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High count-rate superconducting transition edge sensors for near-IR single photon detection FAUSTIN CARTER, DANIEL SANTAVICCA, LUIGI FRUNZIO, Yale University, ANTHONY ANNUNZIATA, IBM, Yale University, DANIEL PROBER, Yale University — Detection of individual near-IR photons with GHz count rates, good timing resolution, and high quantum efficiency is important in a number of applications. These include quantum key distribution, single-photon classical communication, and CMOS imaging for defect analysis. We propose a nano-scale superconducting niobium transition edge sensor (TES). The extremely small detector volume allows for single-photon sensitivity at 4 K, with a much faster response time (nsec) than conventional TES detectors operating below 0.4 K. Efficient photon coupling is achieved with a resonant near-IR planar antenna. The proposed device is intrinsically photon number resolving, unlike a niobium-nitride nanowire detector or an avalanche photodiode. We present preliminary results for device performance.

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