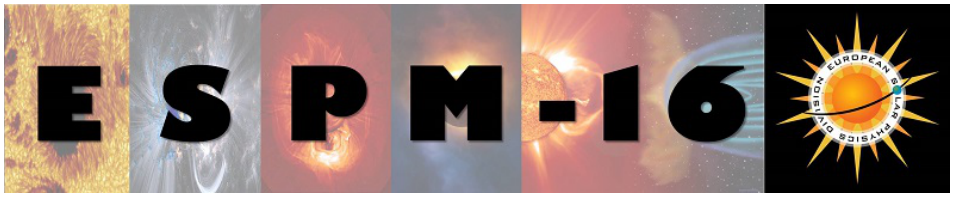

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The role of magnetic fields on the evolution of pores

Wednesday, 8 September 2021 16:30 (13 minutes)

Since the hint of the existence of an invariable value of the vertical magnetic field (Bver) on umbra-penumbra boundaries in sunspots by Jurčák (2011), many investigations have focused on studying this property. Umbra-penumbra boundaries of stable sunspots are defined by a critical Bver (Jurčák et al. 2018, Schmassmann et al. 2018; Lindner et al. 2020). On the other hand, when an umbra or pore do not hold a sufficiently strong Bver, i.e. the inclined field is weaker than the critical value, penumbral magneto-convection overtakes (Jurčák et al. 2015; Jurčák et al. 2017). Here we introduce the study of an evolving pore that does not develop a penumbra. We find a stable phase where the pore does not significantly change and the Bver on its boundary reaches a maximum value, comparable to the critical value found on umbra-penumbra boundaries. We call this value the critical vertical field of the pore. The evolution is complex, however, we find that regions of the pore defined by the critical value are more stable during the first period of the decay. Afterwards, when the pore is separated into smaller patches, the segments with strong Bver decay at the same rate as the whole area of the pore. This study suggests the existence of a critical value of Bver that hinders magneto-convection in pores as well. In addition, in this case study, the stable regions of the pore can be similarly well defined by a critical value of the total magnetic field strength.

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