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Search for the Y(2175) in the Photoproduction Cross Section Measurement of γp ⟶ φπ+ π− p at GlueX

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Based on 334 pb−1 of photoproduction data collected with the GlueX detector at Jefferson Lab, we have measured for the first time the cross section of the exclusive reaction γ+ p ⟶ φ(1020)π+π−p by reconstructing the final state K+K−π+π−p produced with a photon beam of energies between 8.0 and 11.6 GeV. Based on the measured differential cross section, we have performed a search for the strangeoniumlike exotic candidate Y(2175), recently renamed to φ(2170). This state has been reported by different e+e−annihilation experiments and it is addressed here for the first time in a photoproduction
experiment. We do not find evidence for this state when using the resonance parameters quoted by the Particle Data Group and provide upper limits on the photoproduction cross section. Instead, we find a structure at a mass of m(φππ) = 2.24 GeV/c2 with a statistical significance of about 5σ. The parameters of this structure differ from those quoted by the Particle Data Group for the φ(2170) and are consistent with a previous observation in e+e−annihilation. In addition, there is evidence for a second structure at 1.82 GeV/c2.

Collaboration

GlueX Collaboration

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