

Measurement of Dust Environment around Mercury by MDM (Mercury Dust Monitor) on Board MMO Bepi Colombo

Sho Sasaki, MDM Team, National Astronomical Observatory of Japan

To clarify the dust environment around Mercury, MDM (Mercury Dust Monitor) will be on board MMO (Mercury Magnetosphere Orbiter) Bepi Colombo. MDM will measure interplanetary dust particles (IDP) from asteroids and comets, beta meteoroids, particles from Mercury as impact ejecta, and possibly interstellar dust particles. An order of magnitude higher dust flux is expected at the Mercury's orbit than at the Earth's orbit. It is important to determine dust particle flux onto Mercury, since dust particles would be at least partly the source of sodium atmosphere of Mercury.

The MDM consists of four lightweight heat-resistant piezoelectric ceramic sensors of lead zirconate titanate (PZT), with the total area 64 cm^2 . The minimum detectable mass of dust particles is $1 \times 10^{-13} \text{ g}$ assuming that dust impact velocity is 30 km/s . The MDM is attached to the side panel of MMO.

Previously Helios spacecraft measured dust flux in the inner solar system down to 0.3 AU but observation time around perihelion was limited since the aphelion was around the Earth's orbit. Interaction of dust particles with Mercury was not measured at all. MDM/Bepi Colombo will first measure dust environment around Mercury.

MDM team members are Hiromi Shibata (PI: Kyoto University), Ken-ichi Nogami, Masayuki Fujii, Hideo Ohashi, Sho Sasaki, Takeo Iwai, Maki H. Nakamura, Seiji Takechi, Shigeyuki Minami, Takashi Miyachi, Hiroshi Kimura, Sunao Hasegawa, Takayuki Hirai, Hajime Yano, Eberhard Gruen, and Ralf Srama.