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Development of low-noise kinetic inductance detectors for far-infrared astrophysics[1] ALYSSA BARLIS, Univ of Pennsylvania, STEVEN HAILEY-DUNSHEATH, Caltech, CHARLES M. BRADFORD, JPL/Caltech, CHRISTOPHER MCKENNEY, NIST, HENRY G. LE DUC, JPL/Caltech, JAMES AGUIRRE, Univ of Pennsylvania — The star formation mechanisms at work in the early universe remain one of the major unsolved problems of modern astrophysics. Many spectral lines at far-infrared wavelengths (10 μm $< \lambda <$ 1 mm) are excellent tracers of star formation, but detecting them requires the next generation of sensitive detectors. We are working to develop a detector system for a far-infrared balloon-borne spectroscopic experiment using kinetic inductance detectors (KIDs), which have the potential to achieve high sensitivity, low noise levels, high multiplexing factor, and may enable future space missions. We describe the design, fabrication, and noise performance measurements of prototype detector devices targeting an optical noise equivalent power below $1 \times 10^{-17}\,\mathrm{W\,Hz^{-1/2}}$ with readout frequencies below 250 MHz. The devices consist of arrays of 45 lumped-element KID pixels patterned out of thin-film aluminum on silicon wafers. They are optically coupled to incident radiation with a set of feedhorns. We use an FPGA-based readout system to read out the response of all the pixels in the array simultaneously.

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