Abstract Submitted
for the GEC19 Meeting of
The American Physical Society

**A multipass laser system for free-free experiments**[1] C.M WEAVER, B.N. KIM, N.L.S. MARTIN, University of Kentucky, B.A. DEHARAK, Illinois Wesleyan University — A multipass laser system is being developed for an electron scattering apparatus that will be used for laser-assisted free-free electron scattering experiments. The basic idea is that a gated Pockels cell is used to rotate horizontally polarized light, in an injection mode, to vertically polarized light which is then trapped in a repetitive path using mirrors and a polarizing beam-splitter cube. A test bed has proved the feasibility of this technique: 20 passes have been observed with a 20% loss per round trip; this would correspond to in an increase of a factor of 5 in data collection. The system is now being installed on the scattering apparatus with similar initial results; we will present a progress report on this multipass system. We hope to increase the efficiency of the system so that there is only 10% loss per round trip in order to achieve an order of magnitude improvement in data collection compared to that of a single pass set up.

[1]This work was supported by the National Science Foundation under grants Nos. PHY-1607140 (NLSM), PHY-1708108 (BAd)

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Date submitted: 04 Jun 2019 Electronic form version 1.4