Abstract Submitted
for the DNP11 Meeting of
The American Physical Society

**Analyzing Detector Acceptance for Design Optimization**
KATHRYN MEEHAN, DARKLIGHT COLLABORATION — Both the unsolved mystery of 26% of our universe that is dark matter as well as other observed astrophysical anomalies have motivated theories that go beyond the standard model and predict the existence of an A' boson. This particle is theorized as the carrier of a "dark force" that couples with electromagnetism. The Free Electron Laser at Jefferson Laboratory will be used to create an e-p collision that will allow the DarkLight detector to detect the A' boson if it occupies the relevant parameter space. To detect the A' boson, detectors need to be placed at locations that would maximize the signal and minimize background processes such as e- + e- $\rightarrow$ e- + e- (Moller scattering) and e- + p $\rightarrow$ e- + p (e-p scattering). The computer program ROOT is used to calculate the acceptance and efficiency of the detector for different cuts on the angles of outgoing particles. Efficiency plots were generated for a realistic detector cut.

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Date submitted: 01 Aug 2011 Electronic form version 1.4