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Title: Reconnection of Magnetic Flux Tubes

Cluster: Cross-Theme Theory and Data Analysis/SECTP

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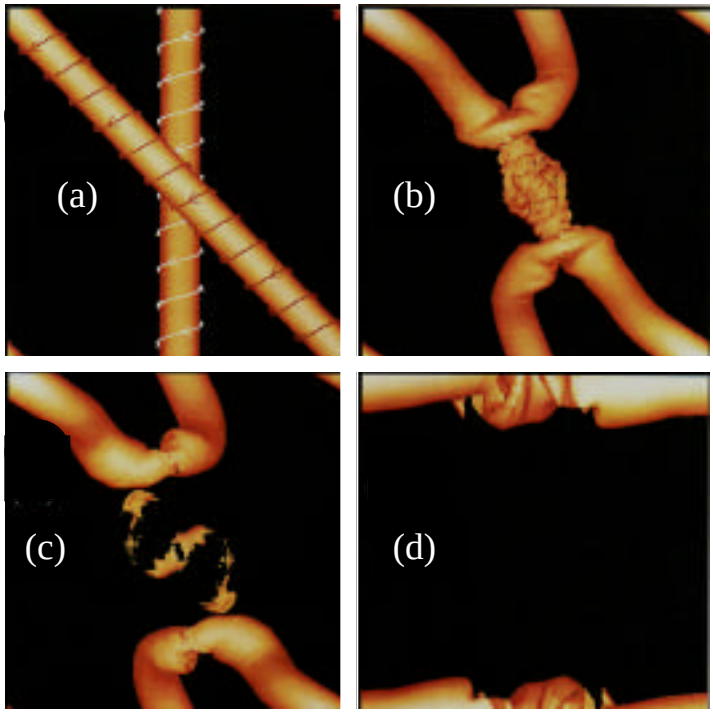
- First three-dimensional picture of reconnection process

The collision and reconnection of magnetic flux tubes has been simulated for the first time in a truly three-dimensional configuration as would occur on the sun. Upon collision, magnetic fields in the flux tubes themselves are cut and reconfigured into new configurations. The new reconnected field then snaps away from the reconnection site, just like a released rubber band. The plasma in the tubes is carried with the field and is therefore ejected from the reconnection region, as if shot from a slingshot. It is found that reconnection depends significantly on the relative orientation of the two flux tubes.

Magnetic Flux Tubes are the basic building blocks of solar magnetic fields. When they collide with each other in the solar atmosphere, they reconnect to release their stored magnetic energy, causing solar flares. The solar particles accelerated by these flares interact with the Earth's magnetic field and ionosphere, damaging satellites and disrupting radio communications. Thus the complex three-dimensional reconnection of magnetic flux tubes is a major driver of space weather and is of great importance to NASA's Living With a Star program.

Reconnection of Magnetic Flux Tubes

Time sequence of 2 merging flux tubes: Flux tubes meet (a), merge (b), reconnect (c), Separate (d).



Reference: Linton, Dahlburg and Antiochos, "Reconnection of Twisted Flux Tubes as a Function of Contact Angle, Ap. J., **553**, 905-921, 2001