

SO/PHI data request form

(Cruise phase + first science orbit; SO/PHI-Team internal version)

Continuum intensity perturbation due to solar oscillations

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MPS

Science case (stay on one slide):

Please also state, why is PHI needed; why is the science unique?

- Solar continuum intensity is often used as one of the observables in helioseismic measurements. These measurements show a centre-to-limb systematic effect (Zhao et al. 2012). This appears due to some physical, such as the interaction between p-modes and granulation (Baldner & Schou, 2012, Schou & Birch 2020) as well as radiative transfer effects in the perturbed atmosphere (Kostogryz et al. 2021), and instrumental effects (Liang et al. 2018, Gizon et al. 2020).
- Solving radiative transfer in the perturbed atmosphere due to oscillations is not a trivial problem (Kostogryz 2021), however, it allows us to understand the physical reason of the centre-to-limb variation of the observed oscillations. Recently, we solved this problem and described behaviour of different modes from the centre to the limb.
- Observing from two angles should allow us to check the calculations. As we observe the same position from different angles we will measure the intensity with the maximum contribution of the different sources to the intensity at different heights. This will cause the phase shift and the amplitude difference between the two measurements and closer to the limb this phase shift and amplitude will be larger. A good understanding of these effects will lead to a better understanding of the mode physics near the solar surface and also it will lead to reducing some of the systematic errors in helioseismic measurements.

Requirements/data (use additional slide if needed)

Besides best guess requirements, you may also list minimum requirements on the data

- Type of solar feature: Full disk.
- HRT or FDT: FDT
- Physical parameters needed (available: B_LOS, vector B, v_LOS, I_c, raw data): I_c
- Total length of observation: At least 24 hours.
- Cadence (maximum 1 dataset/min): 1/min
- Pointing needs (disc centre, limb, active region location, particular μ): N/A (full disk)
- Orbit needs: Large overlap with Earth view. At least ~ 15 degrees off Earth-Sun angle.
- Total number of datasets: At least 24 hours (1440 datasets)
- Full frame 2k x 2k or partial frame 1kx1k, 0.5kx0.5: Full disk.
- Full resolution or 2x2, 4x4 binned data: Resulting solar diameter of at least 500 pixels
- noise level (default 10^{-3}): Default should be fine, no polarimetry
- Co-observations with other instruments: HMI. Should preferably avoid eclipse seasons.
- Special requests: This is intended to be covered with the 2021 and 2022 HS runs.