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Temperature Dependence of Kinetic Inductance in a WSi Superconducting Nanowire Single-Photon Detector[1] KATHRYN L. NICOLICH, The Ohio State University, CLINTON T. CAHALL, Duke University, GREGORY P. LAFYATIS, The Ohio State University, JUNGSANG KIM, Duke University, DANIEL J. GAUTHIER, The Ohio State University, M. S. ALLMAN, V. VERMA, SAE WOO NAM, National Institute of Standards and Technology (NIST) — There is currently great interest in developing detectors for efficiently measuring single photons for applications in quantum information science. One appealing platform is the superconducting nanowire single-photon detector (SNSPD). Here, a single photon absorbed by a nanowire of superconductor causes a region of the wire to transition to the normal (nonsuperconducting) state, which can be sensed by passing a small current through the device. The timing jitter and reset time of the detector is related to the kinetic inductance (L_k) of the nanowire that arises from the ballistic motion of Cooper pairs through the device. Thus, it is important to understand how this inductance depends on device parameters, such as the current passing through the device as well as the temperature. Recent work has shown that L_k diverges when the nanowire is heated to T_c, which has implications in the development of novel superconducting devices. Here, we measure L_k for various temperatures in a WSi SNSPD by fitting the falling edge of measured single-photon pulses.

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