Goddard collaborates with international partners on Magnetospheric Multiscale instrument

May 1 2012

Takanobu Omoto (Meisei Lead Engineer), Mark Cox (MSFC), and Toshihiro Kobayashi (Meisei) test an MMS Dual Ion Spectrometer in the clean tent. Credit: Credit: NASA/MSFC

Whether it's a giant solar flare or a beautiful green-blue aurora, just about everything interesting in space weather happens due to a phenomenon called magnetic reconnection. Reconnection occurs when magnetic field lines cross and create a burst of energy. These bursts can be so energetic they could be measured in megatons of TNT. To study this phenomenon, NASA is readying a fleet of four identical spacecraft, the Magnetospheric Multiscale (MMS) mission, for a planned launch in 2014.

At NASA's Goddard Space Flight Center in Greenbelt, Md., a team of scientists and engineers are working on a crucial element of the MMS instrument suite: the Fast Plasma Instrument (FPI). Some 100 times faster than any previous similar instrument, the FPI will collect a full sky map of data at the rate of 30 times per second -- a necessary speed given that MMS will only travel through the reconnection site for under a second.

"Imagine flying by a tiny object on an airplane very rapidly," says Craig Pollock, the Co-Investigator for FPI at Goddard. "You want to capture a good picture of it, but you don't get to just walk around it and take your time snapping photos from different angles. You have to grab quick shots as you're passing. That's the challenge."

FPI is being assembled at Goddard, from sub-assemblies built there, at the Southwest Research Institute in San Antonio, Texas, and at the Meisei Electric Company, Ltd. in Isasaki Japan. FPI sensors are being tested at Goddard, NASA's Marshall Space Flight Center in Huntsville, Ala., and at Japan's Institute of Space and Astronautical Science near Tokyo.

During the last week of March, 2012, researchers from all four teams came together at the Low Energy Electron and Ion Facility (LEEIF) at the National Space Science and Technology Center in Huntsville to test part of the FPI: the Dual Ion Spectrometer (DIS) flight sensors built at Mesei. The tests focused on the instrument's response when exposed to the space environment.

In the LEEIF facility, scientists and engineers expose the Dual Ion Spectrometer to ion beams of specific energy from specific directions to determine the response. This known response will be used to calibrate the flight data. Each of the MMS spacecraft will need four spectrometers, so there are 16 DIS instruments total. They will be paired

with 16 Dual Electron Spectrometers (DES) and 6 Instrument Data Processing Units (IDPUs) that are being built at Goddard to complete the full FPI.

Provided by NASA's Goddard Space Flight Center