Abstract Submitted
for the DAMOP06 Meeting of
The American Physical Society

Formation and properties of cold quasi-one-dimensional molecules with Feshbach resonance interaction VLADIMIR YUROVSKY, ABRAHAM BEN-REUVEN, School of Chemistry, Tel Aviv University, MAXIM OLSHANII, Department of Physics & Astronomy, University of Southern California — Bound states of cold atoms with two-channel two-body interactions in harmonic waveguides are analyzed. The two-atom problem can be approximated by a one-dimensional model at low energies and small values of the non-resonant scattering length [1,2]. In the case of a strong resonance, two-atom bound states contain mostly the contributions of the open channel. The closed channel contribution becomes dominant in weak resonances, such as the 543 G resonance in ^{6}Li. The results are applicable both to bosonic and fermionic atoms. The formation of molecules by three-body association of indistinguishable bosonic atoms becomes allowed thanks to the non-integrability of the resonant one-dimensional three-body problem. This problem is analyzed by a numerical solution of the Faddeev-Lovelace equations [3]. A large value of the association rate coefficient of more then 10^{-4}cm^2/s is predicted in the vicinity of the weak Feshbach resonance in Na. The rate vanishes at large detunings, since the integrability is restored, and both at zero and at high collision energies. 1. V. A. Yurovsky, Phys. Rev. A **71**, 012709 (2005). 2. V. A. Yurovsky, physics/0601073. 3. V. A. Yurovsky, A. Ben-Reuven, and M. Olshanii, physics/0512033.

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Date submitted: 27 Jan 2006 Electronic form version 1.4