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Nonlinear Kinetic Inductance Devices for Future Millimeter Wave Detection AMY SOUDACHANH, University of New Mexico, ERIK SHIROKOFF, University of Chicago — Submillimeter and far-infrared radiation, originating from the cosmic microwave background (CMB) and warm dust in star forming galaxies, make up a significant part of the radiation in the universe. Precise studies focusing on this radiation will help answer questions about how the universe formed and provide information on cornerstone topics in physics: the big bang, the search for dark matter, and the relation between quantum mechanics and gravitational fields. Traditionally, electromagnetic radiation in this spectrum has been detected with the use of bolometers; however, bolometers have reached their limit of sensitivity. For in-depth analyses of CMB, overall sensitivity must increase. Recent developments in microwave detection technology have attempted to reduce device size to achieve greater sensitivity, one example being the kinetic inductance parametric up-converter (KPUP). KPUPs use nonlinearity in the superconductors to observe a shift in resonant frequency by a change in inductance when a DC current is applied to an inductor-capacitor circuit. Additionally, nanofabrication allows for more devices per unit area, increasing overall sensitivity. This work will focus on the design of filter components for KPUP test chips and cryogenic testing.

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