Spectropolarimetric observations of filaments in Hα and D3

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Motivation of the work

• Extension of our prominence observing program for investigating their magnetic field (see poster by Renzo Ramelli et al.)

• Preliminary study in view of future filament observations with a Fabry Perot filter (Alex Feller talk)

• Exploration of the diagnostic potentiality of the Hanle effect in forward scattering and/or other physically plausible mechanisms
Observations at IRSOL

- Full Stokes spectro-polarimetric measurements using ZIMPOL2
- 19 Hα, 6 He D3 line observations over 10 days
- Positive Q/I defined to be parallel to the local direction of the filament
- Integration time: 10 to 30 minutes
- Observations at disc centre
Observation in Hα March 18 (2005)

Hα disk image

The red line indicates the slit position during the observation
Stokes images

Along the spatial direction different structures can be recognized

Stokes profiles are obtained by averaging along the vertical orange interval (see next Figure)
Hα - Stokes profiles in the filament

Almost all the observations give similar shapes (linear polarisation amplitudes vary, but are of the order of a few times $10^{-3}$).

A Q/I peak at line centre.

Wing peaks in U/I.

V/I signals are generally absent.
Observation in He D3 March 19 (2005)

The red line indicates the slit position during the observation.
Stokes images

Very faint signatures are seen in the I and Q/I images.

Stokes profiles are obtained by averaging along the vertical orange interval (see next Figure).
D3 - Stokes profiles in a filament

In the I profile the filament signature is very faint.

The positions of the lines of the D3 multiplet are marked.

The Q/I profile amplitude is of the order of a few times $10^{-4}$. Similar shapes are found also in prominences.

In some other observations no polarization signatures were detected.
Conclusions

• In these observations at the solar disc centre we have found:
  – $\text{H}\alpha$: filaments show a Q/I peak in the line centre, while in U/I two peaks are found in the line wings
  – He-D3 line: the polarization signatures, if present, are very faint ($\sim 10^{-4}$), and seem to have similar shapes to those observed in prominences. The Hanle effect in forward scattering due to the inclined magnetic field of the filament plasma can explain these Q/I signals.