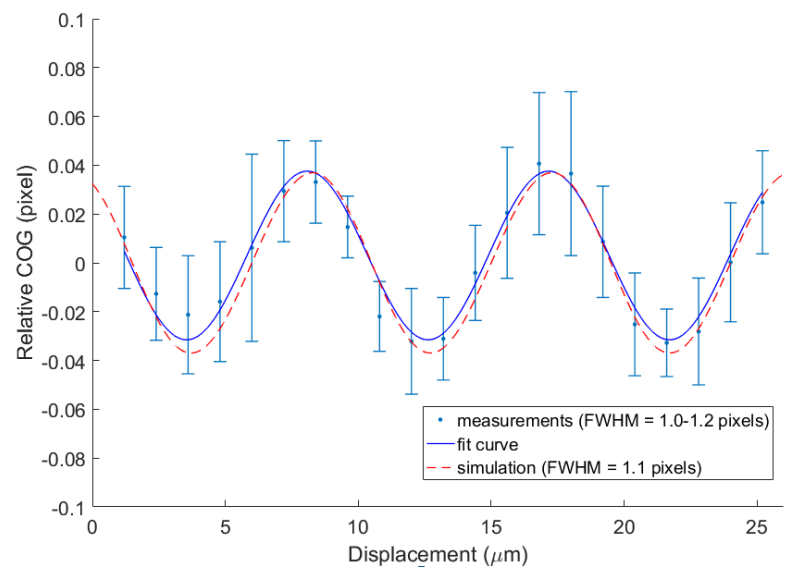
$$\text{CoG}(x; \theta, \delta) = \underbrace{A(\theta) x + B(\theta)}_{\text{Linear fit}} + \underbrace{\alpha(\delta) \sin(\beta x + \gamma)}_{\text{Residuals}}$$

## COG

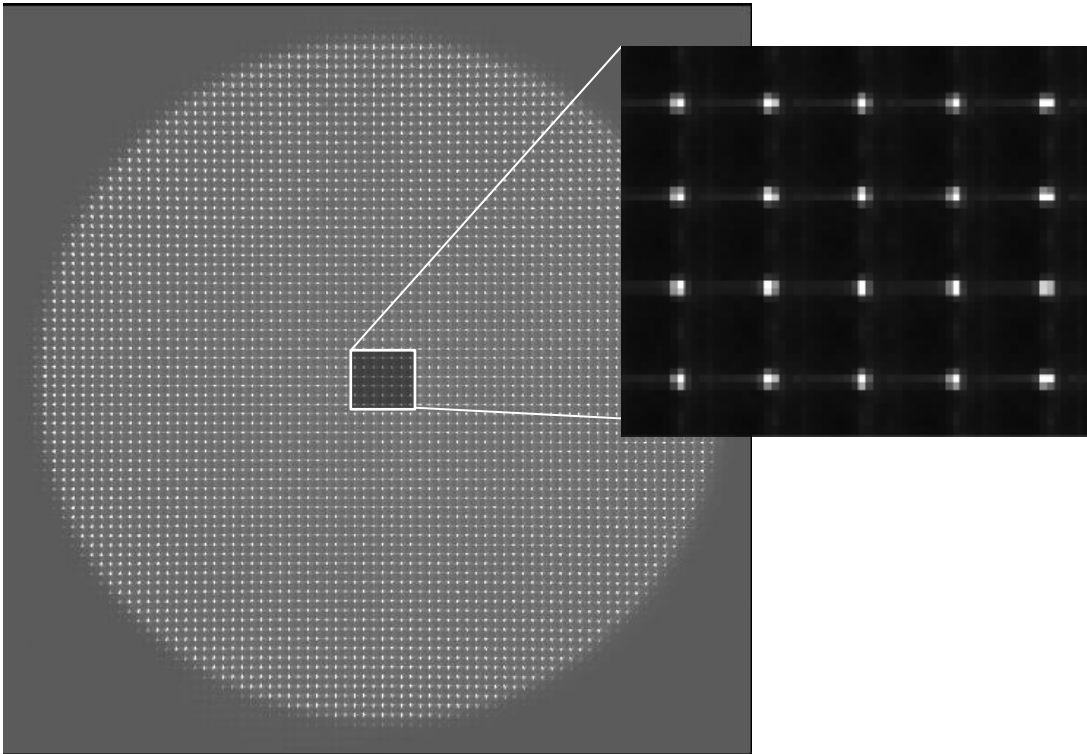


## Residuals

Centroid gain variations - vertical, rotation angle = 0°



## WFS Camera: $\mu$ Lens array

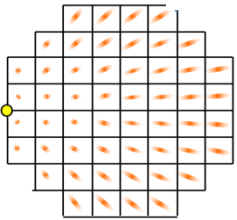


### Preliminary results

- ❑ 13 pixels per subaperture
- ❑ Spots  $\sim 1.5$  px FWHM

## Conclusion

WFS  
camera

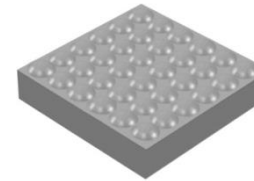


Noise analysis

Angle of  
acceptance

Spot CoG

$\mu$ Lens  
array



Optical relay

Cosmetic

Measurements done so far are fully compatible with HARMONI LTAO specifications

## Outlook

Elongated  
source

2020.11

Fully integrated  
and tested

2021.1

Validation of WFS  
models

2020.3



## Centroid gain variations - vertical, multi angles

