Detection of Single Electrons or Photons using a Superconducting Nanowire

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We report the detection of single electrons by a 6 nm-thick, 100 nm-wide, Nb0.7Ti0.3N strip deposited on a SiOx/Si substrate, already described as a low-noise Superconducting Single Photon Detector [1]. When operating around 8 K, and biased slightly below the critical current, a meander-shaped device proves able to count the single keV electrons issued from the cathode of a scanning electron microscope (SEM) with an efficiency approaching unity. It is also possible to map the electron detectivity as well as the photon detectivity on the same device. A clear correlation between the two measurements is observed, with a superior spatial resolution though (around 100 nm) for the SEM mapping.

[1]S.N. Dorenbos et al, Appl. Phys. Lett. **93**, 131101 (2008).