

Radiative Transfer Simulations for 1.9 THz Band Remote Sensing Observations of the Martian Atmosphere with SMILES-2

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For better understanding of global warming and space weather predictions, recovery of Ozone layer, physics and dynamics such as planetary and gravity waves, and chemical reaction networks of the Earth's middle atmosphere, the Submillimeter Wave Limb Emission Sounder 2 (SMILES-2) mission is currently being studied. The target species of the SMILES-2 are H₂O, N₂O, NO₂, NO, CO, H₂CO, OH and O-atom, and so on, which are also key species to study the CO₂ stability problem on the terrestrial planets of the solar system and the formations/sources and destruction processes of CH₄ on Mars. The SMILES-2 will employ 4 K-cooled superconductor/insulator/superconductor mixer detectors and superconducting hot-electron bolometer mixer (HEBM) detectors for the frequency bands below 600 GHz and above 1.8 THz, respectively.

Currently we are developing a superconducting NbTiN HEBM detector integrated with a waveguide slot and a horn antenna for 1.8-2.0 THz band remote sensing observations. We also carried out the feasibility studies of the spectral lines of HO_x, CO, NO_x, and their isotopes in the Martian atmosphere observed with SMILES-2 equipped with the HEBM by performing the radiative transfer simulations. In this conference, we will present the results of these simulations.

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