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火星周回探査機搭載用サブミリ波サウンダ FIRE の開発状況 II
FIRE: Submillimeter sounder for the Maratian atmospheric observations

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This paper describes the development status of a submillimeter atmospheric emission sounder FIRE which is proposed as an onboard payload of the Japanese Mars meteorological orbiter MELOS.

The submillimeter wavelength has potential advantages for the atmospheric remote sensing as there exist a large number of roto-vibrational transitions of many photochemically important species in the Martian atmosphere such as H2O, H2O2, HO2, CO, O2, O3 and SO2. The vertical profiles of the atmospheric state (e.g., temperature, chemical compositions) can be retrieved by using the pressure dependency of the spectral line shape of those rotational transitions. Furthermore, thanks to high frequency resolution of the heterodyne technique, direct measurements of wind speed are realized through observing the Doppler shift of the molecular spectrum. Last but not least, the submillimeter observation is independent of dust opacity and local time. All these characteristics make the submillimeter instrument unique, and will provide a substantial progress on the Martian meteorological understanding.

We present the results of the measurement sensitivity study with respect to the key physical parameters such as H2O, temperature, HDO/H2O, and line-of-sight wind velocity, with assuming realistic instrumental parameters.

キーワード: Mars, sub-mm sounder
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