

Poster Session

(abstracts are given in alphabetical order)

The operation of SIS mixer as up- and down-converter at low frequencies for frequency multiplexing

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A feasibility study of a frequency multiplexed read-out scheme for large number Transition Edge Sensor arrays is described in paper [1]. The read-out makes use of frequency up- and down-conversion with Superconducting-Insulator-Superconducting (SIS) tunnel junctions operating at GHz frequencies, in combination with an existing frequency multiplexed read-out at MHz frequencies. Such read-out scheme can drastically reduce the wiring from room temperature to the cryogenic detectors.

Experimental measurements of a SIS tunnel junction operating as frequency up- and down-convertors at low frequencies (< 10 GHz) were carried out. A possibility to implement a “traditional” SIS-mixer for down- and up-conversion with acceptable conversion loss (well below 15 dB) has been demonstrated. Dependencies of the conversion efficiency on the SIS-junction parameters, local oscillator (LO) power and SIS-bias have been measured and compared with theoretical estimations. The best conditions for the SIS-mixer operation at low LO frequencies have been determined. The transitions between different regimes of operations (quantum and classical; quasiparticle and Josephson) have been studied in a wide bath temperature range by using specially designed circuits with an integrated control line for the Josephson effect suppression. Preliminary conclusions on the feasibility of the frequency-multiplexed TES read-out using superconducting tunnel junctions will be presented.

The work was supported by The RFBR and the Ministry of Education and Science of the Russian Federation.

References

1. G. de Lange «Feasibility of a frequency-multiplexed TES read-out using superconducting tunnel junctions», Journal of Low Temperature Physics, special issue LTD 15.