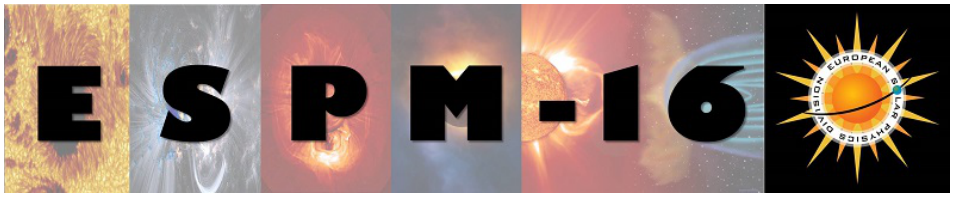

Contribution ID: **523** Type: **Poster**

Interaction of horizontal vortex tubes with magnetic fields

Thursday, 9 September 2021 11:13 (13 minutes)

Granular lanes are seen in continuum images as features appearing as a bright rim followed by a dark lane traveling into a host granule. With the help of 3-D magnetohydrodynamic simulations it was found that the observed intensity pattern is the visible signature of a subsurface velocity vortex tube. These vortex tubes are regularly generated close to intergranular lanes and have their axis parallel to the solar surface.
We present an analysis of a high-resolution spectropolarimetric data set obtained with the CRISP instrument at the Swedish 1-m Solar Telescope. The data consists of full Stokes measurements in the Fe I 617.3 nm spectral line taken at a cadence of approximately 28 seconds. We detect several cases of granular lanes exhibiting co-spatial elongated linear polarization patches and examine their temporal evolution and magnetic signature. By studying simulations calculated with the CO5BOLD code we are able to investigate the origin of the observed magnetic field. The simulations show several components (lane-aligned, turbulent, or twisted) of magnetic field dominating in different stages of the vortex evolution and revealing a complex magnetic structure. During the process the magnetic field is trapped within the horizontal vortex tube which twists the magnetic fields and transports them into the granules where they emerge to the surface. Our observations therefore are first indications of a "shallow recirculation" process taking place on the Sun.

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