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Detailed STJ and MCA Characterization with a Pulsed UV Laser

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The response of high-resolution detectors to a short-pulse laser consists of a set of equidistant peaks corresponding to integer numbers of absorbed photons that follow Poisson statistics. Since the laser has a negligible intrinsic line width, the peaks can be used for detailed characterization of the detector and the data acquisition system. We have characterized superconducting tunnel junction (STJ) photon detectors in the UV and soft X-ray range with a pulsed 355 nm laser at rates up to 5000 counts/s. The observed peaks are described by a Gaussian to very high accuracy, with a width between ~ 1 and ~ 2 eV FWHM depending on the detector area. For high statistics, centroids can be determined with an accuracy of a few meV over a range of hundreds of eV. This allows identifying non-linearities in the detector and the digitizer that can limit the accuracy of centroid measurements.

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

N

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

N

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