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Solar jets: SDO and IRIS observations in the perspective of new MHD simulations

Solar jets are observed as collimated plasma beams over a large range of temperatures and wavelengths. They have been observed in H α and optical lines for more than 50 years and called surges. The term “jet” comes from X-ray observations after the launch of the Yohkoh satellite in 1991. They are the means of transporting energy through the heliosphere and participate to the corona heating and the acceleration of solar wind. Several characteristics have been derived about their velocities, their rates of occurrence, and their relationship with CMEs. However, the initiation mechanism of jets, e.g. emerging flux, flux cancellation, or twist, is still debated.

In the last decade coordinated observations of the Interface Region Imaging Spectrograph (IRIS) with the instruments on board the Solar Dynamic Observatory (SDO) allow to make a step forward for understanding the trigger of jets and the relationship between hot jets and cool surges. We observe at the same time the development of 2D and 3D MHD numerical simulations to interpret the results.

We review a few jet studies based on IRIS spectra and SDO observations and show that with the same observations, different theoretical interpretations are possible based on different approaches, e.g. cartoons, non-linear force-free field extrapolation, 3D MHD data driven simulations.

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