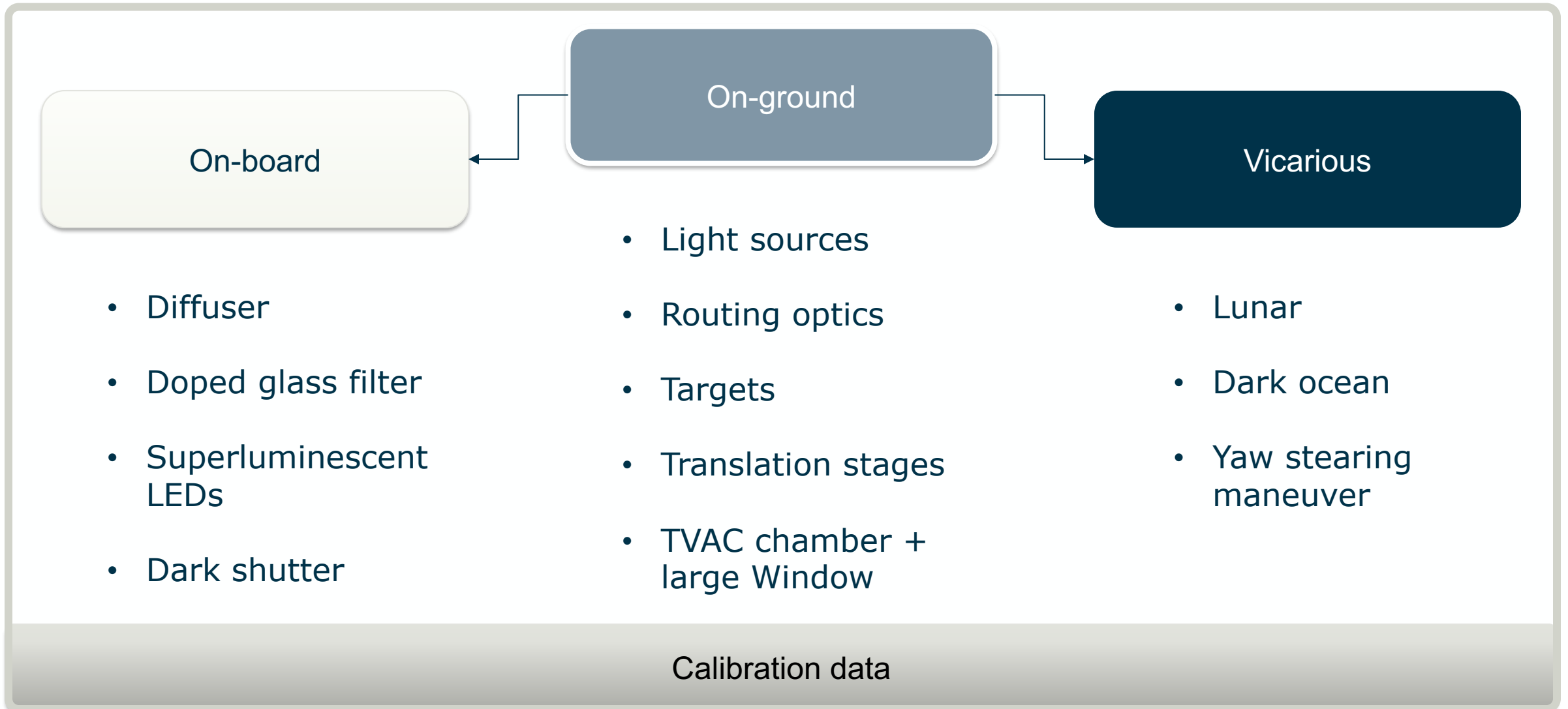


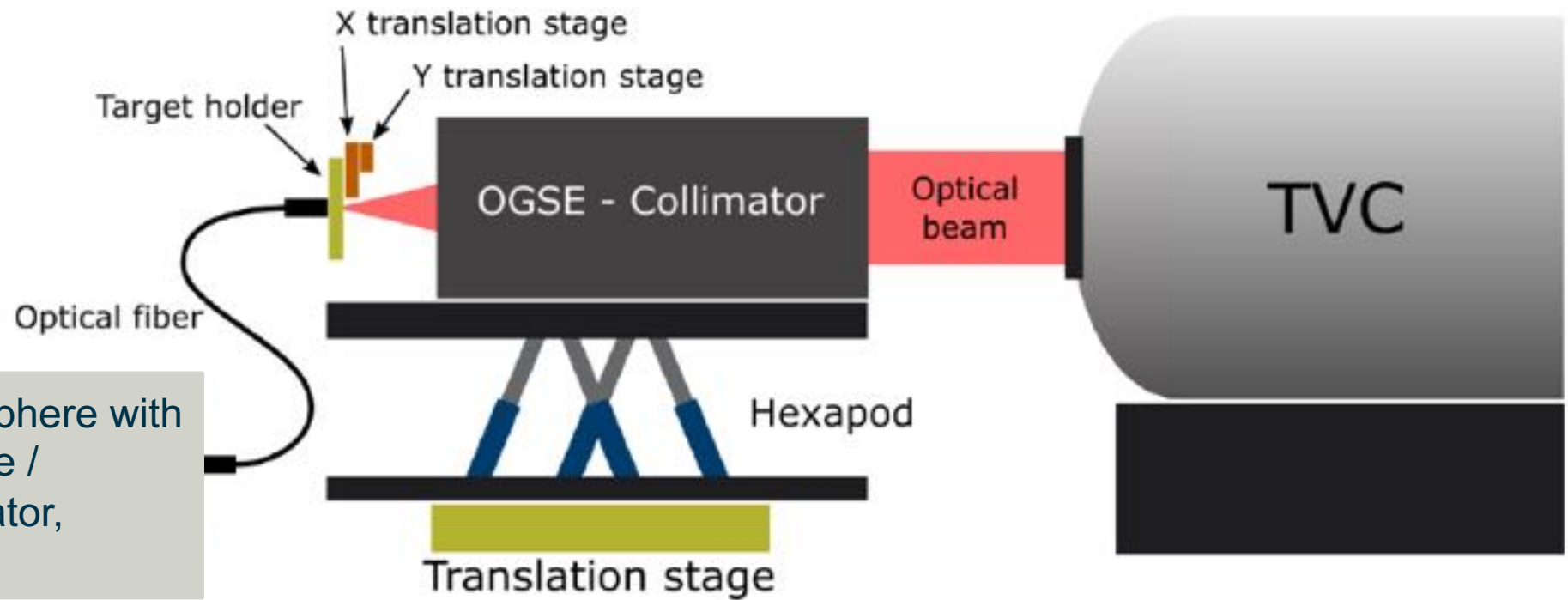
A preliminary overview of on-ground and on-board calibration activities for the **CHIME Mission**

2022-10-20

Strese, Helene (1); Gabriele, Antonio (1); Celesti, Marco (2); Nieke, Jens (1); Weber, Heidrun (1)
Organisations: 1: European Space Agency ESA-ESTEC, Keplerlaan 1, 2201 AZ Noordwijk, The Netherlands; 2: HE Space for ESA, European Space Agency ESA-ESTEC, Keplerlaan 1, 2201 AZ Noordwijk, The Netherlands

