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Scintillation yield from electronic and nuclear recoils in superfluid helium-4 RYAN SMITH, ETHAN BERNARD, ANDREAS BIEKERT, JUNSONG LIN, DANIEL MCKINSEY, ROGER ROMANI, BURKHANT SUERFU, VETRI VELAN, LANQING YUAN, University of California, Berkeley, SCOTT KRAVITZ, Lawrence Berkeley National Laboratory, SCOTT HERTEL, PRATYUSH PATEL, DOUGLAS PINCKNEY, ALESSANDRO SERAFIN, University of Massachusetts, HERALD COLLABORATION — Superfluid He-4 is a promising target material for direct detection of light (<1 GeV) dark matter. Signal channels for dark matter - nucleus interactions in superfluid helium include prompt photons, triplet excimers, rotons and phonons, but measurement of these signal strengths have yet to be performed for low energy nuclear recoils. A study of scintillation yield from electronic and nuclear recoils was carried out in superfluid He-4 at ˜1.75 Kelvin, with deposited energy in the range of 10-1000 keV. Scintillation from a 16 cm^3 volume of superfluid He-4 was read out by six PMTs immersed in the superfluid.Yields of both prompt and delayed scintillation components were measured. Elastic scattering of 2.8 MeV neutrons (generated by a deuterium-deuterium neutron generator) from superfluid He-4, with a liquid organic scintillator module used as far-side detector, was used to determine the scintillation signal yield for a variety of nuclear recoil energies. For comparison, Compton scattering of Cs-137 gamma-rays from the superfluid He-4, with NaI scintillators used as far-side detectors, was used to determine the scintillation signal yield of electronic recoils.

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