

Title: *Magnetic Levitation on the Sun*

Cluster: *Cross-Theme Theory and Data Analysis/SECTP*

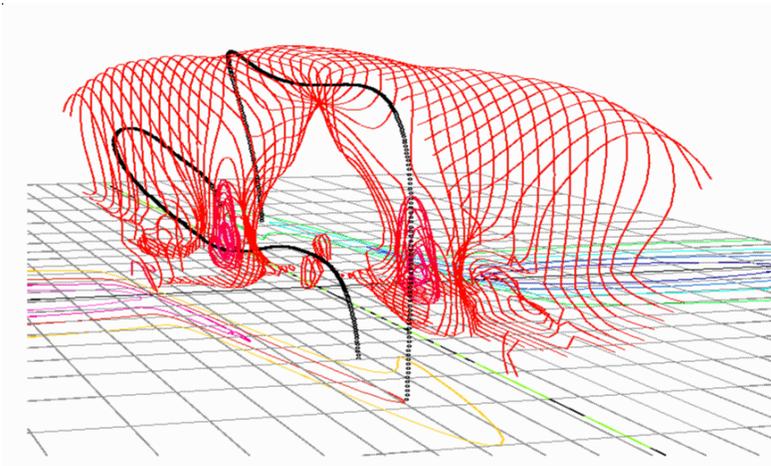
Contributor: *Spiro Antiochos/NRL*

• **Solar Prominences are Magnetically Supported Against Gravity**

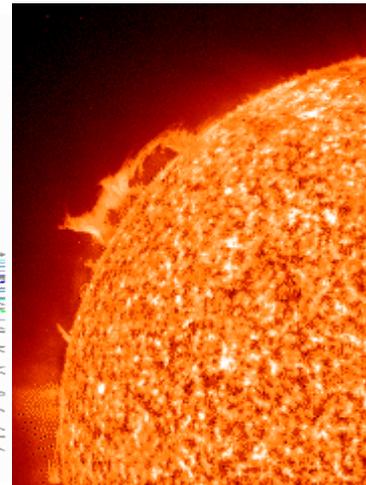
Solar prominences are mysterious and striking phenomena, with over a billion tons of heavy mass arcing in the Sun's corona. They are key components of coronal mass ejections and eruptive flares, and they have eluded understanding as to why they don't fall down under the acceleration of the Sun's gravity. Results from a 3D time dependent MHD code developed at NRL with NASA's SEC Theory Program support, show that they can be magnetically supported by the time evolving 3D structure of the Sun's magnetic field.

These models for unraveling the processes underlying mass ejection from the sun provide the theoretical foundations needed for physics-based forecasting of the sun's Space Weather impacts on spacecraft and astronauts at Earth. There is also inseparable synergy between the models and interpretation of data from NASA spacecraft science missions.

Predicted structure of prominence mass (red) lines and two of the magnetic field lines (black) holding the mass up



Solar prominence seen by EIT on SOHO March 19, 1997



Devore C. R. and Antiochos, S. K., "Dynamical Formation and Stability of Helical Prominence Magnetic Fields", **The Astrophysical Journal**, Vol. 539, p. 954, 2000.