

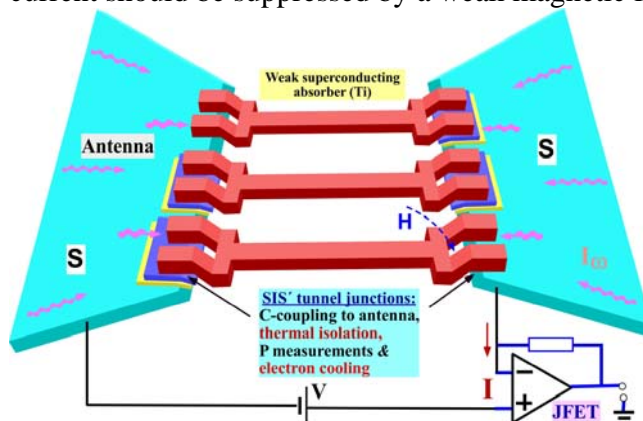
A Parallel/Series Array of Superconducting Cold-Electron Bolometers with SIS' Tunnel Junctions

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A novel concept of the parallel/series array of Superconducting Cold-Electron Bolometers (SCEB) with Superconductor-Insulator-Weak Superconductor (SIS') Tunnel Junctions has been proposed. The concept was developed for matching the CEB with JFET amplifier at conditions of high optical power load. The SCEB array is further development of CEB array in current-biased mode [1]. The main difference is in use of a weak superconducting absorber and SIS' junctions instead of a normal absorber and SIN junctions. The bias point should be at voltages less than voltage corresponding to a difference superconducting gap of electrodes and absorber $\Delta_1 - \Delta_2$. This concept gives opportunities to fabricate the SCEB array in the same technology as used for the SCEB in voltage-biased mode [2]. The SIS' junctions are fabricated in loop geometry and a critical current should be suppressed by a weak magnetic field.



For combination of effective HF operation and low noise properties, the current-biased SCEBs are connected in parallel for HF signal and in series for DC. A signal is concentrated from an antenna to the absorber through the capacitance of the tunnel junctions and through additional capacitance for coupling of superconducting islands.

The applications can be considerably extended to higher power load by distributing power between N bolometers and decreasing the electron temperature. Due to increased responsivity, the photon NEP could be easily achieved at 300 mK for number of bolometers in the array more than 4 for wide range of optical power loads. The optimal number of bolometers N for power load of 0.5 pW is equal to 8. The concept of the SCEB array has been developed for the BOOMERanG balloon telescope and other advanced cosmology instruments.

[1] Leonid Kuzmin, "Array of Cold-Electron Bolometers with SIN Tunnel Junctions for Cosmology Experiments". EUCAS-07; accepted to Journal of Physics: Conference Series (JPCS), 2007.

[2] Leonid Kuzmin, A Superconducting Cold-Electron Bolometer with SIS' and Josephson Tunnel Junctions. LTD-12, accepted to Journal of Low Temperature Physics, 2007.