# In-flight calibration

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# In-flight calibration: motivations

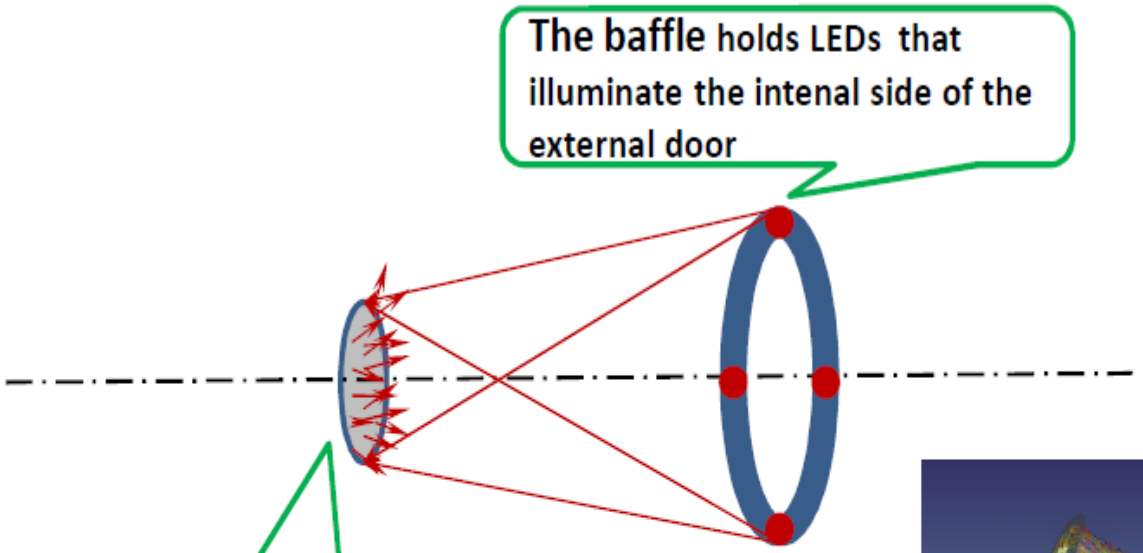
This operation is required to check:

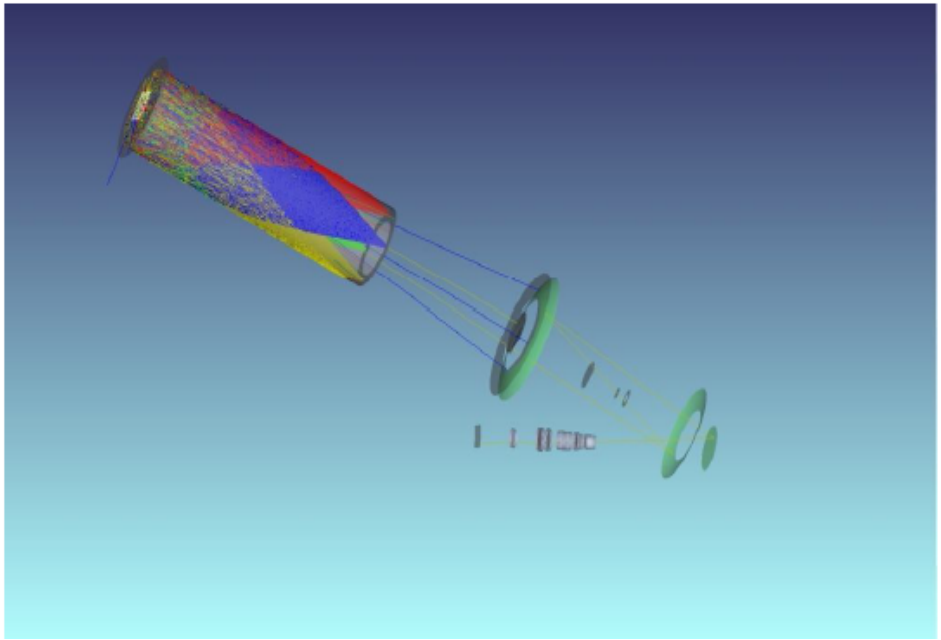
- Flat-field (vignetting) of the detector during the whole mission
- Stability of th e LCVR during the whole mission
- IO alignment check (single point failure) during ground tests & the whole mission

The concept is to illuminate the back side of the external door during the non operative time of the mission while the door is closed and the coronagraph turned off.

This operation can be performed by LEDs set on the fist baffle of the boom.

