

Contribution Title: TOPOLOGY BOUNDS THE ENERGY OF KNOTS AND LINKS
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In this talk we present new results on the minimal energy of magnetic knots and links in ideal magnetohydrodynamics. By using classical results of Arnold (1974), Moffatt (1990) and Freedman and He (1991), we prove that the topology of magnetic knots and links provides a lower bound on the magnetic energy of the system [2]. By relying on standard relaxation techniques of the magnetic field, the groundstate energy of tight knots up to 10 crossings is determined [1], and the relationship between this energy and topological crossing number, ropelength and internal twist is examined.

These results find useful applications in the context of astrophysical flows, and provide further grounds to establish a mathematical foundation for the classification of physical knots and links based on a one-to-one correspondence between energy and topology [3].

[1] Maggioni F. & Ricca, R.L. On the groundstate energy of tight knots. Proc. R. Soc. A. Submitted (2009).

[2] Ricca, R.L. Topology bounds energy of knots and links. Proc. R. Soc. A 464, 293-300 (2008).

[3] Ricca, R.L. (Ed.) Lectures on Topological Fluid Mechanics. Lecture Notes in Mathematics vol. 1973, Springer-Verlag, Heidelberg (2009).