

# Quark Confinement and the Hadron Spectrum XI



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## The JLab Eta Factory (JEF) Experiment

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Decays of the  $\eta$  meson provide a unique, flavor-conserving laboratory to probe the isospin violating sector of low energy QCD and search for new physics beyond the Standard Model. The JEF Experiment has been developed in Hall D at Jlab to measure  $\eta$  decays emphasizing on rare neutral modes with two orders of magnitude background reduction compared to the previous experiments. The projected results will have profound physics impact: the  $\eta \rightarrow B\gamma \rightarrow \pi^0\gamma\gamma$  decay provides a stringent constraint on a dark leptophobic gauge boson (B) coupled to baryon number in 140-550 MeV mass range; C-violating  $\eta$  decays offer the best window for direct constraint on C-violating and P-conserving (CVPC) new physics; the Dalitz distribution of  $\eta \rightarrow \pi^0\gamma\gamma$  probes interplay of vector & scalar meson resonances in ChPT;  $\eta \rightarrow 3\pi$  will offer an improvement in the uncertainty of the light quark mass ratio. The detail of the experiment will be presented.

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