

Abstract Submitted  
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**Effects of tunneling on thermalization of quasi-one-dimensional gases** VLADIMIR YUROVSKY, School of Chemistry, Tel Aviv University — A many-body system, that does not approach thermal equilibrium, was realized in the quantum Newton's cradle experiment at Penn State [1], performed on an array of quasi-one-dimensional Bose gases in a two-dimensional optical lattice. This behavior reflects integrability of the Lieb-Liniger-McGuire model (see [2]), which can approximately describe the gas in each of the lattice tubes. Thermalization was observed in recent Penn State experiments [3] when the lattice depth is decreased. The present theoretical approach relates thermalization to the coupling of adjacent waveguides in the two-dimensional optical lattice due to tunneling of atoms. The analysis provides estimates of the thermalization rate and its dependence on the tunneling rate. The estimates are in agreement with the experimental results [3]. 1. T. Kinoshita, T. R. Wenger, and D. S. Weiss, *Nature*, Vol. 440, 900, (2006). 2. V. A. Yurovsky, M. Olshanii, and D. S. Weiss, *Adv. At. Mol. Opt. Phys.*, Vol. 55, 61, (2008). 3. D. S. Weiss, private communication (2007).

Vladimir Yurovsky  
School of Chemistry, Tel Aviv University

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