

Measurement of exclusive π^0 and η photoproduction in the Primakoff region with a linearly polarized photon beam at GlueX

A critical test for low-energy QCD is the decay of the neutral pion. Comparing this analytic prediction with measured data thus provides a valuable test for low energy QCD and symmetry breaking. The lifetime of the π^0 can be measured using exclusive π^0 photoproduction in the Coulomb field of a nucleus, referred to as the Primakoff effect. Using this technique, the PrimEx-I and II experiments found a combined radiative width measurement of 7.806 ± 0.117 eV, which agrees with the chiral anomaly prediction within 0.72%, however there is tension with NLO calculations at the level of 2 standard deviations. Exclusive π^0 and η photoproduction were observed during the Charged Pion Polarizability experiment at JLab's Hall D, which utilized a linearly polarized 4.3-12 GeV photon beam incident on a Pb208 target. Exclusive π^0 and η photoproduction yields between $0-4^\circ$ lab angle have been extracted from the data. The π^0 yields are fitted with theoretical terms convoluted with the angular resolution and experimental acceptance, and compared with the PrimEx-I Pb208 result. We also present the first measurement of the linear polarization asymmetry for π^0 photoproduction in the Primakoff region, which is sensitive to nuclear incoherent processes. This work was supported by D.O.E. grant DE-FG02-88ER40415 A022

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