SO/PHI data request form

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

Magnetic field flux evolution and H-alpha filament formation

Ricardo Gafeira, David Orozco Suarez

University of Coimbra, Instituto de Astrofisica de Andalucía

Science case (stay on one slide):

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

It is well-known that magnetic fields support and surround the cool and dense plasma of filaments above the visible solar surface (photosphere) and several configurations have been proposed for them.

Although their detailed configuration is under debate, these magnetic fields are rooted in the underlying photosphere and stay rooted there for a long period of time, until the filaments vanish or get ejected.

The imprint on the magnetic field at the photospheric layers are relevant for understanding the whole filament formation and evolution process.

The photospheric counterpart of the filaments magnetic skeleton can actually be seen even before the filaments are visible. Hence, it is important to follow the evolution of magnetic fields under filaments.

Hence, we propose to study the emergence and cancelation rates of the photospheric magnetic field along the solar surface just where the filament sits.

With this information we expect to identify regions where the emerging and canceling rates will be different from the quiet Sun surroundings or even specific of filament appearance

Ultimately, if precursors for the H-alpha filament appearance and formation were identified using PHI data, the locations where filaments will appear could be predicted before we can observe it from the Earth. In this case, this result will strongly depend for the future observations on the gap between the PHI observation of the target and the time that will be possible to observe from the earth.

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 H-alpha filaments
- HRT or FDT: HRT
- Physical parameters needed (available: B_LOS, vector B, v_LOS, I_c, raw data): vector B, v_LOS, I_C
- Total length of observation: 3/6 hours
- Cadence (maximum 1 dataset/min: 10 min or less (I based that values on the nano flare programs)
- Pointing needs (disc centre, limb, active region location, particular μ): N/D
- Orbit needs (spatial resolution/co-rotation/angle to Earth/angle to other spacecraft): Preferentially an SO-Sun-Earth angle lower than 60 degrees
- Total number of datasets: 36/72
- Full frame 2k x 2k or partial frame 1kx1k, 0.5kx0.5: Full frame
- Full resolution or 2x2, 4x4 binned data: Full resolution
- noise level (default 10^{-3}): Default
- Co-observations with other instruments: any ground telescope that observes H-alpha
- Special requests: