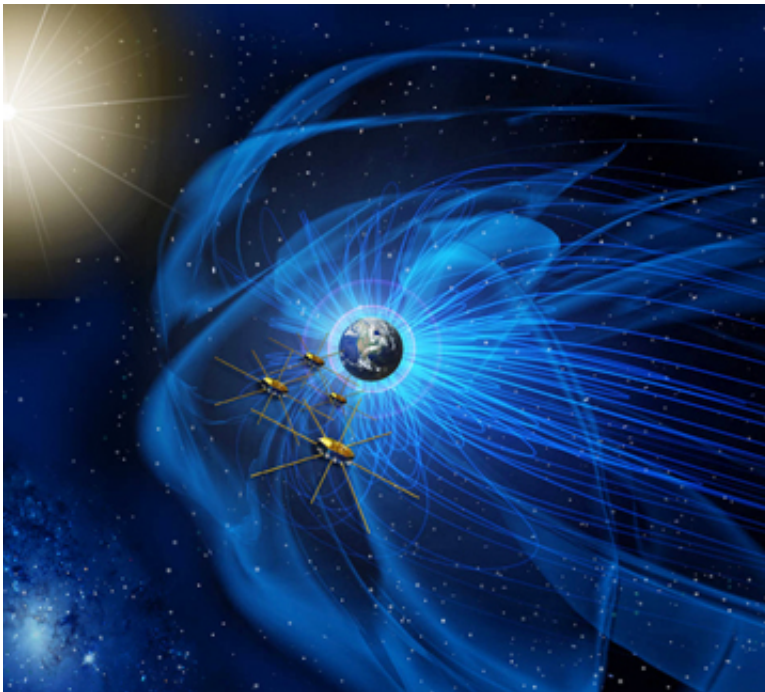


UNH instruments to lift off on NASA four-satellite mission March 12

March 6 2015, by David Sims



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.

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."

Provided by University of New Hampshire

Citation: UNH instruments to lift off on NASA four-satellite mission March 12 (2015, March 6) retrieved 19 April 2024 from

<https://phys.org/news/2015-03-unh-instruments-nasa-four-satellite-mission.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--