J/ψ near threshold photoproduction at CLAS12

Richard Tyson[1]

[1]University of Glasgow, United Kingdom

J/ψ near threshold photoproduction plays a key role in the physics program for the Thomas Jefferson National Accelerator Facility (JLab) 12 GeV upgrade due to the wealth of information its study has to offer. The cross section of J/ψ near threshold photoproduction is dependent on the number of hard gluons involved in the reaction and should therefore contain information on the nucleon gluonic form factor and the contribution of gluons to the nucleon mass. The 2015 and later 2019 announcements by the LHCb collaboration of the discovery of potential charmonium pentaquark states also requires independent experimental data to be verified.

The JLab based CEBAF Large Acceptance Spectrometer (CLAS12) collaboration aims to measure the J/ψ near threshold photoproduction cross section using both a proton and a deuteron target, as the later further offers the possibility of searching for isospin partners to the LHCb pentaquarks. Several analysis procedures, such as event selection and machine learning based particle identification techniques, have already been designed and tested on CLAS12 data taken towards these measurements.

This talk will describe the aims and experimental design for the measurement of J/ψ near threshold photoproduction on proton and deuteron targets with the CLAS12 detector along with the current stage of the data analysis.