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Small Array of Low Frequency Readout Quantum Capacitance Detectors

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The Quantum Capacitance Detector (QCD) is a new high-sensitivity direct detector under development for low background applications such as far-infrared spectroscopy from a cold space telescope. The QCD has demonstrated an optically-measured noise equivalent power of $2 \times 10^{-20} \text{ W Hz}^{-1/2}$ at 1.5THz, making it among the most sensitive far-IR detectors systems ever demonstrated, and meeting the requirements for spaceborne spectroscopy. The QCD has also demonstrated single photon detection and counting of 1.5THz radiation. Up to this point, a readout frequency of the order of 2.8GHz has been used. For spaceborne applications, a reduction of readout frequency is desired in order to minimize the readout power requirements. To that effect, we have fabricated and tested a 5x5 array of Quantum Capacitance Detectors with pixel readout frequencies between 613 and 648MHz. There were 4 different detector designs in the array. We have characterized the array under optical illumination with 1.5THz radiation. The measured Noise Equivalent Powers measured under 10-19W of optical loading varied between 2×10^{-20} and $6 \times 10^{-20} \text{ W/Hz}^{1/2}$.

Less than 5 years of experience since completion of Ph.D

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Student (Ph.D., M.Sc. or B.Sc.)

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