Observational evidence of photospheric magnetic dips in filament channels

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Magnetic loops
filament flux tube
overlaying arcades

Magnetic dips
$z > 4 \text{ Mm}$
$z < 4 \text{ Mm}$

Adapted from Aulanier & Schmieder (2002)
Modeled dips

Adapted from
Aulanier et al. (1999)

Hα filament

$B_z(z=0)$ & Magnetic dips
$B_t(z=0)$

Dips viewed in 3D
JOP 178 International campaign
16 October 2004
1. Simultaneously observations of the polarized profiles of Fe I doublet 6301-6302 Å, Na I, Hα with beam exchange technique
2. Data processing (flat field, dark current) → SQUV
3. Inversion code for the Fe I doublet with a PCA-based algorithm in a Milne-Eddington atmosphere using a grid of models B, Inc., Azi. with error bars in the LOS ref. frame
4. Change of the system of reference to local frame
5. The 180 ° ambiguity is not resolved, two solutions for incl. and azi.

Criterion used for resolving the ambiguity: the chirality rules for filaments
According to the directions of the fine *structures* and the *feet* (Halpha)
I(Hα)

Sinistral filament

B (Fe I)
B horizontal mean direction
if the chirality is sinistral

- Filament axis
- Photospheric inversion line (Bz)
B horizontal mean direction if the chirality is dextral

DEXTRAL CASE

- Filament axis
- Photospheric inversion line (Bz)
Case #1
Case #1 3D view

In the filament channel: horizontal dip
Case # 6
Case #6  3D view

In the filament barb: horizontal dip
Modeled dips ...

Adapted from
Aulanier et al. (1999)

Hα filament

$B_z(z=0)$ & Magnetic dips

$B_t(z=0)$

Dips viewed in 3D
... and THEMIS dips

Lopez Ariste et al. (in preparation)

Hα filament

\( B_z \) & \( B_t(z=0) \)

Dip viewed in 3D
Conclusion

THEMIS/MTR observes simultaneously in multi lines: H\(\alpha\), Fe 6302 and 6301, Na D1

High sensitivity of the magnetic flux: 10 Mx/cm\(^2\)

Magnetic field vector tangential to the photosphere

Photospheric dips = « bald patches » observed in filament channels

consistent with model of Aulanier & Démoulin (1998)
Inversion errors (case #1)