



MAX-PLANCK-GESELLSCHAFT



On-board calibration of the PHI instrument on-board the Solar Orbiter: Autonomous flat fielding of the HRT



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SO/PHI

- **SO:** Solar Orbiter is an ESA mission with unique orbit design, launch in October 2018
- **PHI:** Polarimetric and Helioseismic Imager
- First solar **imaging spectropolarimeter** on a deep space mission



PHI (Structural Thermal Model)

Challenges in the calibration

- Spectropolarimetric data:
2 Gb / data set
- Bandwidth for PHI:
50 Gb / orbit



- Efficient compression:
on-board data analysis
- **Necessary to calibrate
science data on-board**

- Spectropolarimetric
observations need
high accuracy



- **In-flight calibration
data generation is
necessary**

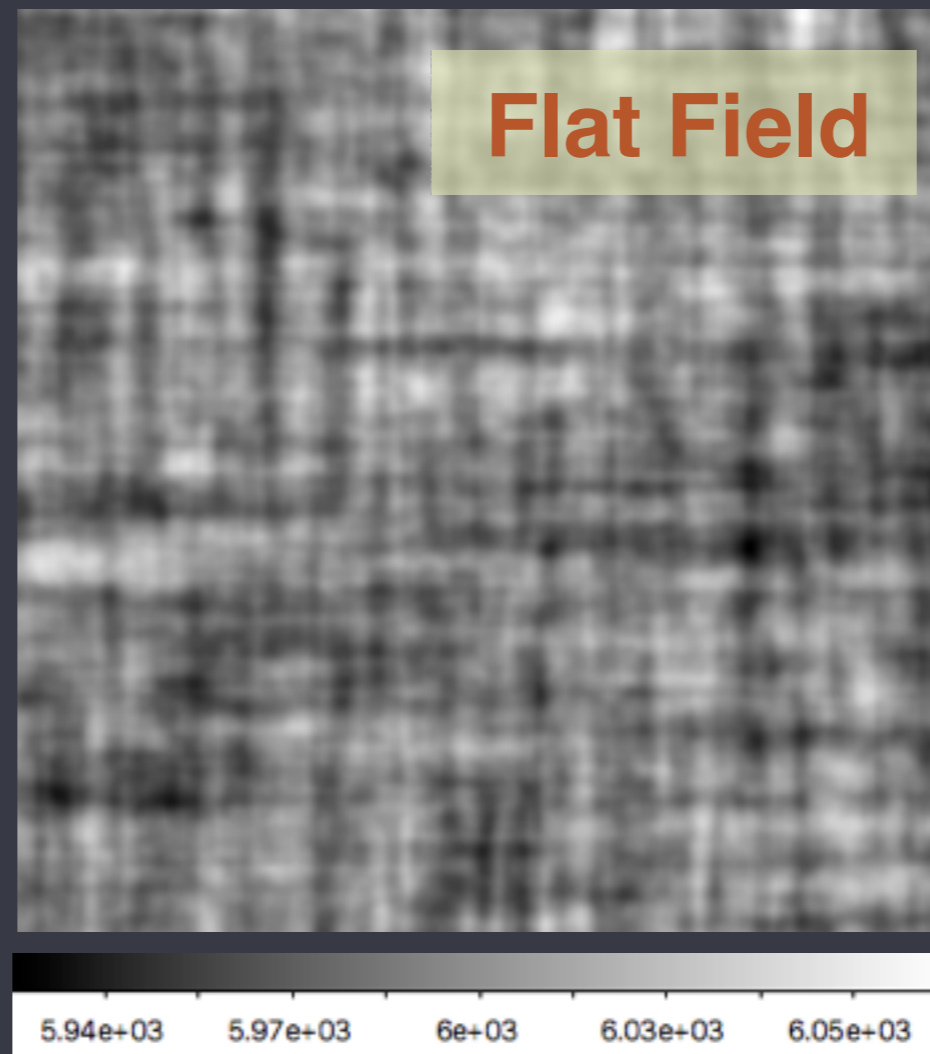
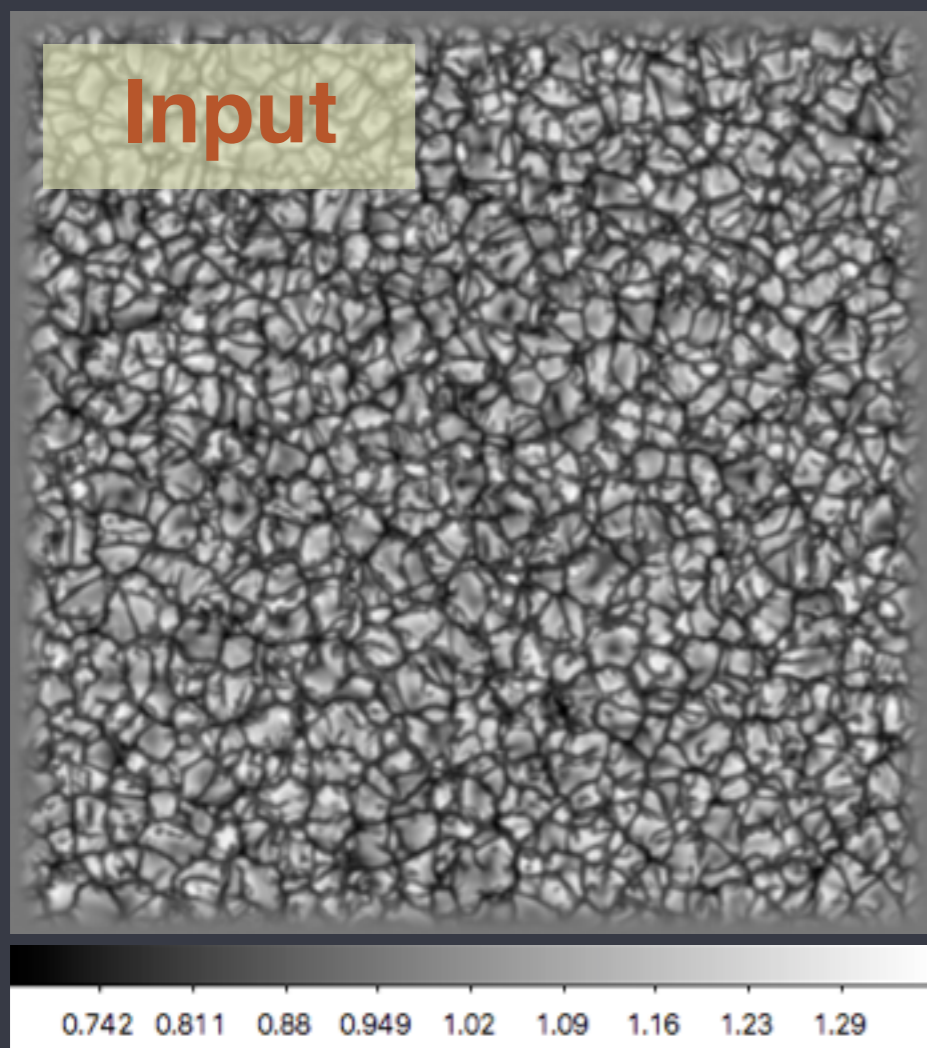
- Limited bandwidth
and S/C visibility



