

Invited Talk

Absorption of electromagnetic radiation and non-equilibrium superconductivity

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Superconductivity plays a key role in a variety of astronomical detectors. For TES devices the only role is being a thermometer of a freely suspended piece of normal matter. SIS devices provided absorption by means of a tunnel-barrier, using photon-assisted tunneling with no loss in the superconductor. STJ's and MKIDs are both pair-breaking detectors, creating a superconducting non-equilibrium state. With STJ's the read-out is done with a tunnel-junction, with MKIDs the microwave-impedance is used as a probe. Various strategies are used to describe the non-equilibrium state ranging from an increased effective temperature, excess quasiparticle density to a full microscopic treatment including non-equilibrium distributions of both electrons and phonons over the energies. The latter has been developed in the 70-ies, mostly close to T_c and for conventional superconductors. The current usage is at much lower temperatures and often for less conventional superconducting materials. I will discuss what is known and potentially useful for current detector-research and point out where improved insight is desirable.