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Technical Performance of a 45cm² Large Area Photon Calorimeter and Results from a 10gd Surface Search for Light Mass Dark Matter with this Device

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We have designed and tested a large area 11-gram photon detector with 45 cm² surface area and 3.9 eV energy resolution, employing a TES-based readout on a Si absorber. With a 20 μ s rise time due to the fast collection of athermal phonons, this device significantly surpasses both timing and energy resolution requirements of future neutrinoless double beta decay experiments.

Though not optimized for dark matter searches, this device was operated in collaboration with SuperCDMS in a short exposure light-mass DM search on the surface for 10 gram-days. The results of this search illustrate both the immediate and long term scientific potential of athermal phonon sensor technology for light mass dark matter direct detection.

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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