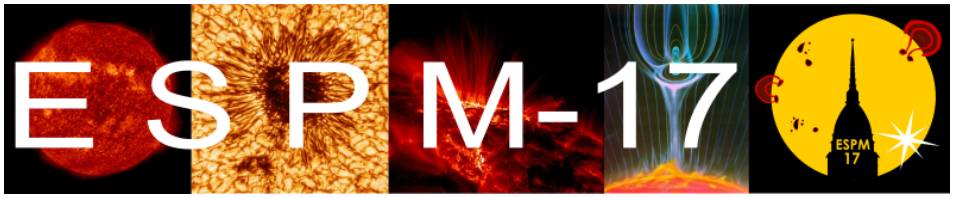

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Helical Structures Captured by Metis During a Polar Crown Prominence Eruption

Tuesday 10 September 2024 18:10 (15 minutes)

We present observations of a solar eruption captured by Metis onboard Solar Orbiter on October 12, 2022, during its perihelion passage. Using total brightness data, we observed the outward propagation of helical structures for more than three hours, extending up to 3 solar radii following a polar crown prominence eruption. These structures exhibited a notable trend: their inclination decreased as their polar angle and height increased. Further analysis, including examination of EUI images, revealed evidence of an eruptive flux rope in the lower corona with distinguishable footpoints as the source of these helical structures.
We also performed a comparative analysis with a high-resolution magnetohydrodynamic simulation of bursty interchange reconnection, finding strong similarities in the evolution of the observed and simulated structures. The white light structures in the simulation form as dense plasmoid plasma intermittently launched along open field lines when the plasmoids are ejected. The same ejection process also launches torsional Alfven waves, which may act as seed perturbations to form magnetic switchbacks within the solar wind. These observations and simulations suggest that sustained bursty interchange reconnection occurred following the eruption. Additionally, they demonstrate a key new observable associated with the bursty interchange reconnection process, providing a link between coronal dynamics and in-situ measurements such as those of switchbacks observed by Parker Solar Probe.

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