SO/PHI data request form

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

Stereoscopic reconstruction of 2D photospheric velocity flows

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MPS

Science case (stay on one slide):

- Line-of-sight (LoS) velocity at photospheric heights has been measured for decades, while horizontal velocity is currently inferred using tracking algorithms applied to time series of magnetograms (LoS and vector) or continuum images. Combining PHI with HMI we will have the first possibility to measure LoS velocity from two vantage points, and this information can be used to observationally reconstruct two components of the 3D velocity vector.
- While the determination of the velocity vector will still be incomplete, the observations of particular phenomena on the Sun may allow to reconstruct the full velocity vector in particular cases. For instance, granular motions are mostly radial; similarly, the emergence of bipoles within a forming active region mainly occurs along the conjunction line between the forming sunspots. Such particular phenomena have a (approximate) symmetry that, combined with a favorable observation geometry, can be exploited for the full determination of the velocity vector with only two vantage points.
- Combined observations with PHI and HMI can be used to measure the proper horizontal motions of several features on the solar photosphere. If successful, we would use such measurements to constrain and validate widely used tracking algorithms applied to magnetic regions. Simulations are needed to validate the reconstruction algorithm and to properly treat systematic errors.

Requirements/data(use additional slide if needed)

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

- Type of solar feature: emerging AR (if possible, otherwise QS)
- HRT or FDT: HRT
- Physical parameters needed (available: B_LOS, vector B, v_LOS, I_c, raw data): vector_B, v_LOS and I_c
- Total length of observation: at least 2h
- Cadence (maximum 1 dataset/min): less than 90s
- Pointing needs (disc center, limb, active region location, particular μ): active region location
- Orbit needs (spatial resolution/co-rotation/angle to Earth/angle to other spacecraft): 20-60 degrees to Sun-Earth line
- Total number of datasets: at least 80
- Full frame 2k x 2k or partial frame 1kx1k, 0.5kx0.5: best: full frame; needed: AR size
- Full resolution or 2x2, 4x4 binned data: full resolution
- noise level (default 10^{-3}): 10^-3
- Co-observations with other instruments: HMI
- Special requests: Angle to the Earth