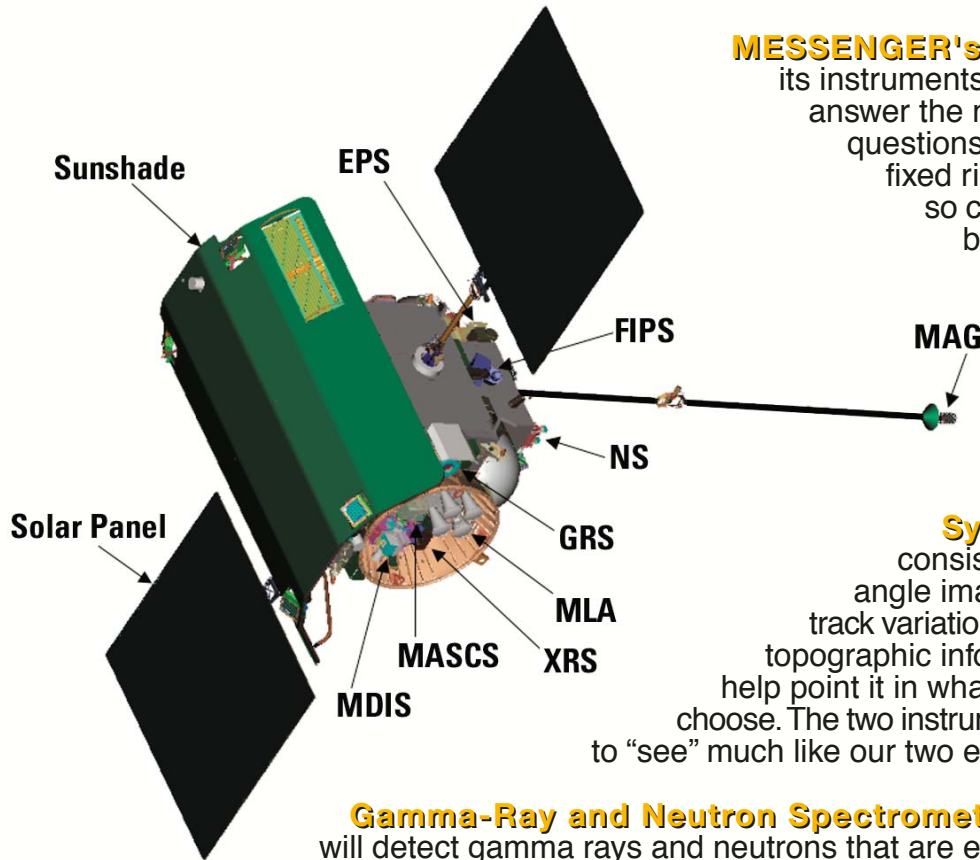


MESSENGER Spacecraft Payload



MESSENGER's science payload—its instruments—was carefully chosen to answer the mission's six key science questions. Most of the instruments are fixed rigidly to the spacecraft's body, so coverage of Mercury is obtained by spacecraft motion over the planet. Instrument descriptions, and how each instrument provides information needed to understand Mercury, follows.

Mercury Dual Imaging System (MDIS): This instrument consists of wide-angle and narrow-angle imagers that will map landforms, track variations in surface spectra and gather topographic information. A pivot platform will help point it in whatever direction the scientists choose. The two instruments will enable MESSENGER to "see" much like our two eyes do.

Gamma-Ray and Neutron Spectrometer (GRNS): This instrument will detect gamma rays and neutrons that are emitted by radioactive elements on Mercury's surface or by surface elements that have been stimulated by cosmic rays. It will be used to map the relative abundances of different elements and will help to determine if there is ice at Mercury's poles, which are never exposed to direct sunlight.

X-Ray Spectrometer (XRS): Gamma rays and high-energy X-rays from the Sun, striking Mercury's surface, can cause the surface elements to emit low-energy X-rays. XRS will detect these emitted X-rays to measure the abundances of various elements in the materials of Mercury's crust.

Magnetometer (MAG): This instrument is at the end of a 3.6 meter (nearly 12-foot) boom, and will map Mercury's magnetic field and will search for regions of magnetized rocks in the crust.

Mercury Laser Altimeter (MLA): This instrument contains a laser that will send light to the planet's surface and a sensor that will gather the light after it has been reflected from the surface. Together they will measure the amount of time for light to make a round-trip to the surface and back. Recording variations in this distance will produce highly accurate descriptions of Mercury's topography.

Mercury Atmospheric and Surface Composition Spectrometer (MASCS): This spectrometer is sensitive to light from the infrared to the ultraviolet and will measure the abundances of atmospheric gases, as well as detect minerals on the surface.

Energetic Particle and Plasma Spectrometer (EPPS): EPPS measures the composition, distribution, and energy of charged particles (electrons and various ions) in Mercury's magnetosphere.

Radio Science (RS): RS will use the Doppler effect to measure very slight changes in the spacecraft's velocity as it orbits Mercury. This will allow scientists to study Mercury's mass distribution, including variations in the thickness of its crust.