

A Compact Millimeter-Wavelength Fourier-Transform Spectrometer

Wednesday, 2 December 2020 08:45 (25 minutes)

We have constructed a Fourier-transform spectrometer (FTS) operating between 50 and 330 GHz with minimum volume (355x260x64 mm) and weight (5.9 kg) while maximizing optical throughput ($100 \text{ mm}^2 \text{ sr}$) and optimizing the spectral resolution (4 GHz). This FTS is a modified polarizing Martin-Puplett interferometer with unobstructed input and output in which both input polarizations undergo interference. The instrument construction is simple, with mirrors milled on the box walls and one motorized stage as the single moving element. We have characterized the performance of the FTS and compared the measurements to an optical simulation. The instrument was used to characterize the end-to-end spectral response of a kilo-pixel radiometer constructed for the South Pole Telescope. The same FTS is also a prototype similar to the instrument designed for a NASA MIDEX mission (PIXIE) for measuring cosmic microwave background (CMB) B-modes and spectral distortion in space.

Presenter: PAN, Zhaodi

Session Classification: 7. methods: instrumentation 3