

Lead Tungstate Calorimeter of the GlueX Detector

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A new electromagnetic calorimeter (ECAL), consisting of 1,596 lead tungstate (PbWO_4) scintillating crystals, has been constructed and installed in Hall D at Jefferson Lab (JLab). This ECAL replaces the inner section of the forward lead-glass calorimeter in the GlueX detector. The upgrade was motivated by the requirements of the Jefferson Lab Eta Factory experiment, which aims to study various $\eta^{(\prime)}$ decays, with particular emphasis on rare neutral modes. The calorimeter features a modular design. Scintillation light from the crystals is collected by Hamamatsu R4125 photomultiplier tubes, each equipped with a custom voltage divider and amplifier developed at JLab. The resulting analog signals are digitized using flash ADCs operating at a 250 MHz sampling rate. All ECAL modules were fabricated at Jefferson Lab, with the project initiated in 2022. The upgrade effort took approximately three years to complete. Commissioning of the detector was performed using the light-monitoring system, cosmic rays, and subsequently the photon beam. The ECAL was successfully integrated into the GlueX trigger system and fully commissioned in April 2025. The detector is now in use for physics production runs. In this talk, I will provide an overview of the calorimeter upgrade project and present initial ECAL commissioning results.

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