

Multi-scale photospheric plasma motions and energy transfer to the solar corona

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Recent ground- and space-based observations reveal the presence of multi-scale motions, such as vortex motions, swirling in the complex intergranular lanes. In these regions, magnetic flux tubes are generated via the interaction of granulation motion and the background magnetic field. Vortex motions are particularly important in understanding the dynamics of the solar atmosphere since they stress the magnetic field, increase the available magnetic energy, drive the upper atmosphere and contribute towards heating of the solar corona. They are also important from a hydrodynamic perspective, redistributing momentum and mass in turbulent flows. In this talk, I will present a statistical analysis of the properties of photospheric vortices and the results of numerical simulations in order to answer the following research question: Can photospheric flow patterns reorganise the magnetic field emanating from inter-granular lanes sufficiently to create efficient conduits for transporting mass and energy from the lower solar atmosphere into the upper atmosphere, solar corona and solar wind?