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Electron Rescattering in Optical Vortices[1] CHAD PETERSEN, JAMES STROHABER, IGOR MARIYENKO, CORNELIS UITERWAAL, University of Nebraska - Lincoln — A well-known phenomenon in ultrafast intense-field ionization is the rescattering of electrons. It is of central importance in most currently employed techniques for the generation of attosecond pulses[2]. Polarization plays an important role, with linear polarization tending to favor rescattering, while circular polarization tends to inhibit it[3]. Observations of this kind have been successfully explained by assuming the electron's orbit can be calculated classically after it has been released in the initial ionization step[4]. We are currently investigating if we can influence the rescattering probability using *laser optical vortices*[5]. These (and other) special light modes are becoming increasingly popular in the manipulation of microscopic particles. Their effect on such particles can often be understood in terms of the transfer of *optical orbital angular momentum* (optical spanner). In a separate contribution we describe our experimental efforts to create intense optical vortices of femtosecond duration. In the present contribution, we discuss trajectories of free electrons in optical vortices and other fields with exotic topologies. [2] see e.g. Z. H. Chang, *Phys. Rev. A* **70,** 043802 (2004) [3] D. N. Fittinghoff *et al.*, *Phys. Rev. A* **49,** 2174 (1994) [4] P. B. Corkum, *Phys. Rev. Lett.* **71,** 1994 (1993) [5] see e.g. L. Allen *et al.*, *Optical Angular Momentum* (IoP, Bristol, 2003).

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