

RARE ETA AND ETA-PRIME DECAY PROGRAM AT HALL D/JEFFERSON LAB*

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Measurements of several rare η and η' decay channels will be carried out with an upgraded GlueX detector in Hall D as part of the Jefferson Lab Eta Factory (JEF) program. JEF will commence in late March 2025: the combination of highly-boosted η/η' production, recoil proton detection, and a new fine-granularity high-resolution lead-tungstate insert in the GlueX forward calorimeter confers uniqueness to JEF, compared to other experiments worldwide. JEF will search for new sub-GeV gauge bosons in portals coupling the Standard Model sector to the Dark sector, will provide constraints on C-violating/P-conserving reactions, and will allow precision tests of low-energy QCD. Simulations have been driving methods towards significant background reduction and signal isolation for key rare decay channels: the $\gamma p \rightarrow \eta p$, $\eta \rightarrow \pi^+ \pi^- e^+ e^-$ channel will be shown as an example. Details on the hardware upgrade and initial look at the commissioning of the device will also be presented.

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