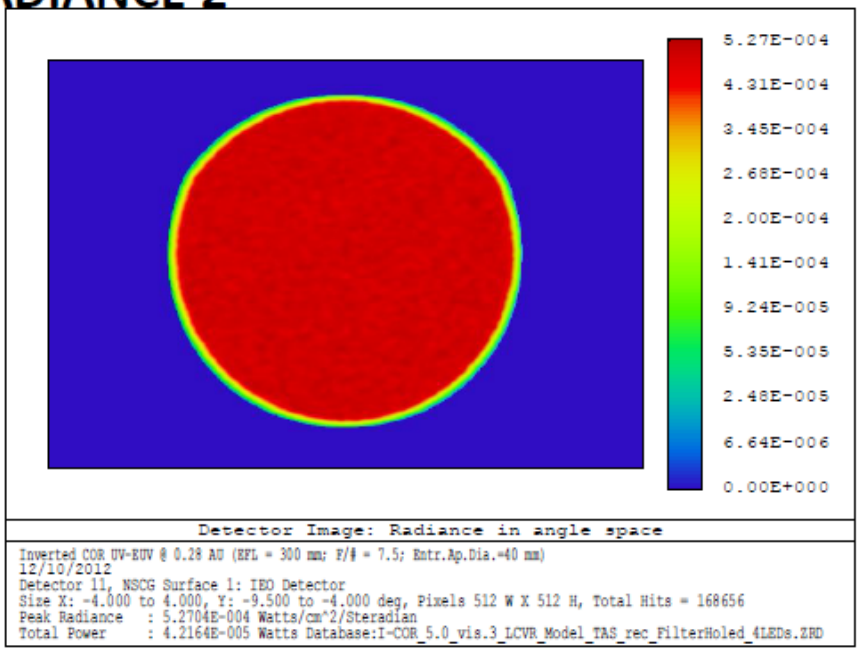
# METIS: the spectroscopic channel (1/3)

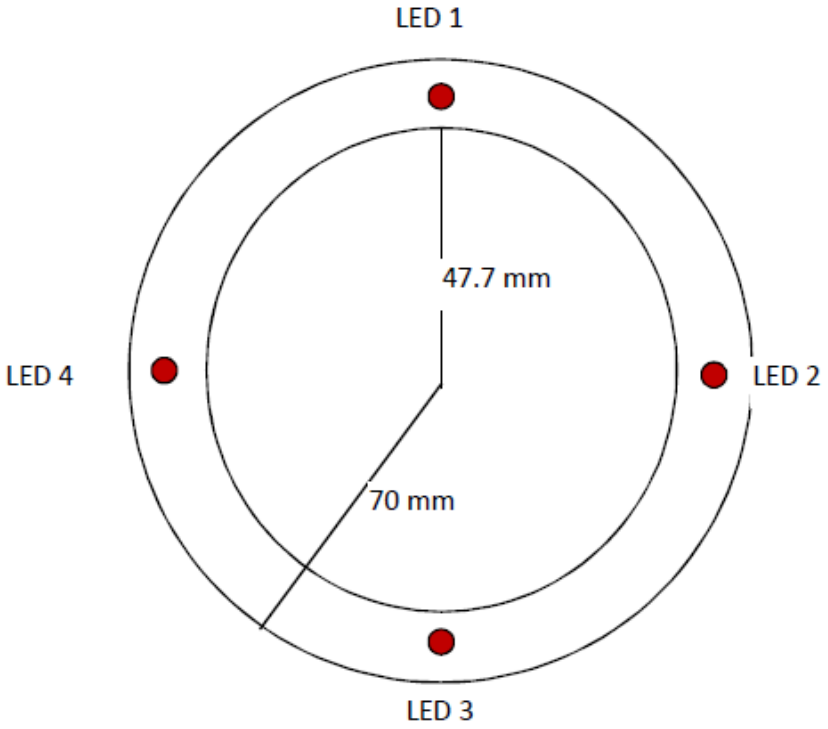


# METIS: the spectroscopic channel (1/3)

**RADIANCE 2**




For each LED the suggested emitted cone is int an angle of 10°.
Smaller angles causes not uniformity of illumination of IEO diffuser.
Bigger angles can cause stray ligh

# METIS: the spectroscopic channel (1/3)

**Simulations**

**Souces**
Power: 1.0E-3 W (each LED) → 4.0E-3 W tot
Solid angle apex: $2\vartheta \approx 10°$
Polarization : linear on y axis (Jy)

**Detector 1**
On M2 hole: 5.5E-7 W total flux of polarized light into the feld of view of ±3°.

**Detector 2**
On VL focal plane: 4E-8 W total flux of polarized light.

# METIS: the spectroscopic channel (1/3)

## Conclusion

Considering a beam at λ= 550 nm a total flux of 4E-8 W in the VL detector lead to a flux of: (energy of visible-light photon: $3 \cdot 10^{-19}$ Joule )

$$4E-8W \rightarrow 2 \cdot 10^{5} \frac{photons}{pixel \cdot s}$$

Considering:
2048 × 2048 pixels
50% reflecting optics (M1, M2 & filter) efficiency
30% Polarimeter optics efficiency
80% detector efficiency

$$\boldsymbol{flux = 2.4 \cdot 10^{4} \frac{photons}{pixel \cdot s}}$$

That is about $10^4$ $e^-$/s/pixel
Within the full well capacity of the detector

**A more accurate calculation of the LEDs power can be carried out once the material and finish of the external door back side will be known.**