



Contribution ID: 105

Type: not specified

A Cooper pair transistor single photon detector with quantum enhanced sensitivity

Friday, 19 March 2021 14:00 (15 minutes)

We propose the design of an ultra-sensitive THz photon detector based on a superconducting Cooper Pair Transistor (CPT). A photon absorber is connected to the gate electrode, which is coupled to a quarter wavelength coplanar-waveguide (CPW) resonator. Photon-generated quasiparticles in the absorber modify the charge on the gate, which modulates the resonator inductance that results in a shift of the resonant frequency of the CPW resonator. The exceptional charge sensitivity of the CPT provides an ideal architecture to realize a THz detector architecture capable of detecting single THz photons. Furthermore, the inherent non-linearity of the CPT allows parametric amplification by pumping on the CPT Josephson inductance to further enhance the detector sensitivity. I will present an overview of the device design, preliminary simulations, and provide initial estimates of the detector sensitivity. Phosphor

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Session Classification: Photodetectors

Track Classification: Photodetectors