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Mercury Plasma/Particle Experiment (MPPE) onboard BepiColombo/MMO

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Mercury is one of the least explored planets in our solar system. No spacecraft has visited Mercury since Mariner 10 made three flybys two in 1974 and one in 1975. Though nearly 30 years have passed since the Mariner-10 Mercury fly-bys, most aspects of Mercury remain unknown. In order to elucidate the detailed plasma structure and dynamics around Mercury, an orbiter BepiColombo MMO (Mercury Magnetospheric Orbiter) is planned to be launched in the timeframe between 2012 and 2013 as a joint mission between ESA and ISAS/JAXA. Although the plasma scientific payload of Mariner 10 was very limited, it made a very important discovery that Mercury possesses an intrinsic magnetic field, whose intensity was in a very intriguing range in terms of comparative planetary magnetospheres. The dominance of the dipole term in the spherical harmonic expansion of Mercury's magnetic field suggests that the interaction between the solar wind and Mercury's magnetosphere should be "Earth-like", in contrast to the cases of Mars and Venus where the planetary magnetic fields have only local effects on the interaction. On the other hand, because of its small size and gravity, Mercury has very different environmental characteristics compared to the Earth. In order to investigate the plasma/particle environment around Mercury, Mercury Plasma/Particle Experiment (MPPE) was proposed. MPPE is a comprehensive instrument package for plasma, high energy particle and energetic neutral atom measurements. It consists of 7 sensors: two Mercury Electron (MEA1 and MEA2), Mercury Ion Analyzer (MIA), Mercury mass Spectrum Analyzer (MSA), High Energy Particle instrument for electron (HEP-ele), High Energy Particle instrument for ion (HEP-ion), and Energetic Neutrals Analyzer (ENA).