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Combining the point of view of SO/PHI-HRT and SDO/HMI to characterise facular and solar network brightness at the limb

Close-to-limb magnetic field observations face challenges due to foreshortening, reduced light levels, the influence of the observation angle on the radiative transfer, among other effects. These factors contribute to increased uncertainty in the inferred magnetic field, impacting studies involving magnetograms.

To address these limitations, we can leverage data from a second vantage point. When observing magnetic features near the limb, a second perspective, where the same magnetic features appear closer to the disc centre, provides more accurate information. The Solar Orbiter mission, with its heliocentric orbit and hence varying view angles relative to the Sun-Earth line, presents a good opportunity for such observations. Its spectropolarimeter, the Polarimetric and Helioseismic Imager (SO/PHI), can be used for complementing magnetograms by other instruments, that observe in the Sun-Earth line.

We have previously combined SO/PHI Full Disk Telescope and SDO/HMI data, to demonstrate the benefits of this approach for characterising the intensity contrasts of faculae and solar network features compared to single-instrument observations. In particular, this allows studying weaker magnetic features closer to the limb.

Data from the SO/PHI High Resolution Telescope are now available, and can be combined with other instruments. This presents a good opportunity to improve on previous studies. We present the first results from combining SO/PHI High Resolution Telescope data with SDO/HMI, recorded close to quadrature in their orbits, to study facular and network brightness.

Primary authors: GANDORFER, Achim (Max-Planck-Institute für Sonnensystemforschung); CALCHETTI, Daniele (Max-Planck-Institute for Solar System Research); OROZCO SUAREZ, David (Instituto de Astrofísica de Andalucía (IAA-CSIC)); VALORI, Gherardo (MPS); WOCH, Joachim (Max-Planck-Institut für Sonnensystemforschung); HIRZBERGER, Johann (Max Planck Institute for Solar System Research); SINJAN, Jonas; DEL TORO INIESTA, Jose Carlos (IAA (CSIC)); BLANCO RODRÍGUEZ, Julián (University of Valencia); ALBERT, Kinga (Max Planck Institute for Solar System Research); KRIVOVA, Natalie A. (Max Planck Institute for Solar System Research); SOLANKI, Sami K. (Max-Planck-Institut für Sonnensystemforschung (MPS), Göttingen, Germany) and School of Space Research, Kyung Hee University, Yongin, Republic of Korea); LI, Xiaohong (Max Planck Institute for Solar System Research)

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