A THz FTS for Site Testing at Dome A

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Abstract

With an altitude of 4093m and temperatures as low as -80 celsius degree, Dome A in Antarctic is a very attractive site for astronomical observations, especially at frequencies beyond 1THz. Preliminary observation results by a radiometer at 661GHz, which was brought to Dome A in 2008 by Chinese Antarctic expedition team, have demonstrated that Dome A has the lowest PWV among those good THz sites (ALMA site, South Pole and Dome C, for example) on the earth which have been investigated. To have better understanding on the atmospheric condition at Dome A, we have developed a broadband THz FTS to be deployed to the site in Jan. 2010. The FTS will measure atmospheric emission in the frequency range of 0.75-15THz (split in two bands), from which atmospheric transmission is derived using an atmospheric propagation model. Broad spectral coverage helps make this derivation more accurate—this is particularly important at Dome A, where the extremely cold temperatures lie well outside the tested range of water vapor continuum models. The FTS mainly consists of a Martin-Puplett interferometer subsystem in rapid scan mode, which is fabricated by BlueSky and QMC, an outdoor subsystem for atmospheric signal coupling and calibration, and a data acquisition subsystem. Two room-temperature DLATGS detectors with respective filters (short- and long-wavelength ones) are employed since the FTS is designed for unattended and long-duration operation. The details of the FTS and preliminary measurement results will be presented.