PrimEx-η : A Precision Measurement of the η Radiative Decay Width

Andrew Smith (for the PrimEx-D(GlueX?) Collaboration

Abstract

The η meson is a unique probe of QCD symmetry breaking. Of particular importance is the $\eta \to \gamma\gamma$ decay, as it proceeds via the chiral anomaly. In the chiral limit, the amplitude for the two photon decay of the pure SU(3) states, η_0 and η_8, is exactly calculable, and therefore a precision measurement of the η radiative decay width provides both a precision test of this chiral anomaly prediction as well as information about the η-η' mixing angle. In the past, this 2γ decay width has been measured both in a fixed target experiment which utilized the Primakoff effect and in e^+e^- collider experiments. However, a large discrepancy between the results of this Primakoff measurement and the average of the collider experiments remains unresolved. The PrimEx-η experiment in Hall D at Jefferson Lab will perform a precision measurement of $\Gamma_{\eta\to\gamma\gamma}$ via the Primakoff method to both resolve this discrepancy, and to improve the overall uncertainty. In this talk the motivation and experimental techniques will be discussed along with a presentation of some data from the experiment's first phase which was completed in the Spring of 2019.