ULTRACOLD ATOMS AT SURFACES: SCATTERING, STICKING AND QUANTUM DISSIPATION

Dennis P. Clougherty
Department of Physics, University of Vermont
Burlington, VT 05405-0125 (Dated: September 24, 2007)

It was predicted long ago that quantum reflection has a profound e threshold law for the sticking probability in the weak coupling limit, and experiments over the past fifteen years have verified this prediction. Whether this result survives for arbitrary couplings to the inelastic channels remains an open theoretical question. Deviations from the perturbative result are explored using simple models that explicitly include the quantum dynamics of the excitations that ultimately must carry away the energy as an atom sticks to a surface. Lessons learned from this analysis should be applied in phenomenological approaches to describing sticking and scattering from surfaces.