What Does a Magnetic Flux Rope Look Like?

Sarah E. Gibson[1]

[1]*National Center for Atmospheric Research*

Abstract:

Solar magnetic flux ropes are often represented by the archetypal "slinky" toy. Although this may be a fair representation of the flux rope's magnetic field lines, the observational manifestation of the flux rope at different wavelengths may look entirely different. Forward modeling explicitly takes into account three crucial factors leading to the appearance of the flux rope: the physical state of the flux rope's plasma and magnetic field, the physical process that translates the physical state into an observable quantity (e.g., Thomson scattering, collisional excitation, Faraday rotation, etc., etc.), and finally the observer's position relative to the flux rope. I will use investigate the observable properties of flux ropes at multiple wavelengths and in a range of spatial contexts, including active regions and quiescent prominences, and CMEs in the corona and solar wind. In this way we can consider different stages in the flux rope's life cycle – from emergence through the solar surface, to quiescent storage phase in the solar corona, to eruption into the solar wind, to propagation and evolution through the heliosphere, and finally to the flux rope as it manifests to in-situ sampling.

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References:

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