

Abstract Submitted
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Recent progress on using ultrafast electron microscopy to study fundamental electron-photon interactions¹ JARED ZEMAN, RYAN ANTHONY-CERES, BRETT BARWICK, Ripon College — We report progress on using low energy ultrafast electron microscopy to demonstrate the exchange of quantized amounts of orbital angular momentum (OAM) between electrons and photons. The goal of our project is to demonstrate a new method whereby arbitrary amounts of OAM can be transferred to free electrons using the Kapitza-Dirac effect. This technique would enhance the sensitivity of ultrafast electron microscopes, electron interferometers and provide a new method of shaping the spatial properties of electron beams. In addition, we will discuss our progress on using all-optical techniques to compress free electron pulses from 100's of femtoseconds to tens of femtoseconds or shorter. If these efforts are successful the temporal resolution of ultrafast electron microscopes would be improved by more than an order of magnitude, allowing dynamics of systems that have motions too fast for current technologies.

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