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Superconducting Bolometric Photon Detectors Using Epitaxial Niobium Thin Films KEVIN M. INDERHEES, PAUL B. WELANDER, SEONG-SHIK OH[1], JAMES N. ECKSTEIN, Department of Physics, Frederick Seitz Materials Research Laboratory, University of Illinois at Urbana-Champaign, Urbana, Illinois 61801 — Efficient single photon detection is a key part of optical qubit systems. We have made and tested superconducting bolometric photon detectors constructed from high quality epitaxial single crystal niobium films that are very flat. The devices operate at 4.2K and consist of narrow links which are current biased close to their critical current value. Absorption of a photon drives a portion of the device into the normal state, generating an observable voltage signal. The sensitivity is maximized when the link is biased near the critical current. The time averaged output voltage is linearly dependent on the optical power that illuminates the link. In order to optimize detector characteristics, we have studied the effects of changing the film thickness, the device geometry, and adding a protective cap.

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