Abstract Submitted
for the DAMOP16 Meeting of
The American Physical Society

Intense Laser Ionization and Acceleration of Electrons in Highly-Charged Ions Using Vortex Laser Beams[1] LIANG-WEN PI, ANDREW VIKARTOFSKY, ANTHONY F. STARACE, University of Nebraska-Lincoln —
Recent advances in laser technology have led to the development of high-power petawatt lasers, making possible laser intensities of the order of 10^{22} W/cm^2. An electron in a highly-charged ion can be ionized in a laser field at its peak intensity and swiftly accelerated to GeV energies. Our prior investigation of laser acceleration of electrons using linearly-polarized Gaussian beams (with zero orbital angular momentum) has revealed that the final-state energies and ejection angles of the electrons depend on the initial target ion positions relative to the laser focus.[2] We report here recent simulations of laser ionization and acceleration of electrons using linearly-polarized vortex laser beams (i.e., Laguerre-Gaussian beams), which carry orbital angular momentum and can spin microscopic objects. These simulations show that the inherent spiral phase structure of the vortex beams leads to improved final-state energy and ejection angle distributions of the electrons.

[1]This work is supported in part by DOE, Office of Science, Division of Chemical Sciences, Geosciences, and Biosciences, under Grant No. DE-FG02-96ER14646.
[2]L.-W. Pi, S. X. Hu, and A. F. Starace, Phys. Plasmas **22**, 093111 (2015).

Liang-Wen Pi
Univ of Nebraska - Lincoln

Date submitted: 29 Jan 2016 Electronic form version 1.4