Abstract Submitted
for the DAMOP13 Meeting of
The American Physical Society

**Below threshold dissociation in the photodissociation of $H_2^+$ using ultrashort intense pulse**[1] SHUO ZENG, BRETT ESRY, Kansas State University — With the increasing availability of few-cycle laser pulses, many studies are showing the short pulse effects that are due to the carrier-envelope phase, but short pulses drive other effects as well. We will focus on one such effect known as below threshold dissociation (BTD), *i.e.* the dissociation of a state with fewer *net* photons than simple energy conservation would seem to require. Below threshold dissociation has been known as a strong-field mechanism for some time, but its origins in non-adiabatic time evolution mean that it is now showing surprisingly large effects in the very short pulses now used. We thus revisit BTD through our ability to solve the time-dependent Schrödinger equation essentially exactly — neglecting only ionization — for the benchmark $H_2^+$ system. Our study thus not only takes BTD into a new laser parameter regime, but it also allows investigating the effects of including nuclear rotation in the calculations. Since these had been neglected in previous studies of BTD and we know that rotation effectively wipes out other non-adiabatic effects like vibrational trapping [1], we anticipate that rotation will play an important role.

[1] F. Anis and B. D. Esry, Phys. Rev. A 77, 033416 (2008)

[1]Supported by the Chemical Sciences, Geosciences, and Biosciences Division, Office of Basic Energy Sciences, Office of Science, U.S. Department of Energy.

Shuo Zeng
Kansas State University

Date submitted: 25 Jan 2013 Electronic form version 1.4