PHOTOSPHERIC CONVECTION AND SOLAR MAGNETIC FIELDS AT SMALL SCALES

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Abstract: The surface of the Sun (photosphere) exhibits a plethora of features resulting from the interaction of different spatial and temporal scales of convective plasma flows and magnetic fields emerging from the solar interior. From the vastly visible sunspots, to the very tiny magnetic bright points (MBPs), the evolution of magnetic fields embedded in the photospheric plasma determines some processes occurring at upper solar atmospheric layers related to energy release, solar activity and ultimately having implications on space weather. Recent high-resolution solar observations have revealed the finest structuring and dynamics of the solar atmosphere. In particular, by tracking the proper motion of structures over time series of images acquired by ground-based, balloon-borne and space solar telescopes, we are able to investigate the plasma dynamics. Furthermore, solar magnetograms are employed to identify the evolution of magnetic features. The analyses show the mutual interplay of plasma flows and magnetic fields shaping the configuration of small-scale solar regions. High-cadence magnetograms and horizontal velocity maps are important tools to study many different small-scale processes such as the formation and disappearance of magnetic bright points accompanying the evolution of a region of interest, but also to probe signatures of magnetic field emergence at multiple scales including the emergence of flux tubes with the characteristic photopheric flow profiles, and the response of the solar atmosphere to such emergence. These investigations are crucial to complement further multi-wavelength multi-layer studies aiming to look into the solar behavior from the lower to the upper solar atmosphere.

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Session 5: Space plasma physics and nonlinear processes in space geophysics
Invited talk