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Scalable Single Photon Detector for Terahertz and Infrared Applications. BERNARD MATIS, DONG HO WU, Naval Research Laboratory — Recent advancements in the research areas of quantum dot (QD) and single electron transistors (SET) open up an exciting opportunity for the development of nanostructure devices. Of the various devices, our attention is drawn in particular to detectors, which can respond to a single photon over a broad frequency spectrum, namely, microwave to infrared (IR) frequencies. Here we report on transport measurements of parallel quantum dots, fabricated on a GaAs/AlGaAs 2-dimensional electron gas (2DEG) substrate, under the influence of external fields associated with 110GHz and 1 THz signals. We further investigate the scalability of our detector in addition to its temperature dependence up to 4.2K. We will discuss experimental results, and their dependence on quantum dot size, and fabrication techniques, as well as the limitations in developing a QD photon detector for microwave and IR frequencies, whose noise equivalent power can be as high as 10^{-22} W/Hz$^{1/2}$.

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