High Resolution Vector Polarimetry of Sunspot Magnetic Fields

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First Results from high temporal and spatial resolution measurements of the full Stokes vector in a sunspot are presented. These measurements were performed at the German Vacuum Tower Telescope on Tenerife.

We used the Lockheed narrow band tunable filter and a polarimeter package which allows twodimensional recording of the different Stokes pairs I±V, I±Q and I±U in rapid sequence. A complete set is obtained within about 10 seconds. The field of view is 50 arcsec×100 arcsec. The spatial resolution of our present data is 0.8 arcsec. The measured Stokes vectors were transformed into magnetic field parameters using the Potsdam computer code applying theoretical calibration functions for different model atmospheres.

We show images of intensity, total magnetic field strength, longitudinal and transversal components of the magnetic field, and the field inclination. Radial structures in the penumbra are well resolved, and we present circular scans of the magnetic parameters in the limb side penumbra. These scans show variations of about 1.5 arcsec width which can be identified in magnetograms of several minutes temporal distance. We further investigate the relations between intensity, magnetic field strength and inclination.