Soft X-Ray Single-Photon Detection with Superconducting Tantalum Nitride and Niobium Nanowires

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Abstract - We have fabricated ultrafast dark count-free soft X-ray single-photon detectors (X-SNSPDs) from TaN with various conduction path widths, and we compare their properties with corresponding data from a Nb X-SNSPD. The TaN X-SNSPDs offer an improved detector performance regarding device detection efficiency, latching and pulse amplitudes. Wide conduction paths allow for a certain energy-resolving capability in contrast to narrow TaN conduction paths. However, wide paths also limit the detection efficiency at low temperatures, which can be explained within a hot-spot model.

Keywords - Nanofabrication, soft X-ray detectors, superconducting nanowire single-photon detectors, superconductors, tantalum nitride.

IEEE/CSC & ESAS European Superconductivity News Forum (ESNF) No. 22 October/November 2012. ESNF Reference No.ST321 Category 4.
The published version of this preprint appeared in *IEEE Transactions on Applied Superconductivity* 23, 2200505 (June 2013).