Interpretation of IFU spectropolarimetric observations of solar plage photosphere

G. Liu[1], J. Buttler[1], I. Milic[1,2,3], M. van Noort[4], J. M. Borrero[1], J. S. Castellanos Duran[4], and Christoph Kuckein[5,6]

[1] Institute for Solar Physics (KIS), Georges-Köhler-Allee 401A, 79110 Freiburg, Germany
[2] Faculty of Mathematics, University of Belgrade, Studentski Trg 16, 11000 Belgrade, Serbia
[3] Astronomical Observatory, Volgina 7, 11060 Belgrade, Serbia
[4] Max-Planck Institute für Sonnensystemforschung, Justus-von-Liebig-Weg 3, 37079 Göttingen, Germany
[5] Instituto de Astrofísica de Canarias (IAC), Vía Láctea s/n, E-38205 La Laguna, Tenerife, Spain
[6] Departamento de Astrofísica, Universidad de La Laguna, E-38206 La Laguna, Tenerife, Spain

contact e-mail: *milic@leibniz-kis.de*

The development of the Microlensed Hyperspectral Imager (MiHI) prototype enabled an acquisition of high-spatial resolution, high-spectral fidelity, high-cadence spectropolarimetric data sampling the photosphere and chromosphere at visible wavelengths. Multiple datasets have been collected over the last decade, some of which contain magnetically sensitive spectral lines. In this contribution, we present the first efforts to invert these data using a depth-stratified spectropolarimetric inversion code with magnetohydrostatic (MHS) constraints - FIRTEZ. We focus on the two datasets that probe two different plage regions near the disk center and contain two distinct spectral regions: one around the Fe I 630 nm doublet, and the second around the Sodium D1 line. By inverting time-dependent, high-resolution data, we essentially obtain the magnetic and thermodynamic structure of the plage photosphere in 4D (x,y,z,t). We report the detection of persistent, very small-scale opposite polarities around the magnetic elements of the plage that manifest as low-lying loops and are revealed by the MHS inversions. We also present an observation of a collapsing granule and the spectropolarimetric signatures of the collapse, which we attempt to study through the comparison with the synthetic spectra from a very high-resolution (5 km) MHD CO5BOLD simulation.