Abstract Submitted
for the DAMOP08 Meeting of
The American Physical Society

Ultracold Inelastic Collisions in Two Dimensions[1] ZHIYING LI, SERGEY ALYABYSHEV, ROMAN KREMS — We analyze collisions of ultracold atoms or molecules confined by a harmonic potential and show that the cross sections for inelastic s-wave scattering have the same energy dependence as in pure 2D geometry. This indicates that chemical reactions and inelastic collisions may be suppressed in an ultracold gas under strong confinement in one dimension. The confinement does not change the energy dependence of inelastic collisions for non-zero partial waves. We present a numerical proof of the threshold collision laws in 2D. Our derivation and calculations demonstrate that ultracold collisions accompanied with changes of angular momentum in 2D must be suppressed, which indicates that inelastic collisions of atoms or molecules in the presence of weak electromagnetic fields may be controlled by varying the orientation of the external field axis with respect to the plane of confinement.

[1]The work was supported by NSERC of Canada

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Date submitted: 30 Jan 2008 Electronic form version 1.4