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Influence of the magnetic environment on CME deflections

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We study the low-coronal evolution of coronal mass ejections (CMEs) by reconstructing their 3D trajectory and the magnetic environment in which the source region is located. We analyzed a first event on 2008 Apr 09 and modeled it with magneto-hydrodynamic simulations. This event, the Cartwheel CME, exhibited a double deflection that has been reported and analyzed in previous work, but whose underlying cause remained unclear. The Cartwheel CME moved toward a coronal hole and against magnetic gradients. Using high-cadence full trajectory reconstruction, we accurately determined the location of the magnetic flux rope (MFR) and, consequently, the magnetic environment in which it is immersed. We find a pseudostreamer (PS) structure whose null point may be responsible for the complex evolution of the MFR in the initial phase. From the reconstruction of the pre-eruptive magnetic field, we estimate the dynamical forces acting on the MFR and provide a new physical perspective on the motion exhibited by the event. By setting up a similar magnetic configuration in a 2.5D numerical simulation we are able to reproduce the observed behavior, confirming the importance of the PS null point. In addition, we are studying a set of observed events with multiple viewpoints, including Solar Orbiter observations, to understand the mechanisms by which deflections occur under different magnetic scenarios.

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