The Sun generates the biggest explosions in the solar system, solar flares and coronal mass ejections. Solar flares are sudden outbursts that rip through the solar atmosphere releasing unimagined amounts of energy, heating the solar corona to temperatures between 10–20 million of degrees. Coronal mass ejections are enormous eruptions of solar coronal material that send clouds of hot, magnetized plasma out into planetary space. These two eruptive events are linked, but what causes them is still not completely understood. One physical mechanism, called magnetic reconnection, is believed to be related to their onset. This mechanism occurs at very small scale in the solar corona and we cannot directly observe it, even with the most advanced telescopes. However, there is indirect evidence of its occurrence. For example, we can measure some of the energy released by this process in the form of radiation. High cadence observations of energy released by solar flares show discrete pulsations over a vast energy spectrum, from radio to hard x-rays. This suggests that magnetic reconnection is patchy and intermittent, like a summer night in a garden with fireflies. We investigate this mechanism with massively parallelized simulations of coronal mass ejections and eruptive flares. I will show you results of the highest resolution up to date simulations, which allow us to resolve in detail the generation and evolution of macroscopic magnetic islands from spatially and temporally localized reconnection. We study a particle acceleration mechanism (Drake et al. 2006) for particles trapped inside these islands, which could explain the observed bursts of radiation. I will explain how the particle acceleration model works and our estimation of particle energy gains from our simulations. This work was supported by NASA's Heliophysics Supporting Research and Living With a Star Targeted Research and Technology programs.

Wednesday, March 4, 2015
4:00pm
106 Hannan Hall
Refreshments will be served at 3:45

Sponsored in part by the Graduate Student Association
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If you would like to request disability accommodations, please contact Patrick Burke at (202)-319-5315 to make arrangements.