Contribution ID: **3200**                                      Type: **not specified**

# P1.4009 Predicting the topology of self-organization in plasmas

*Monday, 8 July 2019 14:00 (2 hours)*

See the full abstract here:
http://ocs.ciemat.es/EPS2019ABS/pdf/P1.4009.pdf

Complex braided magnetic structures are known to self-organize in plasmas. Through often violent reconnection events, an elaborate braid can detangle itself to form straight flux tubes. Despite our advanced knowledge of plasma physics today, it remains unclear how to predict the topology of the magnetic structure after self-organization. Although it has been conjectured [1] that ultimately the topology is described by only two flux tubes with opposite helicity, recent studies [2, 3] have identified additional constraints. In this study, we simulate the self-organization process with prescribed magnetic braids as initial states. We use a measure called the field line helicity to trace the time-dependent topology in the model. We find that the magnetic relaxation (i.e. re-arrangement) happens in discrete stages. Resistivity and boundary conditions both affect the reconnection events and the resulting topology. Also, the topological evolution in 3D can be described qualitatively by a 2D analogous model with different timescales.

References
[1] E. N. Parker, Ap. J., 264:635-641 (1983).
[2] A. R. Yeates, G. Hornig and A. L. Wilmot-Smith, PRL105, 085002 (2010).
[3] A. R. Yeates, A. J. B. Russell and G. Hornig, Proc. R. Soc. A 471, 20150012 (2015).

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**Session Classification:**  Poster P1

**Track Classification:**  BSAP