

Superstrong magnetic fields are common in bipolar light bridges

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Bipolar light bridges (BLBs) are bright features in sunspots located between two umbrae with opposite magnetic polarity. Recent observations revealed intriguing cases of BLBs with very strong magnetic fields of the order of 8.2 kG. Since these observations were only a handful, it is a question of whether BLBs with extraordinarily strong fields are very rare. We used the most extensive set of spectropolarimetric observations of sunspots with BLBs compiled so far, consisting of data acquired with Hinode/SOT-SP. We analyzed these data using a state-of-the-art inversion technique, which accounts for the data degradation caused by the intrinsic PSF of the telescope. We identified 98 individual BLBs within 51 distinct sunspot groups. Since 66% of the identified BLBs were observed multiple times, our sample contained a total of 630 spectropolarimetric scans. Our analysis showed that 89% of the (individual) BLBs contain magnetic fields stronger than 4.0 kG, at the height of maximum magnetic sensitivity, with even higher field strengths in deeper layers. We also found that BLBs display a unique continuum intensity and field strength combination, forming a population well-separated from the umbrae and the penumbrae.