Pre-flight calibration of the Full Sun Imager on board Solar Orbiter

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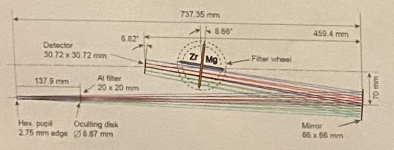
Summary

FSI benefited from an extensive calibration program at component, subsystem and system level. Recognizing that off-band spectral lines can represent significant contributions, the spectral response was characterized from 1 to 100 nm. This required the combination of measurements made on several beamlines and an extensive modeling effort of the materials used in the coatings and filters. The uncertainty on the end-to-end calibration is estimated to be 5% in-band and 25% off band. Regular L2 files include all known corrections except for the filter uniformity.

Instrument

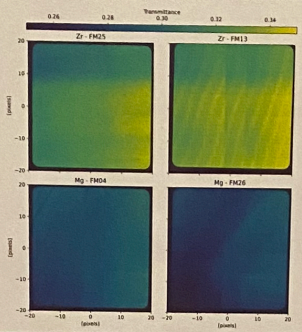
Wide field single mirror off-axis telescope using dual-band multi-layer coating and mutually exclusive filters for passband selection. An occulting disk can be inserted in the beam to suppress stray-light to observe the EUV corona above 2Rs.

Passband center	174 Å and 304 Å alternatively
Field of View	3.8 arcdeg × 3.8 arcdeg
Resolution (2 px)	9 arcsec
Typical cadence	600 s



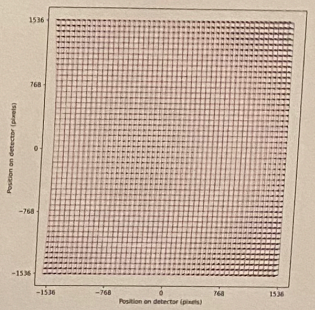
Filters uniformity

The small pupil design is sensitive to the uniformity of the transmittance. This is not accounted for yet in L2 data but amounts to less than 10% across the FOV.



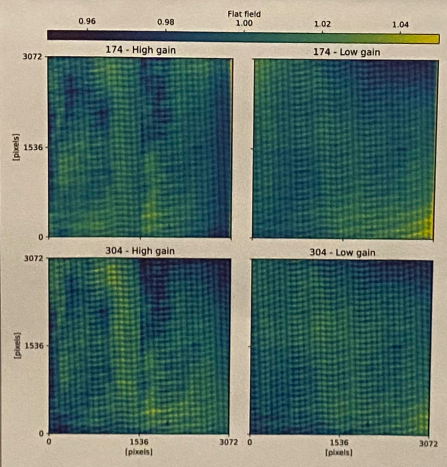
Optical distortion

Significant distortion comes from the wide-field off-axis design. It was characterized from the as-built Zemax-model and is corrected in L2 data.



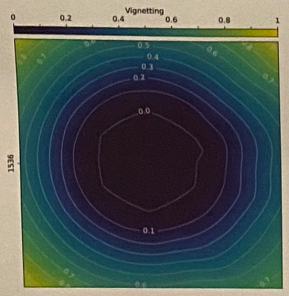
Flat field

Measured with a monochromatic wide beam at 17.4 nm (Zr filters) and 30.4 nm (Mg filters). Different for the high and low gain detector settings.



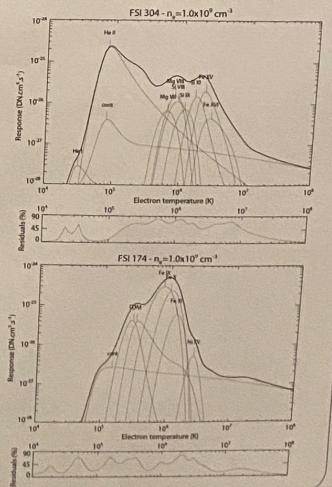
Vignetting

Significant only when the occulting disk is in place. Computed from as-build mechanical model. Not accounted for yet in L2 data.



CHIANTI 10.1 isothermal response

Corresponding to the spectral response below



Spectral response

Optical modelling of components + end-to-end calibration where available. Available as part of the EUI S/W repository. A important point given FSI's specific design was the proper separation by the filter wheel of the two passbands reflected by the multilayer coating of the mirror.