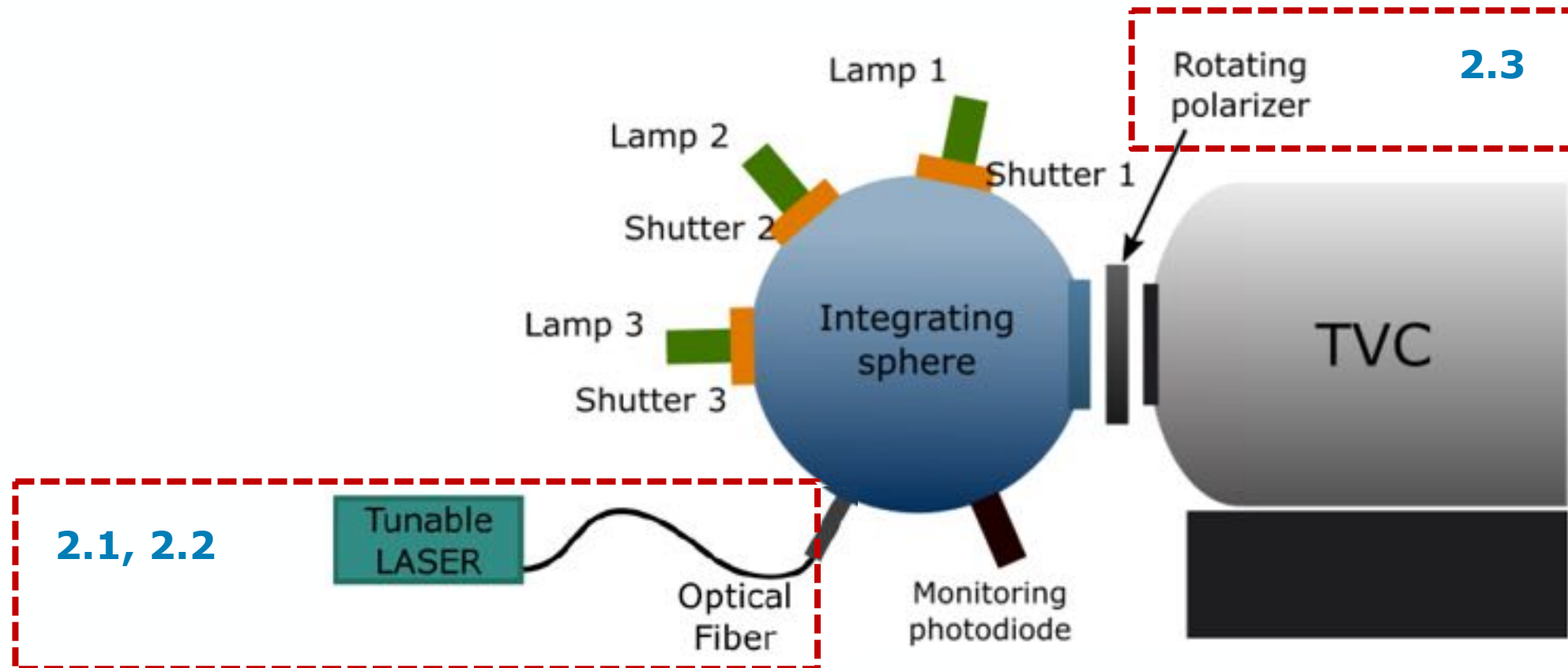
20/10/2022





1.1 Integrating sphere with white light source /
1.2 Monochromator, tunable laser

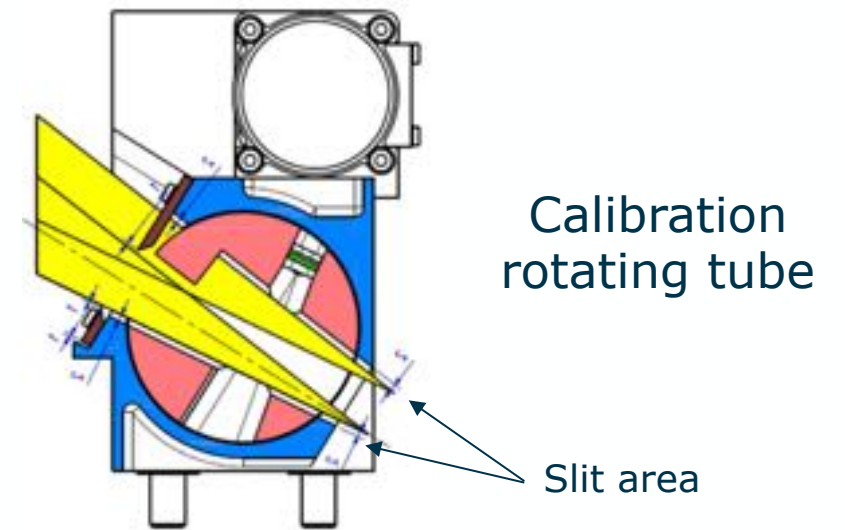
