Session 2

Superstrong magnetic fields in bipolar light bridges

J. S. Castellanos Duran, N. Milanovic, A. Korpi-Lagg, B. Loeptien, M. van Noort, S. K. Solanki
MPS

The strongest magnetic fields on the Sun were long thought to appear in umbrae of large sunspot groups. However, recent spectropolarimetric observations have identified superstrong magnetic fields that are well beyond typical umbral fields, but in bright regions. One of these observations detected superstrong fields up to 8.2 kG in one bipolar light bridge (BLB). These regions appear in between two umbrae with opposite polarity. In this work, we present the first statistical analysis of BLBs. We analyzed spectropolarimetric data taken by Hinode/SOT-SP. These data were analyzed using the 2D coupled inversions that account for the point-spread function of the telescope during the minimization procedure. We found 48 BLBs hosted in 37 different sunspot groups. The 48 BLBs were seen in ~400 different Hinode/SOT-SP scans. Consistently similar characteristics were found in BLBs: superstrong magnetic fields, bi-directional velocity flows, and bipolar magnetic structures with the polarity inversion line commonly appearing along the long axis of the light bridge. In addition, visual inspection of the continuum images combined with the magnetic azimuth information suggests that BLBs are highly sheared regions. Our findings point to the shear being an important common mechanism to enhance the magnetic field to superstrong levels inside BLBs.