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Plasma / Radio Wave Observation plans for Mercury science: Plasma Wave Investigation (PWI) aboard BepiColombo / MMO

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The BepiColombo MMO (Mercury Magnetospheric Orbiter) spacecraft comprises the plasma and radio wave observation system called Plasma Wave Investigation (PWI). The PWI is designed and developed in collaboration between Japanese and European scientists. Since plasma/radio wave receivers were not installed in the former spacecraft, Mariner 10, which observed the planet Mercury, the PWI onboard the MMO spacecraft will provide the first plasma/radio wave data from Mercury orbit. It will give important information for studies of energy exchange processes in the unique magnetosphere of Mercury characterized by the interaction between the relatively large planet without ionosphere and the solar wind with high dynamic pressure. The PWI consists of 3 sets of receivers (EWO, SORBET, and AM2P), connected to two sets of electric field sensors (MEFISTO and WPT) and two kinds of magnetic field sensors (LF-SC and DB-SC). The PWI will observe both waveforms and frequency spectra in the frequency range from DC to 10 MHz for the electric field and from 0.1 Hz to 640 kHz for the magnetic field. In the present paper, we demonstrate the scientific objectives of plasma/radio wave observation around Mercury and “the first electric field / plasma waves / radio waves observations” executed around the Mercury.