Searching for an exotic signal in GlueX simulations

Jake Bennett

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Abstract

Excitations of the gluonic field binding the quark/anti-quark pair within a meson may yield quantum numbers that are not allowed by conventional mesons. These hybrid mesons with exotic quantum numbers provide a means to study QCD as it pertains to quark confinement because they explicitly manifest the gluonic degrees of freedom. Experimental evidence from pion beam experiments of the π₁(1600), whose identification as the lightest hybrid is consistent with model predictions, is controversial and needs confirmation. Photoproduction is expected to produce exotic hybrid mesons more efficiently, but current photoproduction data do not yield a resonant signal for the π₁(1600). The GlueX experiment will conduct a definitive search for light quark hybrid mesons. I will present results of studies I performed using a GlueX detector simulation to search for the π₁(1600) in the reaction \( \gamma p \rightarrow \pi^+ \pi^- \pi^+ n \).