Abstract Submitted
for the DAMOP12 Meeting of
The American Physical Society

Quantum Interferences in Helium ionization in the Presence of Attosecond Pulses and Strong Laser Fields NIRANJAN SHIVARAM, HENRY TIMMERS, University of Arizona, XIAO-MIN TONG, University of Tsukuba, ARVINDER SANDHU, University of Arizona — In the presence of strong near-infrared (NIR) laser fields and attosecond extreme-ultraviolet (XUV) pulses containing discrete harmonics, interferences can occur between different resonance mediated ionization pathways. The phase of the final ion/electron yield depends on the phases of the light fields and quantum phases of the transition matrix elements playing a role in the ionization process. We use attosecond pulse trains to excite Helium atoms to components of laser dressed Floquet states. As the laser pulse intensity ramps on femtosecond timescales, we observe transitions between ionization channels mediated by different atomic resonances. The quantum phase of interfering paths is extracted for each channel and compared with TDSE simulations. Our results elucidate photoionization mechanisms in strong-fields and open doors for photo-absorption/ionization control schemes. In the case of degenerate Floquet resonances the electron yields and angular distributions are also strongly modified by these interferences. We also demonstrate that a two-color ionization measurement can be used to extract the time-of-birth of attosecond pulses with respect to the driving NIR field.

Niranjan Shivaram
University of Arizona

Date submitted: 27 Jan 2012 Electronic form version 1.4