A Strange noise that seems to be generated from inside the NTD Ge Bolometer

We have constructed a metal-mesh Fabry-Perot interferometer (FPI) and are using the NTD Ge Bolometer to realize an ultra-sensitive millimeter wave/terahertz wave spectrometer (Fig. 1).

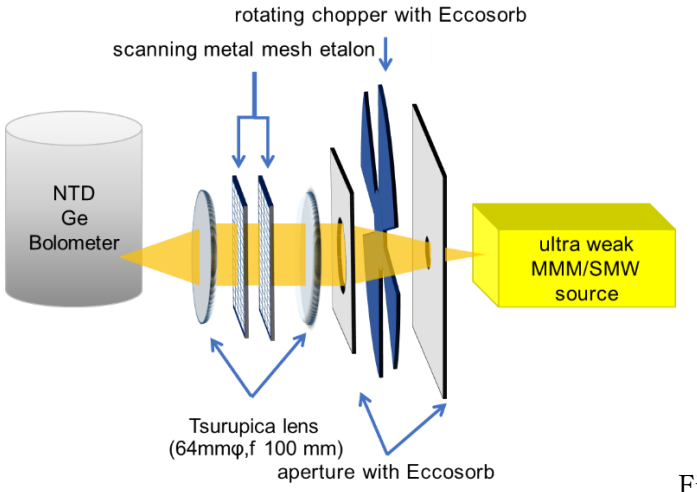

Fig. 1

Since the delivery of the NTD Ge Bolometer, the FPI (metal mesh scanning etalon) has detected a beat noise of about 300 GHz, as shown in Fig. 2, even when the MMW source was turned off. The magnitude of this beat noise varies from time to time.

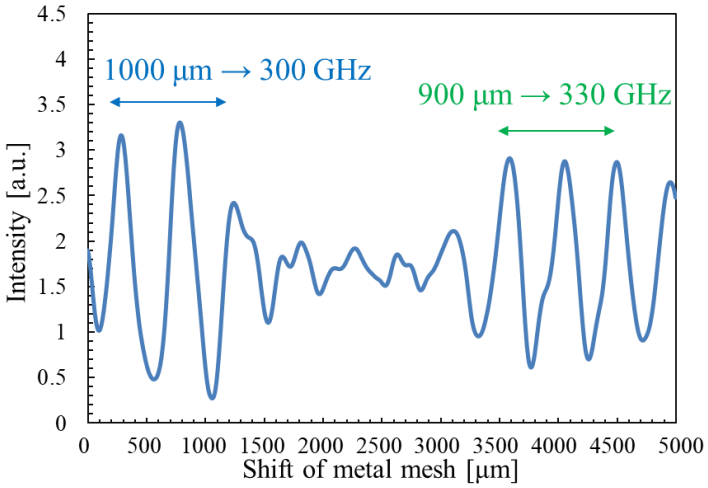

Fig.2

In a recent measurement, when nothing was placed at position of MMW source in Fig. 1, an orange line interference waveform was obtained as shown in Fig. 3. On the other hand, when an aluminum mirror was placed instead of the MMW source, a blue line interference waveform was obtained and the interference waveform became stronger (Fig. 3). This suggests that the NTD Ge Bolometer itself generates noise, which is reflected by the aluminum mirror and reentered the NTD Ge Bolometer, resulting in the interference

waveforms.

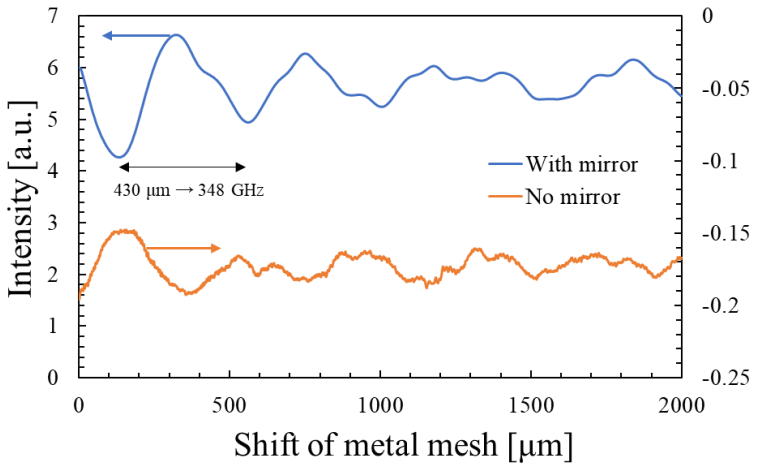

Fig. 3

To further confirm the source of the noise, we placed an aluminum mirror in front of the window of NTD Ge Bolometer as shown in Fig. 4, and observed the DC signal from the detector. The noise was observed only when the mirror was parallel to the detector window (a movie of this experiment is attached). This leads us to speculate that the noise is coming from inside the detector.

The frequency of the currently observed noise is around 300 GHz, which is close to the frequency of the low-pass filter (< 350 GHz) installed inside the detector. Does this have anything to do with it?

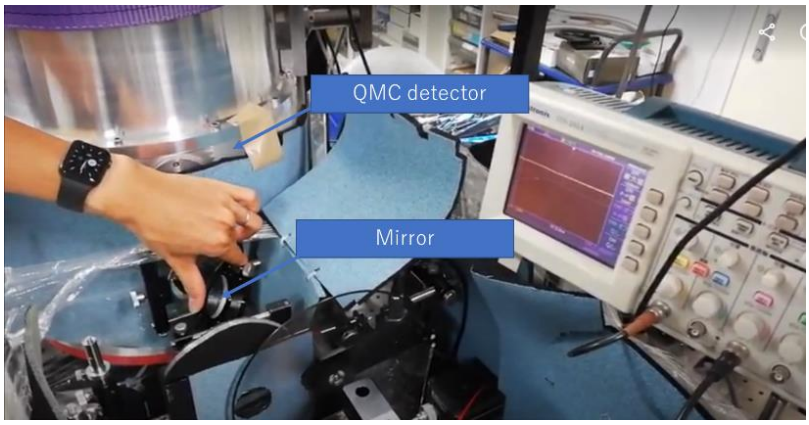

Fig. 4

As described above, we are having trouble making ultra-high-sensitivity spectroscopic measurements due to this strange noise, so please let me know how to solve this problem.