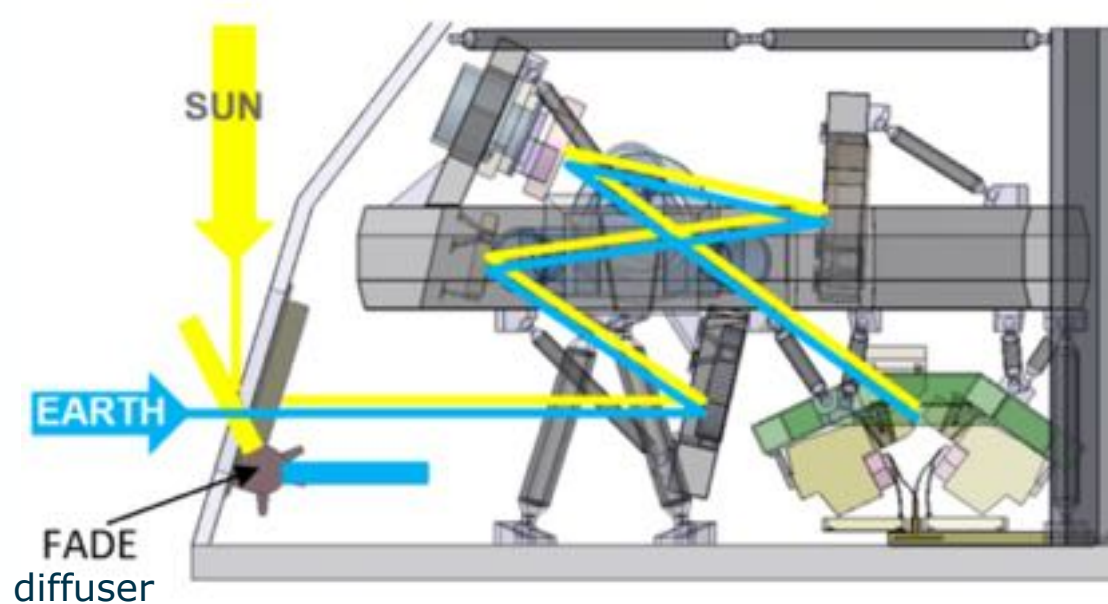
1.1 Focal length , INS boresight, Pixel LoS knowledge, spatial co-registration, MTF
1.2 Straylight



