FOR IMMEDIATE RELEASE
October 29, 2012

MEDIA CONTACTS
Saralyn Stewart
(512) 694-2320
stewart@physics.utexas.edu

Here Comes the Sun: How Solar Flares Happen Faster than Forecast

Simulations show that magnetic reconnection can take place in dense plasmas more quickly than the conventional wisdom holds.

PROVIDENCE—Scientists have struggled to predict how quickly solar flares can detach from the sun and launch the coronal mass ejections that create spectacular auroras and can disrupt communication systems and the nationwide electrical power grid. New computer simulations performed by scientists at the University of New Hampshire (UNH) and the Princeton Plasma Physics Laboratory (PPPL) suggest that conventional theory misses an important effect that drastically speeds up the process.

Solar flares detach from the sun through a process called magnetic reconnection, a common occurrence in space plasmas. The process takes place when the magnetic field lines in the electrically charged plasma of solar flares are stretched, break apart, and reconnect—leaving the plasma to fly off into space.

“Conventional wisdom asserts that reconnection happens slowly when the plasma density is high,” said Yi-Min Huang, a UNH research scientist and principal author of the paper. “What our computer simulation tells us is that slow reconnection basically doesn’t exist.”

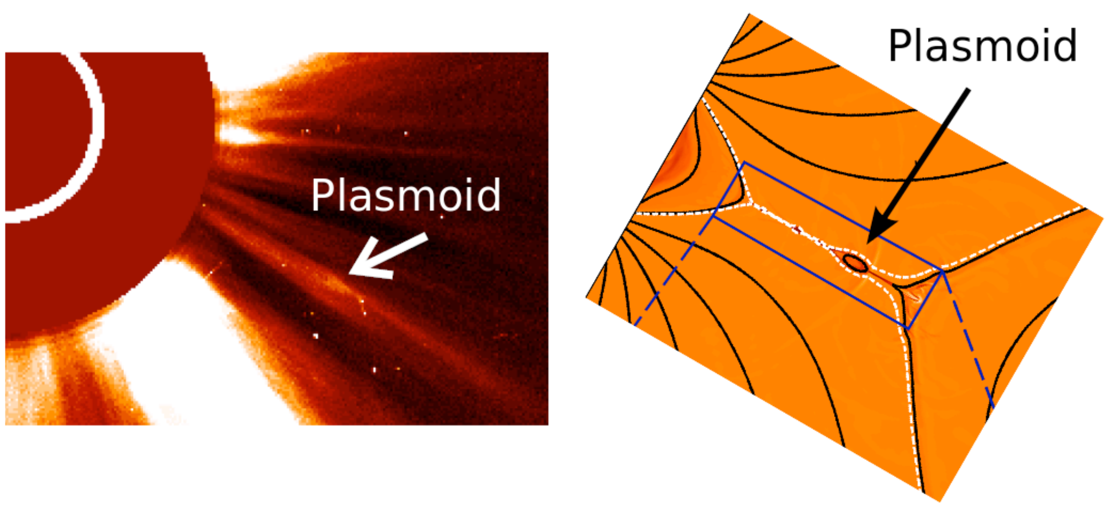

Figure 1. Left panel shows a plasmoid observed as a bright moving blob in the current sheet formed after a coronal mass ejection event, or massive release of plasma from the sun. Right panel shows computer simulation of plasmoid formation in a similar coronal mass ejection.

The new calculations reveal that the region in space where the reconnection takes place is much less stable than conventional theory predicts. The numerical simulations show the formation of a chain of plasmoids, or separate cylinders of plasma, during the reconnection process (Figure 1). Though such plasmoids have been seen in images of solar flares, according to Dr. Huang their possible role in speeding up reconnection had not been recognized.

Scientists contributing to this work include: Amitava Bhattacharjee (UNH, PPPL), Lijia Guo (UNH), and Brian P. Sullivan (UNH).

Contact:
Yi-Min Huang, yimin.huang@unh.edu

Abstracts:

BI2.00005 **Plasmoid Instability in High-Lundquist-Number Magnetic Reconnection**
Session **BI2: Laboratory Plasma Astrophysics I,**
Ballroom DE, Monday, October 29, 2012, 11:30 AM–12:00 PM

CP8.00064 **Distribution of Plasmoids in Large Scale Magnetic Reconnection**
Session **CP8: Poster Session II: Laboratory Plasma Astrophysics I; Magnetic Reconnection; ICF and HEDP**
Hall BC, Monday, October 29, 2012, 2:00 PM–5:00 PM