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## Physics Colloquium

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# “How magnetic energy is stored and released in a star's corona: The Basics”

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**Department of Physics**  
**Montana State University**

**Friday, January 17, 2014**  
**4:10 – 5:00 pm, 108 EPS**

**Abstract:** Solar flares are dramatic events marked by a sudden spike in radiation, including gamma rays, X-rays and visible light, and the ejection of material into space at high speed (often thousands of kilometers per second). Both of these can significantly affect our quotidian lives by disrupting electric power, communications, and GPS performance. Prior to its release, the flare's energy appears to have been stored over vast volumes in the magnetic field above the solar surface. But how can magnetic energy be converted into all the other forms we observe? The basic element underlying current solar flare models involves the equivalence of magnetic energy to the length of magnetic field lines - directly analogous to the potential energy of an elastic string. In minimizing their overall lengths, magnetic field lines naturally create discontinuities in the magnetic field direction (i.e. current sheets). An electric field localized to a very small portion of such a discontinuity can reconfigure the magnetic field lines so as to permit shortening and therefore energy release. I show how the rapid shortening which ensues converts magnetic energy rapidly into kinetic energy, shocks, and then heat.

**Host:** Jiong Qiu  
**Refreshments 3:45 p.m. courtesy of Jiong Qiu**  
**EPS 2nd Floor Atrium**

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