

Spectroscopic observation of the sodium tail on Mercury at Mt. Haleakala

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Mercury sodium exosphere has been intensively investigated since its discovery in 1985 by ground-based spectroscopic observation. While there have been a number of works for sodium distribution on Mercury, the sodium tail that extends anti-sunward direction due to solar radiation pressure is the subject in the present study.

Because of difficulty in observation of the Mercury sodium tail due to its faint emission compared to that on the Mercury disk, its observation results have only been given by Potter et al. [2002, 2007], Kameda et al. [2006] and Mendillo et al. [2007]. Their results showed that the tail extends 40,000 km in the north-south direction, and $\sim 2,500,000$ km in the east-west direction. Their observation also provided us with information such like velocity distribution of sodium atoms in the tail, lifetime for ionization, and initial velocity of sodium atoms at the surface.

We have made observation of the Mercury sodium tail at Mt. Haleakala in Maui, Hawaii using a high-dispersion Echell spectrograph coupled to a 40-cm Schmidt Cassegrain telescope in June 2007. From this observation, anti-sunward velocity of sodium atoms in the tail was obtained for an extension of as far as $\sim 250,000$ km ($100R_M$) from Mercury. The distribution of sodium velocity provides the detailed behavior of sodium atoms beyond 40,000 km from Mercury, up to which observation had been made by Potter et al.[2002]. Since the spectrograph slit was also aligned to the north-south direction, two-dimensional distribution of the tail was obtained. Detailed results of data analysis, including sodium velocity field, will be given at the presentation.