Abstract Submitted
for the DAMOP07 Meeting of
The American Physical Society

**Effects of nonintegrability on stabilization of Feshbach molecules in atom waveguides** VLADIMIR YUROVSKY, School of Chemistry, Tel Aviv University — Deactivation of broad quasi-1D molecules [1,2] is analyzed. Deactivation of tightly bound molecules can be considered to be a two-body inelastic collision, which is suppressed at low collision energies [3,5]. If broad molecules are described by the integrable Lieb-Liniger-McGuire (LLMG) model with attractive interactions, an exact expression for the deactivation rate has a non-zero limit at low collision energy. (This behavior differs from the free-atom case [3], since bound atoms have non-vanishing imaginary momenta.) This absence of deactivation suppression can be related to non-diffraction of the LLMG model, which forbids atom-dimer reflection, and the atom and dimer can approach each other. Solution of Faddeev equations (using the approach of [4]) demonstrates that when the symmetry of the LLMG model is lifted due to a Feshbach resonance and reflection becomes allowed [4], the deactivation of broad molecules becomes suppressed. Thus, both the presence [4] and the suppression of certain processes are among the observable effects of non-integrability. [1] H. Moritz *et al.*, Phys. Rev. Lett. **94**, 210401 (2005). [2] T. Bergeman, M. G. Moore, and M. Olshanii, *ibid.* **91,** 163201 (2003). [3] D. M. Gangardt and G. V. Shlyapnikov, *ibid.* **90**, 010401 (2003). [4] V. A. Yurovsky, A. Ben-Reuven, and M. Olshanii, *ibid.* **96**, 163201 (2006). [5] V. A. Yurovsky and Y. B. Band, Phys. Rev. A, **75**, 012717 (2007).

Vladimir Yurovsky
School of Chemistry, Tel Aviv University

Date submitted: 02 Feb 2007 Electronic form version 1.4