

# Highlights

## RESEARCH AREA 3 - Quantum Science and technologies - 2024

### Single photon detection up to 2 $\mu\text{m}$ in pair of parallel microstrips based on NbRe ultrathin films

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Superconducting microstrip single photon detectors (SMSPDs) are increasingly attracting the interest of the scientific community as a new platform for large area detectors with unprecedented advantages in terms of fabrication. However, while their operativity at the telecommunication wavelength was achieved, working beyond 1.55  $\mu\text{m}$  is challenging. Here, we experimentally demonstrate single-photon operation of NbRe microstrips at wavelengths of 1.55 and 2  $\mu\text{m}$ . The devices are structured as pairs of parallel microstrips with widths ranging from 1.4 to 2.2  $\mu\text{m}$  and lengths from 5 to 10  $\mu\text{m}$ . This innovative design may assure large sensitive areas, without affecting the kinetic inductance, namely the time performance of the detectors. The results are discussed in the framework of the hot-spot two-temperature model.

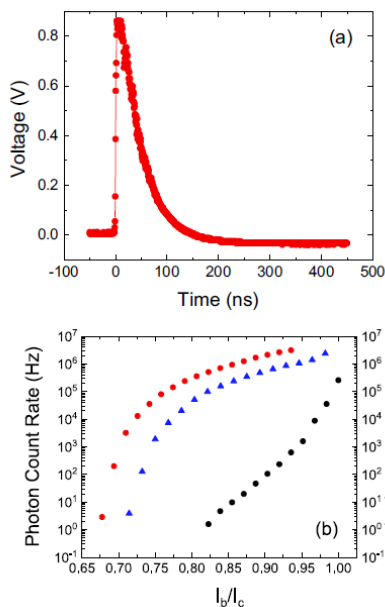


Fig. 1: (a) Typical photon response pulse for the detector D1 at  $T = 1.57$  K and  $I_b = 200$   $\mu\text{A}$  at 1.5  $\mu\text{m}$ . (b) Dark count rate (black circles) and photon count rate at 1.55  $\mu\text{m}$  (red circles) and at 2.00  $\mu\text{m}$  (blue triangles) for the device D1 at  $T = 1.57$  K.

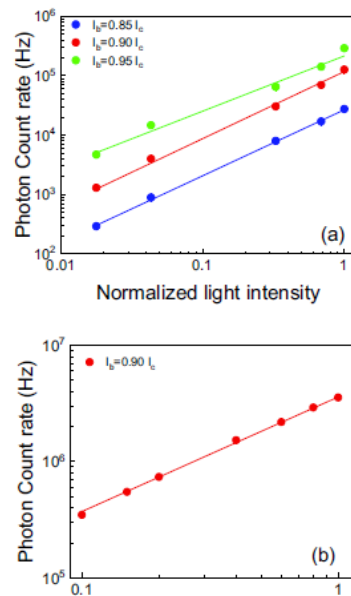


Fig. 2: Photon count rate as a function of light intensity for the device D1 at  $T = 1.57$  K. The lines represent the fitting curves of the experimental data at (a) 1.55  $\mu\text{m}$  as a function of the bias current, and at (b) 2.0  $\mu\text{m}$  for  $I_b/I_c = 0.90$ .