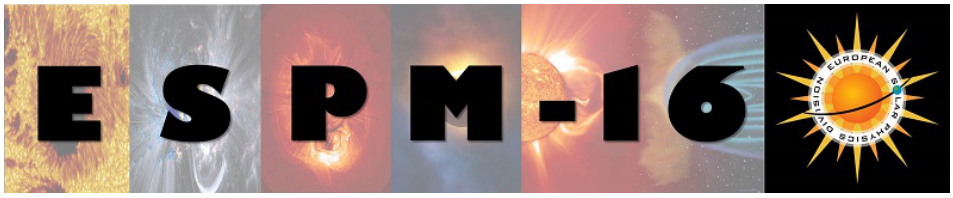

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Probing chromospheric heating in active regions with millimeter interferometry

Thursday, 9 September 2021 11:52 (13 minutes)

The interaction between emerging magnetic fields and the preexisting magnetic canopy in active regions is a complex process but essential for understanding the onset of transient brightenings driven by magnetic reconnection and their role in energy/mass deposition in the chromosphere and above.

We present the results of a comprehensive analysis of SST, ALMA, and SDO observations of a solar active region using nonlocal thermodynamic equilibrium inversions, magnetic field extrapolations, and comparisons with 3D radiative magnetohydrodynamics simulations. Inversions of the SST+ALMA dataset constrain the atmospheric stratification and show that enhanced chromospheric temperatures are associated with strong and inclined magnetic fields that connect patches of opposite polarity in the photosphere as revealed by the extrapolation. Simulations show that Ohmic dissipation during flux emergence leads to a range of observational signatures in the millimeter continuum depending on the details of the current sheets from compact, transient brightenings to warm fibril-like structures, both of which have been observed by ALMA.

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