



Contribution ID: 59

Type: Talk

Overview of the JLab Primakoff Experimental Program

The light pseudoscalar mesons π^0 , η and η' provide a unique laboratory to probe fundamental QCD symmetries at the confinement scale. While π^0 and η are Goldstone bosons due to spontaneous chiral symmetry breaking, η' is not due to an axial U(1) anomaly coupling to the gluon field. The chiral anomaly coupling to the electromagnetic field drives the two-photon decays of these mesons. This system harbors information about the mixing phenomena of the mesons due to the SU(3) (and isospin) symmetry breaking. A study of this system will have important impact on the low-energy QCD: testing the chiral anomaly and probing the origin and dynamics of chiral symmetry breaking; offering a clean path for model independent determinations of the light quark-mass ratio and the η - η' mixing angle; and providing inputs to calculate the hadronic light-by-light corrections to the anomalous magnetic moment of the muon. A comprehensive Primakoff experimental program has been developed at Jefferson Laboratory (JLab) to perform high precision measurements of the two-photon decay widths and the transition form factors of π^0 , η and η' via the Primakoff effect. A measurement of the π^0 radiative decay width was carried out at JLab 6 GeV and the published result achieved a precision of 1.5%. The data collection on the η radiative decay width measurement at JLab 12 GeV was recently completed. The future JLab 22 GeV upgrade will offer a new opportunities to perform the Primakoff experiments off an atomic-electron target with experimental sensitivities not previously achievable. The status of this program and its physics impact will be presented.

Internet talk

Yes

Is this abstract from experiment?

Yes

Name of experiment and experimental site

PrimEx experiment, PrimEx-eta experiment, and Pi0 Transition Form Factor experiment

Is the speaker for that presentation defined?

Yes

Details

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Session Classification: High Energy Particle Physics

Track Classification: Main topics: High Energy Particle Physics