



Origin and early evolution of large-scale solar eruptions

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Magnetic flux rope (MFR) is a coherent magnetic structure with all magnetic field lines wrapping around its central axis. It may exist in various celestial circumstances like the magnetotail of the Earth, the ionosphere of Venus, the Nebula, and the black hole system. In the solar atmosphere, the MFR is even believed to be a fundamental structure of the most large-scale coronal mass ejections, existing prior to and driving the solar eruptions. In this talk, I will present the observational signals of MFR disclosed by SDO/AIA; discuss its formation process based on the analyses of the EUV images, 3D magnetic field extrapolation, differential emission measure, and spectral data. I will also show the kinematic evolution of CMEs in the early phase and the properties and evolution of the reconnection in the wake of the eruption of CMEs.