- 2.1 Radiometric gain, linearity, RNU, SNR/NeDL
- 2.2 ISRF- shape, -FWHM and -barycentre, smile
- 2.3 Polarization

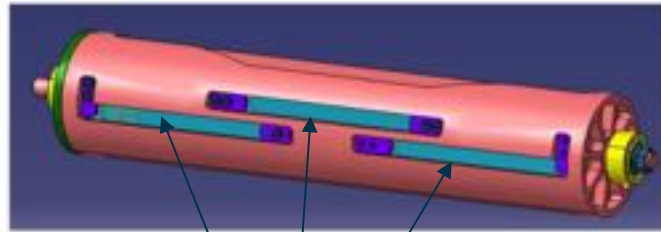
On-board absolute radiometric calibration (1/week)

- Sun and diffuser form a radiometric calibration source of temporally and spectrally constant irradiance, filling the instrument aperture
- Diffuser BRDF characterized first on-ground to quantify deviation from ideal Lambertian behaviour
- Also used for instrument SNR monitoring

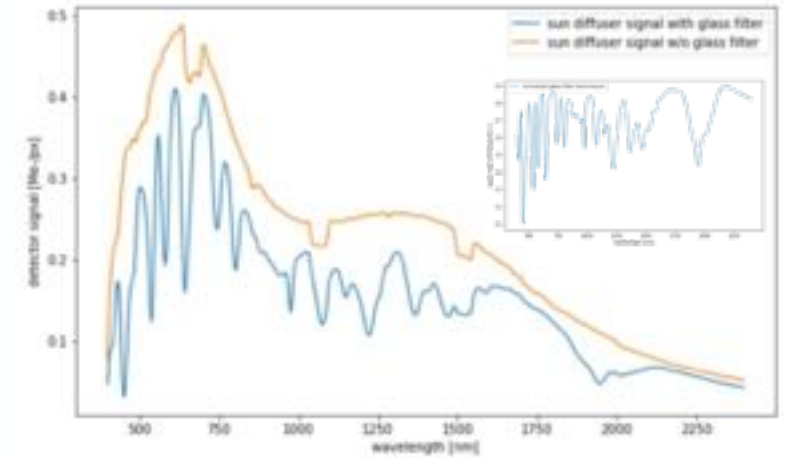
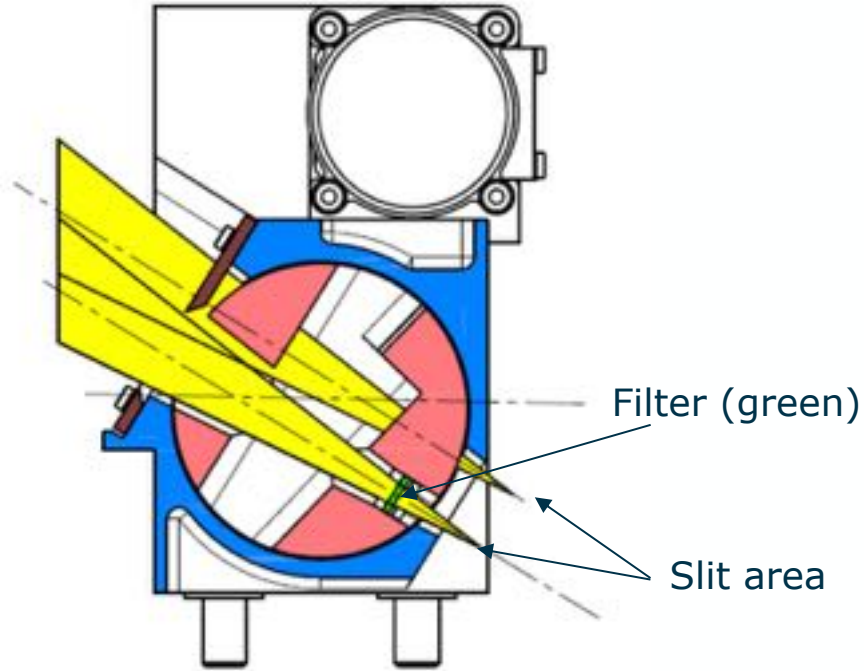


