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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. Except the recent Mercury flyby of MESSENGER, no spacecraft has visited Mercury since Mariner 10 made three flybys two in 1974 and one in 1975. 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 2013 as a joint mission between ESA and ISAS/JAXA. Mercury Plasma/Particle Experiment (MPPE) was proposed in order to investigate the plasma/particle environment around Mercury. 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). Instrument PDR of MPPE sensors were held in October-November 2007. Though some action items are still left, all the MPPE sensors are approved to proceed to EM development phase. One of the important development items is the thermal design of the instrument. Since the thermal environment around Mercury is quite severe, the thermal input from the open area of the plasma/particle sensors should be minimized. Each sensor has its own thermal shield that is thermally insulated from the analyzer. It is very difficult to keep the sensor temperature within an acceptable range while minimizing the thermal input to the spacecraft. The detailed observation mode of MPPE sensors is also under consideration. Since the expected telemetry rate is much lower than the total data generated by the sensors, integrated observation mode including all the MPPE sensors

should be created in order to maximize the science output.