Abstract Submitted
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Chaos in Magnetic Flux Ropes[1] WALTER GEKELMAN, TIM DEHAAS, BART VAN COMPERNOLLE, University of California, Los Angeles — Magnetic Flux Ropes Immersed in a uniform magnetoplasma are observed to twist about themselves, writhe about each other and rotate about a central axis. They are kink unstable and smash into one another as they move. Full three dimensional magnetic field and flows are measured at thousands of time steps. Each collision results in magnetic field line generation and the generation of a quasi-seperatrix layer and induced electric fields. Three dimensional magnetic field lines are computed by conditionally averaging the data. The permutation entropy can be calculated from the time series of the magnetic field data or flows is used to calculate the positions of the data on a Jensen Shannon complexity map. The location of data on this map indicates if the magnetic fields are stochastic, or fall into regions of minimal or maximal complexity. Other types of chaotic dynamical models (Gissinger , Lorentz and Henon) also fall on the map and can give a clue to the nature of the turbulence. The ropes fall in the region of the C-H plane where chaotic systems lie. The entropy and complexity change in space and time, which reflects the change and possibly type of chaos associated with the ropes.

[1] C. Bandt, B. Pompe, Phys. Rev. Lett., 88,174102 (2007)
[2] O. Russo et al., Phys. Rev. Lett., 99, 154102 (2007), J. Maggs, G.Morales, 55, 085015 (2013)

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