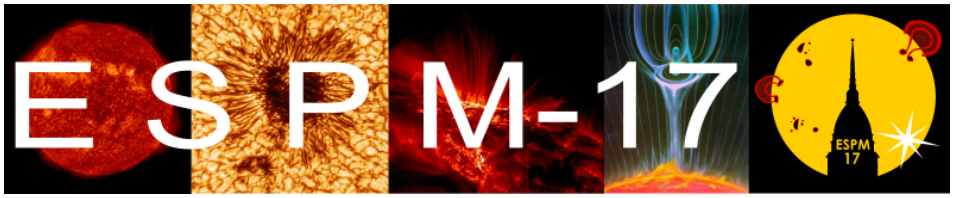

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On the magnetic source of chromospheric heating

Tuesday 10 September 2024 12:15 (15 minutes)

It is generally believed that the chromosphere is heated by the dissipation of acoustic waves or predominantly acoustic slow modes. Here we propose that some of these essentially acoustic waves have a magnetic origin in that they are generated by torsional Alfénic pulses propagating along small-scale magnetic flux concentrations that root in the photosphere. But how do these torsional Alfvén waves dissipate? Recent observations with the Daniel K. Inouye Solar Telescope (DKIST) by C.E. Fischer et al. reveal propagating, arc-shaped bright fronts emanating from chromospheric bright grains. These are located above corresponding photospheric bright points, which in turn are found to interact with vortical flows prior to the appearance of the chromospheric bright fronts. Corresponding three-dimensional magnetohydrodynamic simulations reveal that the arc-shaped structures are weak shock fronts triggered by the torsional Alfvénic pulse of the underlying magnetic flux concentration. Here, we propose a mechanism by which the torsional Alfvén wave excites a predominantly acoustic weak shock front capable of dissipating the torsional Alfvén wave.

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