Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Dynamics of plasmas formed by higher order Bessel beams via optical field ionization BO MIAO, LINUS FEDER, JARON SHROCK, HOWARD MILCHBERG, University of Maryland, College Park — A hollow Bessel beam (J_1) with high intensity ($10^{15} W/cm^2$) and 50 fs pulse length is generated using a spiral phase plate and reflective axicon. The pulse has an on axis minimum, and initially generates a long, tubular plasma structure in hydrogen backfill (100 torr) through optical field ionization. The plasma expands hydrodynamically into the background neutral gas, both outside and inside the tube. The inward radial expansion results in on-axis plasma formation via collisional ionization. The temporal dynamics of this process are measured by transverse interferometry. We present a parametric study of laser pulse intensity and axicon angle (varies the plasma tube radius), and compare to measurements of a plasma formed with J_0 Bessel beam. The J_0 beam has an intensity maximum along the optical axis (also $10^{15} W/cm^2$) and produces a plasma column on axis which then expands radially outward. Despite the stark difference in initial plasma profiles, It is found that after few nanoseconds, the plasmas formed by J_0 and J_1 Bessel beams evolve into similar structures.

Bo Miao
University of Maryland, College Park

Date submitted: 03 Jul 2019 Electronic form version 1.4