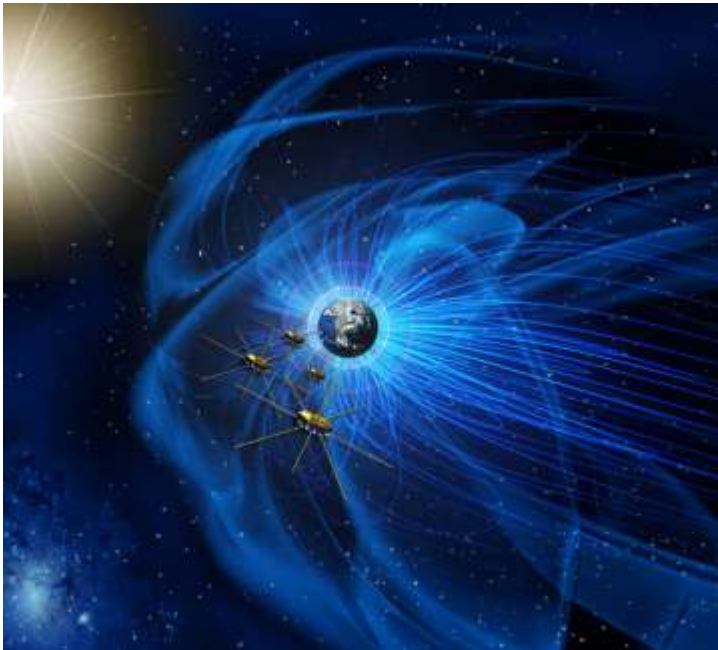


## Media Relations

March 5, 2015

### UNH Instruments to Lift Off on NASA Four-Satellite Mission March 12



Artist concept of the MMS satellites that will fly in a tight formation and provide the first three-dimensional view of magnetic reconnection. Credit:NASA.

DURHAM, N.H. – On March 12, 2015 at 10:44 p.m. EDT, scientists, engineers, and students from the University of New Hampshire’s Institute for the Study of Earth, Oceans, and Space (EOS) and department of physics will watch anxiously as ten years of exacting scientific effort is blasted into outer space by a 191-foot Atlas V rocket launched from Cape Canaveral Air Force Station, Florida.

The launch vehicle will carry a quartet of identical satellites that comprise NASA’s \$1.1-billion Magnetospheric Multiscale (MMS) mission. As part of an international team from 12 institutes, researchers at the Space Science Center housed at EOS constructed and/or coordinated more than half of the key instruments that populate each of the four satellites—each of which carries 30 instrument components for a total of 120.

The launch will be broadcast live on NASA TV: <http://www.nasa.gov/multimedia/nasatv/>

MMS will use the Earth’s magnetosphere, the comet-shaped magnetic shield that protects our planet from solar and cosmic radiation, as a laboratory to study the microphysics of magnetic reconnection—a poorly understood, universal process in which magnetic fields reconfigure themselves and release enormous amounts of energy.

These explosive reconnections drive many of the “space weather” patterns seen in the

magnetosphere. Space weather events can impact communication satellites, GPS navigation, and Earth-based power grids. Scientists want to understand how the magnetic explosions work, in part, to predict when they might occur and better protect the technologies modern society relies upon.

“The longstanding, world-class expertise of the UNH Space Science Center in space instrumentation was critical to forming our excellent international team on MMS, which will contribute many of the new observations for this exciting mission,” says physics professor Roy Torbert, UNH lead scientist for the UNH effort and deputy principal investigator for the MMS mission itself.

Each of the four satellites, flying together as a tightly coordinated, pyramid-shaped fleet through the magnetosphere, will carry identical instruments and will thus be able to gather a multi-dimensional view of the reconnection processes that has eluded previous studies. This is necessary, notes Torbert, because the area where magnetic reconnection occurs—the so-called “diffusion region”—passes by the satellites in just a tenth of a second; together, the four satellites will provide extremely precise time resolution of the process.

For nearly a decade, UNH team members built two Electron Drift Instruments for each of the four spacecraft and the central electronic controls for all the instruments being built to measure the spectrum of electromagnetic fields around the spacecraft. This “FIELDS” instrument suite is comprised of six sensors per spacecraft. The team also took over the construction of a complex, mission-critical instrument late in the game—the Spin-plane Double Probe—designed to slowly pay out 60 meters (192 feet) of spaghetti-like, high-tech cable, at the end of which is an orange-sized metallic sphere that will measure electric potential in the vacuum of space. Including sensors and associated electronics, the international FIELDS team, which was coordinated at UNH, contributed 64 of the total 120 instruments for the mission, with UNH building a total of 28.

“In a sense, MMS represents a culmination of the extensive work done in space science at the university,” Torbert says. “It is based on previous successful NASA and European Space Agency missions in which UNH has participated, such as Cluster, SOHO, ACE, Wind, and Polar, as well as our theoretical and numerical simulation work, where the process of reconnection has been observed and simulated but never studied as rigorously as will be done with MMS.”

UNH researchers are also team members on another MMS investigation, the Energetic Particles Detector Suite (EPD), which will probe the mysteries of how particles are accelerated to near-light speed through magnetic reconnection. Astrophysicist Harlan Spence, director of EOS, is a co-investigator on EPD.

Co-investigators with UNH on the FIELDS investigation on the MMS mission include the Southwest Research Institute, NASA’s Goddard Space Flight Center, the Applied Physics Laboratory at Johns Hopkins University, the Austrian Academy of Sciences, the French Laboratory for Plasma Physics, the Swedish Royal Institute of Technology, the Technical University of Braunschweig, the University of California at Los Angeles, the University of Colorado at Boulder, and the University of Iowa.

The University of New Hampshire, founded in 1866, is a world-class public research university with the feel of a New England liberal arts college. A land, sea, and space-grant university, UNH is the state's flagship public institution, enrolling 12,300 undergraduate and 2,200 graduate students.

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**Images to download:**

[http://www.eos.unh.edu/newsimage/mms1\\_lg.jpg](http://www.eos.unh.edu/newsimage/mms1_lg.jpg)

Caption: Artist concept of the MMS satellites that will fly in a tight formation and provide the first three-dimensional view of magnetic reconnection.

Credit:NASA.

[http://www.eos.unh.edu/newsimage/mms2\\_lg.jpg](http://www.eos.unh.edu/newsimage/mms2_lg.jpg)

The MMS observatories in a clean room being processed for the March 12 launch from Space Launch Complex 41 on Cape Canaveral Air Force Station, Florida. Credit: NASA/Ben Smegelsky.

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