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High Energy Particle Detection with Large Area Superconducting Microwire Array

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We present the first detailed study of an 8-channel 2×2~mm^2 WSi superconducting microwire single photon detectors (SMSPD) array exposed to 120~GeV proton beam and 8~GeV electron and pion beam at the Fermilab Test Beam Facility. Recent advancement in the fabrication of large area SMSPDs make them an ideal sensors for dark matter detection and future accelerator-based experiments. The SMSPD detection efficiency was measured for the first time for protons, electrons, and pions, enabled by the use of a silicon tracking telescope that provided precise spatial resolution of 30~μm for 120~GeV protons and 130~μm for 8~GeV electrons and pions. Time resolution of 1.15~ns was measured for the first time for SMSPD with proton, electron, and pions. We will also present future plans and next steps of this exciting R&D program.

Primary authors: BORNHEIM, Adolf; APRESYAN, Artur; KORZH, Boris; WANG, Christina (Fermilab); SAN MARTÍN, Claudio; PENA, Cristian (Fermi National Accelerator Laboratory); KNEHR, Emanuel; NARVÁEZ, Lautaro; SPIROPULU, Maria; SHAW, Matthew; BARRÍA, Matías; PATEL, Sahil; XIE, Si; VEGA, Valentina

Presenter: WANG, Christina (Fermilab)

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