THz Hot-Electron Photon Counter

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We present a concept for the hot-electron transition-edge sensor capable of counting THz photons. The main need for such a sensor would be a moderate resolution spectrometer on SAFIR with a background-limited NEP ~ 10^{-20} W/Hz^0.5 expected between 1 THz and 2 THz. Under these conditions, the rate of photon arrival is so low that any currently imaginable detector with sufficient sensitivity will operate in the photon counting mode. The hot-electron photon counter based on a submicron-size Ti bridge has a very low heat capacity which provides a high enough energy resolution (250 GHz) at 0.3 K. With the sensor time constant of a few microseconds, the dynamic range would be ~ 50 dB that should be sufficient for most of applications. The sensor couples to radiation via a planar antenna and is read by a SQUID amplifier. A compact array of the antenna-coupled counters can be fabricated on a silicon wafer without membranes. The presentation will describe the concept in detail including results of analytical and numerical modeling of the counter performance.