

Abstract Submitted  
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**A proposed multipass laser system for free-free electron scattering experiments**<sup>1</sup> B.N. KIM, C.M. WEAVER, N.L.S. MARTIN, University of Kentucky, B.A. DEHARAK, Illinois Wesleyan University — We propose to use a multipass laser system to increase the data-taking rate of our laser-assisted electron scattering experiments.<sup>2</sup> The scheme will be similar to that used by other workers.<sup>3</sup> The basic idea is that there will be an “injection mode” where vertically polarized light from the laser passes straight through an appropriately oriented beamsplitter cube, and then passes through an activated Pockels cell (not yet purchased) which rotates the polarization to horizontal. The laser beam passes through the interaction region for the first time, and is reflected by a plane mirror. The laser beam will then be in the “trapped mode” where the reflected laser beam is then deflected through 90° by the beamsplitter cube. It will be reflected back by a second mirror for the return journey, and will repeat this cycle *ad infinitum*. We are carrying out a feasibility study for a round trip of approximately 50 feet. In the absence of a working Pockels cell,  $\lambda/4$  plates are used to create 50% of the beam with the appropriate polarization on each cycle.

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<sup>2</sup>N. L. S. Martin and B. A. deHarak, Phys. Rev. A **93**, 013403 (2016)

<sup>3</sup>T. Mohameda, G. Andler, R. Schuch, Rev. Sci. Instrum. **86**, 023113 (2015)

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