

CLAS2 luminosity upgrade and future physics opportunities

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Hall-B at Jefferson Lab houses the CEBAF Large Acceptance Spectrometer (CLAS12), designed to carry out high energy electron scattering experiments on various nuclear targets with operating luminosity of up to $L = 10^{35} \text{ cm}^{-2} \text{ sec}^{-1}$. CLAS12 was commissioned in early 2018 and started executing the physics program that covers a broad range of topics in nuclear physics. The central focus is the three-dimensional imaging of the quark structure of the nucleon and nuclei. After four years of data taking, new experimental demands require improvement of the operational characteristics of the detector. In particular, efficient reconstruction of multiparticle final states at higher than designed operating luminosity.

A two-stage upgrade is planned for CLAS12 to meet the growing demands for running at higher luminosities with high efficiency of particle reconstruction. The near-term goal is to achieve a luminosity of $L = 2 \times 10^{35} \text{ cm}^{-2} \text{ sec}^{-1}$ with an improved tracking system. The long-term goal is to reach operational luminosities of $L > 10^{37} \text{ cm}^{-2} \text{ sec}^{-1}$ for some selected physics topics. In this talk, we discuss the current performance of the CLAS12 detector, details of planned upgrades to higher luminosities, and the new physics opportunities that these upgrades will provide.

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No

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