

Lead tungstate calorimeter of the Jefferson Lab Eta Factory experiment

Alexander Somov

Jefferson Lab

(for the JEF experiment and GlueX collaboration)

A new electromagnetic calorimeter (ECAL) consisting of 1596 lead tungstate PbWO_4 scintillating crystals has been fabricated and installed in the experimental Hall-D at Jefferson Lab (JLab). The high-granularity, high-resolution calorimeter is required by the JLab Eta Factory experiment, whose main physics goal is to study rare decays of eta mesons. The ECAL replaced the inner part of the forward lead glass calorimeter of the GlueX detector. Prior to the ECAL construction, we built a large-scale prototype, which was used to study performance of ECAL modules and light monitoring system, and to optimize the design of the front-end electronics for JEF operating conditions. The prototype was successfully used in the PrimEx-eta experiment in Hall D. The ECAL is integrated into the trigger system of the GlueX detector using electronics modules designed at JLab. Signals from the detector will be digitized using a twelve-bit flash analog-to-digital converters operated at a sampling rate of 250 MHz. The ECAL is currently at the commissioning stage and should be ready for the physics run in the early fall of the 2024. I will give an overview of the JEF experiment, the performance of the calorimeter prototype, the design and construction of the ECAL, and the integration of the detector and its infrastructure into the Hall D experimental setup.

Acknowledgement: Work supported by the U.S. Department of Energy, Office of Science, Office of Nuclear Physics under contract DE-AC05-06OR23177.

March 11, 2024