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### **The JLab Eta Factory (JEF) experiment at Jefferson Lab<sup>1</sup>**

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The GlueX spectrometer is a large acceptance spectrometer installed in Hall D at Jefferson Lab with good coverage for both charged and neutral particles. In particular photons in the forward direction are detected using the Forward Calorimeter, an array of lead glass blocks. The main physics program is to search for evidence for hybrid mesons. The recently-approved JLab Eta Factory (JEF) experiment extends the GlueX physics program to study rare decays of  $\eta$  mesons with a particular emphasis on the  $\eta \rightarrow \pi^0 \gamma \gamma$  channel. In addition to probing  $\mathcal{O}(\sqrt{s})$  terms in chiral perturbation theory, this channel can be used to search for evidence for lepto-phobic dark matter. A potential extension to the Standard Model posits a dark gauge boson ( $B$ ) that couples predominately with quarks and can be observed in the  $\eta \rightarrow \gamma B$ ,  $B \rightarrow \pi^0 \gamma$  decay chain. The JEF program also plans to search for C-violating/P-conserving decays of the  $\eta$  meson. In order to achieve the requisite resolution to observe these rare channels, this experiment calls for an upgrade to the existing GlueX Forward Calorimeter. After a brief description of the GlueX detector, I will focus on the JEF program with a particular emphasis on the  $B$ -boson search and I will discuss plans for the future.

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