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Experimental Setup and Commissioning of a Test Facility for Gain Evaluation of Microchannel-Plate Photomultipliers in High Magnetic Field at Jefferson Lab ERIC BRINGLEY, TONGTONG CAO, YORDONKA ILIEVA, University of South Carolina, PAWEL NADEL-TURONSKI, Jefferson Laboratory, KIJUN PARK, Old Dominion University, CARL ZORN, Jefferson Laboratory — At the Thomas Jefferson National Accelerator Facility (JLab) a research and development project for a Detector of Internally-Reflected Cherenkov light for the upcoming Electron Ion Collider is underway. One goal is the development of a compact readout camera that can operate in high magnetic fields. Small-size photon sensors, such as Microchannel-Plate Photomultipliers (MCP-PMT), are key components of the readout. Here we present our work to set up and commission a dedicated test facility at JLab where MCP-PMT gain is evaluated in magnetic fields of up to 5 T, and to develop a test procedure and analysis software to determine the gain. We operate the setup in a single-photon mode, where a light-emitting diode delivers photons to the sensor's photocathode. The PMT spectrum is measured with a flash Analog-to-Digital converter (fADC). We model the spectrum as a sum of an exponential background and a convolution of Poisson and Gaussian distributions of the pedestal and multiple photoelectron peaks, respectively. We determine the PMT's gain from the position of the single-photoelectron peak obtained by fitting the fADC spectrum to the model. Our gain uncertainty is <10%. The facility is now established and will have a long-lasting value for sensor tests and beyond-nuclear-physics applications.

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