

Observations of Photospheric Magnetic Structure below a Solar Dark Filament

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The structure of the photospheric vector magnetic field below a dark filament on the Sun is studied using the observations of the Spectro-Polarimeter attached to the Solar Optical Telescope onboard Hinode. Special attention is paid to discriminate the two suggested models, a flux rope or a bent arcade. "Inverse-polarity" orientation is possible below the filament in a flux rope, whereas "normal-polarity" can appear in both models. We study a filament in active region NOAA 10930, which appeared on the solar disk during 2006 December. To know whether it is in the normal orientation or in the inverse one under 180-degree ambiguity of the transverse field, the center-to-limb variation is used for the solution under an assumption that the filament does not drastically change its magnetic structure during the passage. When the filament is near the east limb, we found that the line-of-site magnetic component below is positive, while it is negative near the west limb. This change of sign indicates that the horizontal photospheric field perpendicular to the polarity inversion line beneath the filament has an "inverse-polarity", that is indicating a flux-rope structure of the filament supporting field.

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