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## Probe Fundamental Symmetry and BSM Physics Via the Primakoff Effect

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The fundamental QCD symmetries at low energies and the new physics Beyond the Standard Model (BSM) are two frontiers in the contemporary physics. The Primakoff effect, a process of high-energy photo- or electro-production of mesons in the Coulomb field of a target offers a powerful experimental tool to explore both fundamental issues. A comprehensive Primakoff experimental program has been developed at Jefferson Laboratory (JLab) to perform precision measurements of the two-photon decay widths and the transition form factors of  $\pi^0$ ,  $\eta$  and  $\eta'$  and to search for dark scalars or pseudoscalars via the Primakoff effect. A measurement of the  $\pi^0 \rightarrow \gamma\gamma$  radiative decay width was carried out at JLab 6 GeV and the published result achieved a precision of 1.5%. The data collection for the  $\eta$  radiative decay width measurement at JLab 12 GeV was completed in 2022 and data analysis is in progress. The future JLab 22 GeV upgrade will offer a new opportunity 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.

### **session**

K. Precision and New Physics

**Primary author:** GAN, Liping (University of North Carolina Wilmington)

**Presenter:** GAN, Liping (University of North Carolina Wilmington)

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