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Mercury: Visiting an Elusive Planet (B07)

OBSERVATIONS OF MAGNETIC FIELD, PLASMA, AND ENERGETIC PARTICLES DURING MESSENGER'S FLYBY OF MERCURY ON JANUARY 14, 2008

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Our knowledge of Mercury's magnetosphere had been derived from two Mariner 10 flybys in 1974–1975 that established the presence of an intrinsic magnetic field and of some energetic and plasma electrons. Launched on August 3, 2004, MESSENGER executed the first of three flybys of Mercury on January 14, 2008. The Magnetometer provided high-resolution (0.047-nT) observations of the field, establishing firmly its dipolar nature but with substantial external components, well-defined bow shock and magnetopause crossings both inbound and outbound, and large-amplitude waves in yet to be delineated regions. The Energetic Particle and Plasma Spectrometer (EPPS) instrument consists of two sensors: The Fast Imaging Plasma Spectrometer (FIPS), a novel fish-eye lens sensor, observed for the first time in Mercury's magnetosphere low-energy ions consisting of both heated solar wind and heavier (M/Q¿4) ions most likely originating in Mercury's exosphere and/or surface. The Energetic Particle Spectrometer (EPS) searched for ions and electrons having E¿ 15 keV, expected to be observed on the basis of

Mariner 10 results, but detected none. Count rates for both ions and electrons during magnetospheric traversal were indistinguishable from background, a generous upper limit being less than 0.1 percent of the intensities reported for Mariner 10. The interplanetary magnetic field was pointing generally northward both prior to entry and after spacecraft exit from the magnetosphere. The observations provide new constraints on existing models of solar wind's interaction with the planet.