Superconducting Nanowire Single-photon Detectors: Quantum Efficiency vs. Thickness of NbN Films

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Abstract - The quantum efficiency (QE) of thin NbN superconducting nanowire single-photon detectors (SNSPD) has been systematically studied in a wide spectral range from 400 to 2000 nm radiation wavelength. SNSPDs were made from thin NbN films with thickness between 4 and 12 nm deposited on sapphire substrates. The observed reduction of QE with increasing radiation wavelength is caused by a crossover from the "hot-spot" to the "vortex" mechanism of the nanowire detector response. The crossover wavelength shifts to shorter wavelengths with increasing thickness of NbN films.

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