V135a Measurement of Transmission Loss of a Superconducting Transmission Line with On-chip Resonators at $2\,mm$ Wavelength

Wenlei Shan, Shohei Ezaki (NAOJ)

We have been developing an innovative approach to enable compact focal plane heterodyne detector arrays with SIS mixers for wide field-of-view astronomical observation at mm and sub-mm wavelengths.The new scheme is characterized by the adoption of superconducting monolithic microwave integrated circuits (MMICs), in which superconducting thin film transmission lines are adopted for guiding signals and LOs. The sensitivity of the SIS mixers is highly dependent on the transmission loss of these transmission lines, which remains not fully understood owing to the prohibitive difficulties in the measurement. We used a new method to measure the transmission loss by making use our dual-polarization MMIC receivers. In one of the polarization routes, half-wavelength resonators are coupled to the signal path, while the other polarization route is used as a calibrator. By using a sweeping CW source and SIS junctions as direct detectors, the resonance curves of the resonators can be recorded. Finally the transmission loss is retrieved from the Q-factor of these on-chip resonators. In this presentation, the results about this experiment will be presented. The conclusion is that, the transmission loss of superconducting thin film transmission lines is not a limiting factor in the application of MMIC technology at mm wavelengthes for astronomical observation.