Exclusive threshold J/ψ photoproduction with GlueX

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Abstract

Exclusive charmonium photoproduction near threshold opens the door for studying the gluonic properties of the proton: gluonic GPDs, anomalous contribution to the mass of the proton, gravitational form factors, the *mass* radius of the proton. However, such an ambitious program requires precise measurements to validate the theoretical assumptions that relate the experimental results to the above quantities. The first total cross-section measurements of near-threshold exclusive J/ψ photoproduction ($\gamma p \to J/\psi p$) [1] by the GlueX collaboration sparked remarkable theoretical interest, however had limitted statistics. We will report new total cross-section results based on more than a four-fold increase in statistics. Even more, due to the full acceptance of the GlueX experiment for this reaction, we will present first measurements of the differential cross-sections over the whole near-threshold kinematic region. Such measurements enable more general conclusions about the reaction mechanism when compared to a wide range of theoretical predictions including GPD calculations and models with open-charm intermediate states.

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[1] A. Ali et al. (GlueX collaboration), Phys. Rev. Lett. **123**, 072001 (2019).