

MMS Mission

The Magnetospheric Multiscale (MMS) mission is comprised of four identical spacecraft—each containing 27 instrument components. The mission will use the Earth’s magnetosphere as a laboratory to study the microphysics of magnetic reconnection. Magnetic reconnection is the primary process by which energy is transferred from solar wind to Earth’s magnetosphere and is the physical process responsible for solar flares, geomagnetic storms and many other energetic phenomena throughout the universe, such as the acceleration of charged particles to high energies, and in the laboratory, where it limits the efficiency of magnetic fusion devices. The four spacecraft will fly in a pyramid formation, adjustable over a range of approximately 6 to 250 miles. The data from MMS is intended to be used to greatly improve the models which predict space weather in support of both terrestrial and space exploration activities.

Solar Arrays

Eight solar arrays provide the energy needed to power each observatory. With one panel on each of the eight sides, the slowly rotating spacecraft will always have half of the panels exposed to the sun, except during eclipses when the earth blocks all sun-light. During eclipse, a lithium-ion battery provides power.

Spacecraft Deck (bottom deck)

The Spacecraft Deck supports all of the systems needed to power, control, and communicate with the spacecraft throughout the mission. It uses star sensors and accelerometers to determine the orientation and motion of the spacecraft as well as GPS to determine its precise location and orbital velocity.

Propulsion Module

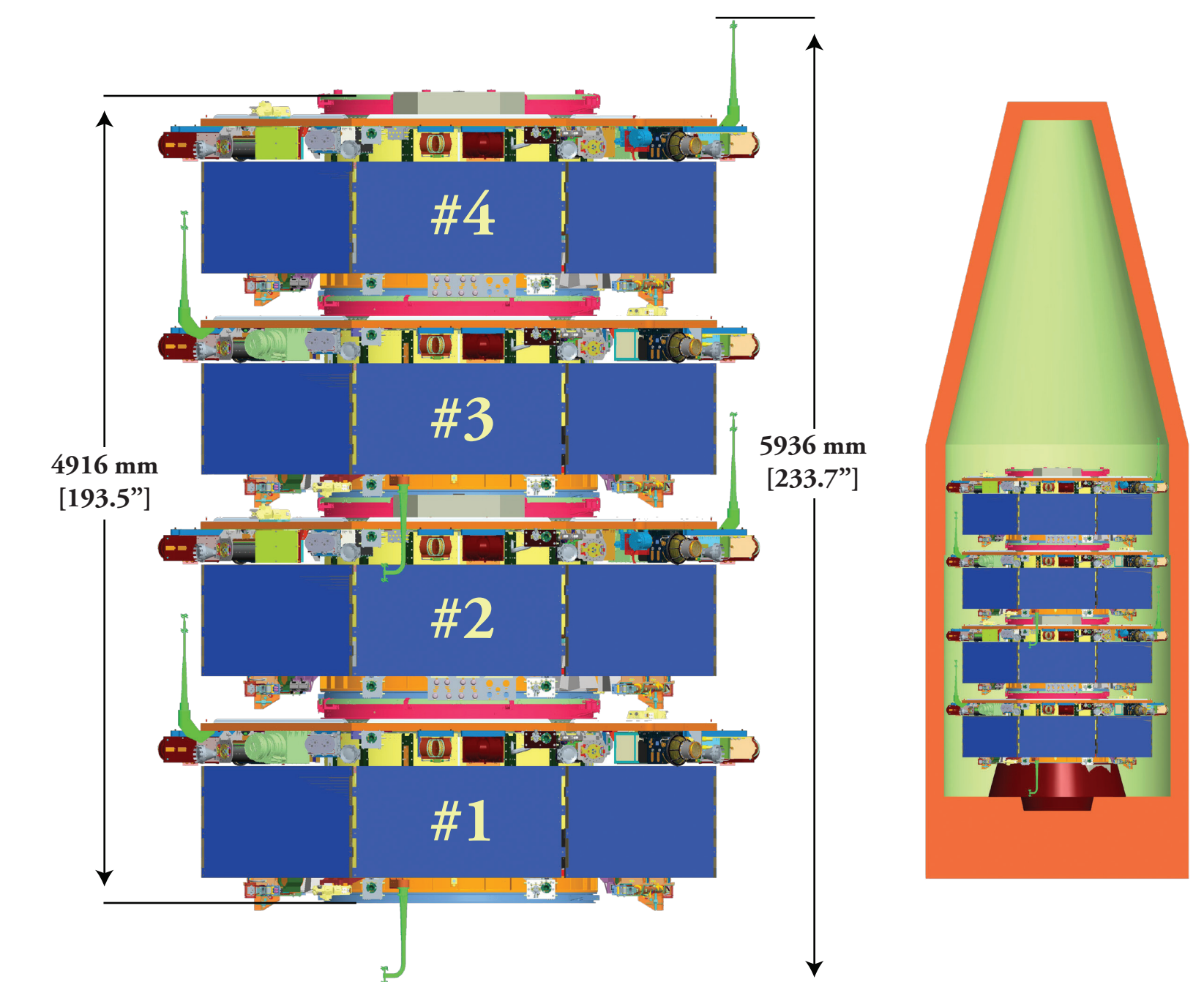
Four titanium tanks inside each observatory carry the hydrazine propellant needed for propulsion on MMS. Each spacecraft will carry about 410 kg of hydrazine and has 12 thrusters which are used for managing momentum, changing orientation, and maneuvering the four spacecraft together in their precise tetrahedral (pyramid-like) orbital formation.

Instrument Deck (top deck)

The Instrument Deck of each spacecraft is equipped with 25 different sensors selected to provide the most useful scientific data for the MMS Mission. This diverse collection of instruments measures the behavior of electromagnetic fields, ions, and electrons in the regions of space where the magnetic fields of the Earth and the Sun meet.

Thrust Tube

The Thrust Tube is the central cylinder of the MMS spacecraft. All tubes are identical in design and support launch loads for the entire stack of observatories. They provide the mounting interfaces for a variety of components including the separation systems, instrument and spacecraft decks, accelerometers, propulsion components, and propellant tanks.



MMS Launch Configuration

The four observatories are launched on the same Atlas-V launch vehicle. The “stack” of four is connected to the Atlas-V’s Centaur upper stage via a separation system provided by ULA.

Learn more about the MMS spacecraft design and mission by visiting the MMS website at <http://mms.gsfc.nasa.gov>. Explore the latest images, animations, and podcasts while having access to a wide range of science and engineering educational activities.

