Abstract Submitted
for the DAMOP18 Meeting of
The American Physical Society

Photoelectron emission from metal and dielectric nanoparticles in intense laser fields[1] JEFFREY POWELL, SEYYED JAVAD ROBATJAZI, ADAM SUMMERS, Kansas State University, MATTHIAS KLING, LMU Munich Max Planck Institute of Quantum Optics, ARTEM RUDENKO, Kansas State University — Nanoparticles provide a unique platform to study the mechanisms of light interactions with complex systems, in particular, the motion of electrons driven by strong fields and excitation of plasmonic resonances. Here we report on the systematic analysis of the photoelectron emission from single, isolated, gas-phase, spherical nanoparticles as a function of particle size, composition and laser intensity. Gold, silica (SiO_2), and silica core/gold shell nanoparticles ranging in size from 5nm to 750nm were irradiated by 800nm, 25fs laser pulses at 0.2-20 TW/cm^2 peak intensities. A high energy velocity-map imaging spectrometer was used to determine the cutoff photoelectron energy for each sample and intensity. Nanoparticle size and composition influence the electron cutoff energy, which provides insight into photoelectron trajectories and rescattering dynamics, both of which are affected by near-field enhancement and plasmonic excitation. In particular, we observe that photoelectrons emitted from gold nanoparticles are much more energetic than those from silica, which, in turn, are much faster than those from isolated atoms or molecules exposed to the same light pulses.

[1]Supported by AFOSR award FA9550-17-1-0369

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Date submitted: 26 Jan 2018 Electronic form version 1.4