Probing Low-Energy QCD, Fundamental Symmetries and BSM Physics via π^0, η and η' Decays

The JLab Eta Factory (JEF) Program in Hall-D at Jefferson Lab IGAL JAEGLÉ, on behalf of the GlueX Collaboration, Thomas Jefferson National Accelerator Facility — The JLab Eta Factory (JEF) Program in Hall-D at Jefferson Lab will collect 500 pb^{-1} of data, or an estimated 5×10^7 $\eta^{(\prime)}$, between 8 and 12 GeV at incident photon-beam energies with the GlueX apparatus and an upgraded Forward Calorimeter. This large data set will enable to study symmetry violation in hadron physics and in particular hadron decay dynamics, and to search for new physics. For examples, the $\eta \to \gamma\gamma\pi^0$ decay, which is sensitive to higher order terms of chiral perturbation theory, is testing of low-energy QCD. The $\eta^{(\prime)} \to 3\gamma$ decay, which is C violating, can constrain further C-violating and P-conserving new physics. Additionally $\eta^{'}$ decays allow to search for new hypothetical GeV scale dark particles (dark photons-like, dark Higgs bosons-like, and axion-like particles). The talk will present the physics objectives and status of the JEF experimental program.

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