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Graphene Josephson Junction Microwave Detector KIN CHUNG FONG, Raytheon BBN Technologies, EVAN WALSH, Massachusetts Institute of Technology, GIL-HO LEE, Harvard University, DMITRI EFETOV, Massachusetts Institute of Technology, JESSE CROSSNO, Harvard University, LEONARDO RANZANI, THOMAS OHKI, Raytheon BBN Technologies, PHILIP KIM, Harvard University, DIRK ENGLUND, Massachusetts Institute of Technology — Modern readout schemes for superconducting qubits have predominately relied on weak microwave signal detection and discrimination. Most schemes are based on heterodyne or homodyne receiver systems and only a few have demonstrated direct detection of microwave photons. The challenges of direct detection stem from the low energy of microwave photons and existing detector efficiency. We have designed, fabricated, and measured a graphene-based Josephson junction (gJJ) microwave detector. Exploiting its low electronic thermal conductivity and specific heat, an electron temperature rise on the order of 0.1 K due to a time average of about 10 photons in the graphene thermal photodetector is readout via a Josephson junction embedded in an 8 GHz microwave cavity. We will estimate the quantum efficiency and dark count probability of the gJJ microwave single photon detectors. This document does not contain technology or technical data controlled under either the U.S. International Traffic in Arms Regulations or the U.S. Export Administration Regulations.

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