Abstract Submitted
for the DAMOP12 Meeting of
The American Physical Society

Controlling molecular scattering in optical lattices and fields[1]
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Experimental physicists accomplished striking progress in preparing ultracold polar molecules in a precise quantum state [1]. Soon enough, one can envision "ideal" experiments of molecular physics where all quantum states of molecules can be addressed and detected. In addition, ultracold polar molecules benefit from a vast tool set of controls. Molecular chemical reactions can be enhanced by electric fields [2] or can be suppressed by optical lattices [3]. If the molecules have a magnetic dipole moment, they can also be controlled by magnetic fields. Starting from these ideas, we want to investigate what would be a scattering event between two molecules in an optical lattice, and in the presence of an electric and magnetic field. We will choose, as a probe example, the OH molecule which has either an electric and magnetic dipole moment. We will compare the effect of these additional external controls on the differential cross section and ask if we can trace back some information on the inter-molecular potential.

[1] Ni et al.,Science 322,231(2008).
[2] Quéméner et al., Phys. Rev. A 81, 022702 (2010); Ni et al., Nature 464, 1324 (2010).
[3] Quéméner et al., Phys. Rev. A 81, 060701(R)(2010); Phys. Rev. A 83, 012705 (2011); de Miranda et al., Nature Physics 7, 502 (2011).

[1]We acknowledge funds from the Air Force Officie of Scientific Research.

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Date submitted: 27 Jan 2012 Electronic form version 1.4