On-board absolute spectral calibration (1/week)

Calibration rotating tube



Filter (at slit geometry)

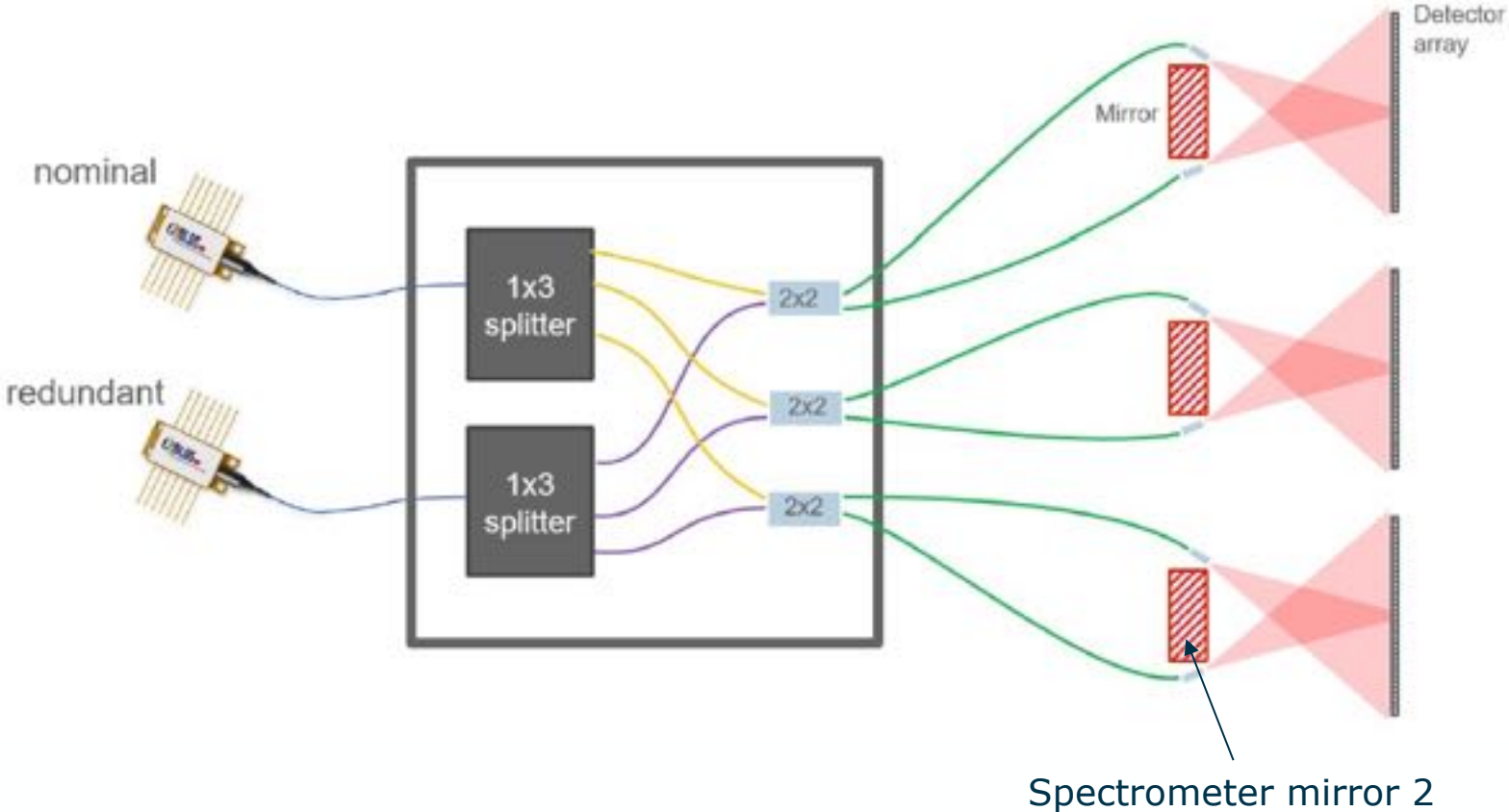


$$\text{OB Filter response} = \frac{\text{Sun+Diffuser+Filter}}{\text{Sun+Diffuser}}$$

Spectral shifts are detected by matching the on-board filter response and the reference filter spectrum characterized on-ground

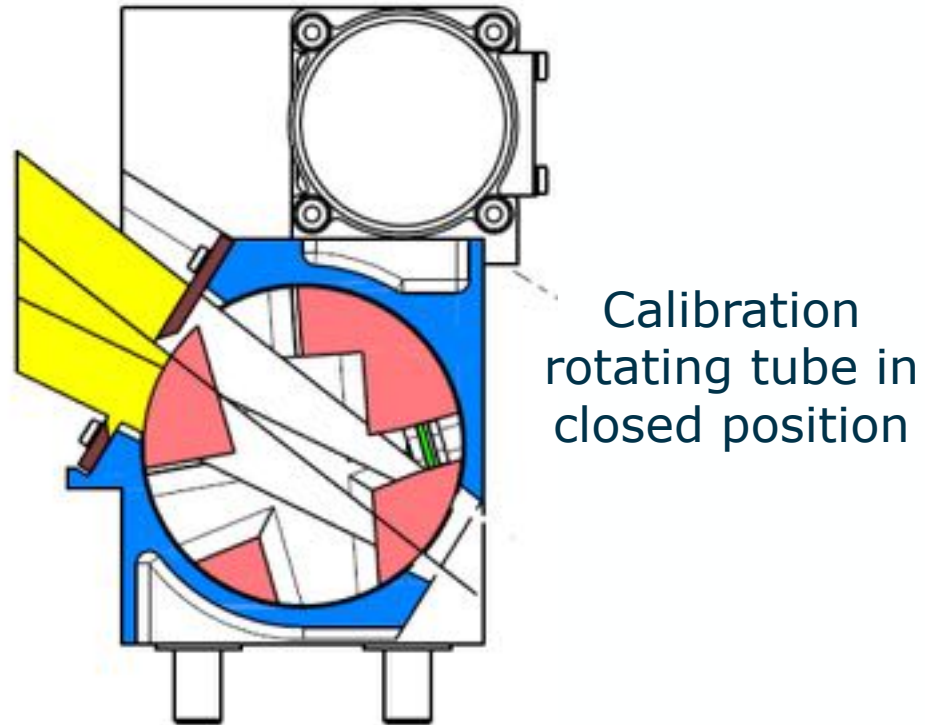
On-board linearity calibration (2/week)

Detector illumination via SLEDs at different integration times to cover the full detector dynamic range and support the linearity calibration table of the OG linearity characterization for the required absolute radiometric accuracy



On-board dark calibration (2/orbit)

- Acquisition at the beginning and at the end of the dayside of the orbit (17s sequence)
- Pixel next to the nominal view field serve for the determination of the time dependent background signal



Lunar (2/month)

- Monitoring of sun diffuser degradation → maintaining relative spectral radiometric accuracy
- Wavelength dependent radiometric gain information when combined with sun diffuser measurements
- Straylight and MTF calibration
- Inclusion of dark deep space observation (2/month) to calibrate for shutter emission

Dark ocean (2/revisit)

- Observations of the dark ocean (night side) provide dark offset information

90° yaw steering (2/year)

- Provides image equalization in the spatial direction
- Image analysis derives an optical flatfield from the ratio of the same earth scene (specific target side) in both directions

Thank you!

