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Waveguide-integrated NbTiN superconducting nanowire single-photon detector with ultralow jitter RISHENG CHENG, XIAOSONG MA, Department of Electrical Engineering, Yale University, PRASANA RAVINDRAN, JOSEPH BARDIN, Department of Electrical and Computer Engineering, University of Massachusetts Amherst, HONG TANG, Department of Electrical Engineering, Yale University — We demonstrate NbTiN superconducting nanowire single-photon detectors (SNSPDs) integrated with Si_3N_4 waveguides for counting visible and infrared photons. The nanowires with different width (30-90 nm) and length (40-80 um) are patterned into U-shapes on 200nm-thick Si_3N_4 waveguides, and the photons travelling along the waveguides could be efficiently absorbed by the nanowires via evanescent coupling. With the use of high-speed SiGe cryogenic amplifier, which operates together with the detector chip at the temperature of 1.7K, the jitter of the detection system is measured to be only 19 ps due to the improved signal-to-noise ratio (SNR), compared to 48 ps measured with room-temperature amplifiers. By investigating the background noise level and the pulse shape of the output signal from the detector, we determine the contribution of the noise to the final system jitter is less than 3ps, indicating that our results are very close to the intrinsic jitter of the detector.

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