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The beam test of the lead tungstate calorimeter prototype with SiPM readout at Jefferson Lab

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The lead tungstate crystals (PbWO_4) are a well-known radiator material for precise homogeneous electromagnetic calorimetry. In nuclear physics experiments, the typical way to read out the crystals is using conventional photomultiplier tubes (PMTs). In the case of the presence of a magnetic field, such a method has some complications and requires a passive PMT shielding design. The recent development of Silicon Photomultipliers (SiPMs) with small pixel pitch sizes and relatively small noise levels opens an opportunity avenue to use such a device as an alternative to conventional PMTs. The SiPM readout method may be beneficial for future nuclear physics and collider experiments. We are presenting the beam test results of the calorimeter prototype instrumented with SiPM readout performed at Jefferson Lab. The SiPM readout performance was compared with PMT readout measured at the same experimental conditions. The prototype was successfully tested using beam of photons in the energy range between 3 GeV and 11 GeV in experimental Hall D. The detector performance was also studied using a secondary beam of positrons provided by Hall D pair spectrometer.

Early Career

Yes

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