- **High autonomy in
these procedures is
required**

Example: Autonomous Flat field generation for HRT

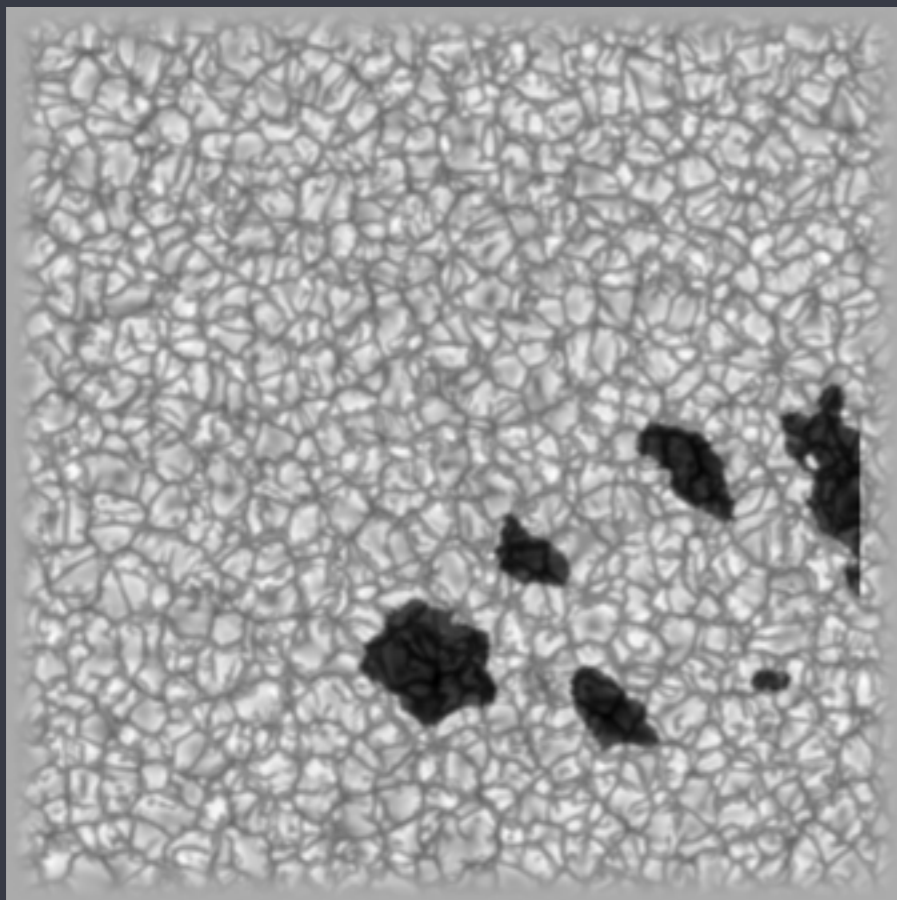
- Method: Image accumulation with spatial displacement for a long time



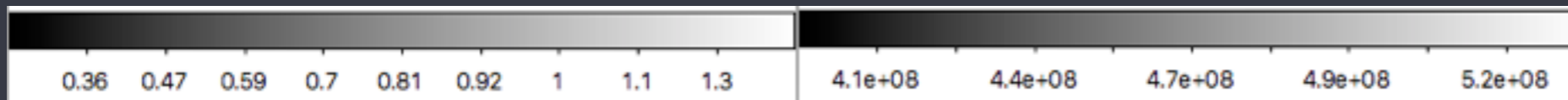
< 0.5%
non-uniformity

Unpredictable disturbances on the flat field

- E.g. **sunspots**, Problem: Autonomy



5.7 %
non-uniformity



Outlook

- End to end test of algorithms before instrument delivery November 2016
- Additional data from lab measurements and commissioning phase