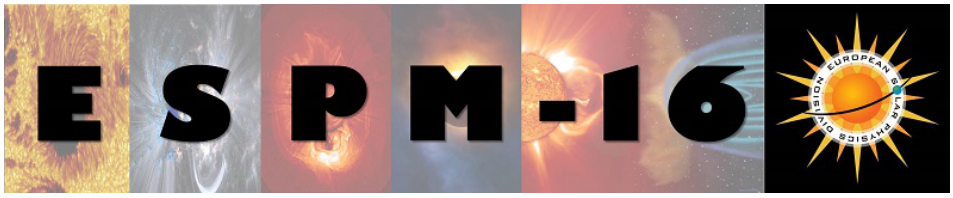

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Simulating the FIP effect in coronal loops using a multi-species kinetic-fluid model

Thursday, 9 September 2021 09:13 (13 minutes)

We investigate abundance variations of heavy ions in coronal loops. We develop and exploit a multi-species model of the solar atmosphere (called IRAP's Solar Atmospheric Model: ISAM) that solves for the transport of neutral and charged particles from the chromosphere to the corona. We investigate the effect of different mechanisms that could produce the First Ionization Potential (FIP) effect. We compare the effects of the thermal force and of the ponderomotive force. The propagation, reflection and dissipation of Alfvén waves is solved using two distinct models, the first one from Chandran et al. (2011) and the second one that is a more sophisticated turbulence model called Shell-ATM. ISAM solves a set of 16-moment transport equations for both neutrals and charged particles. Protons and heavy ions are heated by Alfvén waves, which then heat up the electrons via collision processes. We show preliminary results on composition distribution along a typical coronal loop and compare with typical FIP biases. This work was funded by the European Research Council through the project SLOW_SOURCE - DLV-819189.

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