Abstract Submitted
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Dissociation dynamics of O_2^+ in intense laser fields[1] M. MAGRAKVELIDZE, Department of Physics, Kansas State University, C.M. AIKENS, Department of Chemistry, Kansas State University, S. DE, Saha Institute of Nuclear Physics, India, C.L. COCKE, U. THUMM, Department of Physics, Kansas State University — We studied the nuclear dynamics of diatomic molecular ions in intense infrared laser fields by analyzing their fragment kinetic energy release (KER) spectra as a function of time [1]. We found that, in general, ionization of the neutral parent molecule by an ultra-short pump pulse populates several intermediate electronic states of the molecular ion that contribute to the same KER. Within the Born-Oppenheimer (BO) approximation, we calculated *ab–initio* adiabatic potential energy curves for the molecular ions and their electric dipole-couplings, using the quantum chemistry code GAMESS [2]. By comparing KER spectra that result from the nuclear dynamics on individual and on dipole coupled BO potential curves with that measured for O_2 molecules, we developed a scheme for identifying intermediate states of the molecular ions that are relevant during the dissociation dynamics.

[1] S. De *et al.*, PRA **80**, 011404 (2009); S. De *et al*, PRA **84**, 043410 (2011)
[2] M. W. Schmidt *et al*, J. Comput. Chem., **14**, 1347 (1993).

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