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## **CEBAF Injector Model for K-Long bunch charge at 200 kV**

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The upcoming Jefferson Lab K-Long experiment at Hall D will require unique beam conditions with a much lower bunch repetition rate and atypically high bunch charge. To optimize the Continuous Electron Beam Accelerator Facility (CEBAF) injector for this experiment, we performed Multi-Objective Genetic Optimization (MGO) using General Particle Tracer (GPT) to determine the magnetic elements and RF settings necessary for the K-long bunch charge (0.64 pC) at 200 kV. We also investigated the transmission and beam characteristics of low to high charge per bunch electron beams through the injector for simultaneous operations of all four CEBAF Halls and characterized the transmission as a function of the photocathode laser spot size and pulse length. Our findings provide valuable insights into optimizing the CEBAF injector for the Jefferson Lab K-Long experiment, as well as for other experiments with similar beam conditions.

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### **Footnotes**

### **I have read and accept the Privacy Policy Statement**

Yes

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