

Mars atmosphere remote sensing at THz frequencies.

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The capabilities of a far InfraRed (IR) heterodyne spectrometer on board a Mars orbiter to study the lower and the middle atmospheric composition (~100 km) are investigated. So far there is no such receiver orbiting around Mars. It will provide additional and complementary informations to understand the atmospheric chemistry and dynamics as well as the Mars climate. Compared to shorter wavelength, the FIR radiation has the following advantages: 1) no contamination by aerosols with small size (e.g. ice cloud, dust) 2) observation can be conducted day and night, and 3) thermodynamic equilibrium can be assumed up to above 100 km, i.e. the observed spectroscopic lines are rotational transitions in the fundamental vibrational state.

The thermal emission spectrum is rich of spectroscopic lines that allow to retrieve the vertical distribution of temperature, winds and trace gases such as water vapor, carbon monoxide, molecular oxygen and their isotopes as well as very low abundant species (e.g., H₂O₂, OH, HO₂, HCl, ...). The possibility to retrieve aerosol properties might also be possible.

The instrument characteristics are compatible with the current available technology in order to allow an instrument development for a launch in 2012-2014.

In this study we will focus on the tools that have been developed for retrieval analysis. A summary and the discussion of the results will be presented in another presentation of this session.