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Precision tests of fundamental physics with light meson decays

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Decays of the neutral and long-lived η and η′ mesons provide a unique, flavor-conserving laboratory to test low-energy Quantum Chromodynamics and search for new physics beyond the Standard Model. The program will be realized with the Jefferson Lab Eta Factory (JEF), scheduled to run in 2024 in Hall D at Jefferson Lab. The experiment will use the GlueX apparatus with an upgraded Forward Calorimeter (FCAL-II) to study the decays of η and η', emphasizing on rare decay modes.
The determination of electromagnetic transition form factors of light mesons contributes to the interpretation of the measurement of the anomalous magnetic moment of the muon. Here, an analysis of data from CLAS experiments in Hall B at Jefferson Lab is beginning and will provide information on time-like transition form factors for η, ω, and η' mesons. In addition, an approved proposal for Hall B aims to determine the space-like transition form factor for the neutral pion.

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