# THE ROLE OF THE HELICAL KINK INSTABILITY IN SOLAR CORONAL EJECTIONS

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Coronal Mass Ejections (CMEs) are large-scale eruptive events observed on the Sun that are powered by the Sun's magnetic field. They are formed as magnetic flux ropes, i.e. magnetic fields twisted about each other. CMEs are the most important drivers of space weather effects on Earth. In particular, the structure of the internal magnetic field of the CME determines the severeness of the resulting geomagnetic storm. To predict the onset and orientation of the flux rope axis of CMEs is a major focus of current space weather research.

For this purpose, we have performed a numerical study on the evolution of a twisted magnetic flux rope that emerges from the photosphere to the corona. We study methodically the onset of the helical kink instability which is a current-driven, ideal magnetohydrodynamic instability. The kink instability occurs in a magnetic flux rope if the winding of the field lines about the rope axis exceeds a critical value. Our simulations show that the kink instability plays a significant role in changing the orientation of the flux rope axis even for moderate amounts of twist. The results suggest that accurate dynamical modelling of the coronal magnetic field, e.g. employing data-driven methods, is essential for successful space weather prediction purposes.