Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Dynamics of Large Quantum Systems: Equilibration, Thermalization and Interactions DVIRA SEGAL, University of Toronto, MANAS KULKARNI, Princeton University, KUNAL TIWARI, McGill University — The question of how/whether large quantum systems equilibrate and/or thermalize when prepared in an out-of-equilibrium state has been of enormous interest given recent experimental progress. We address this question in fermionic [1,2] and bosonic [3] systems, by following the dynamics of the full density matrix. We particularly study the case of two large-twin systems connected by a weak link (a quantum impurity), and we show that the total system equilibrates and thermalizes when the weak link is susceptible to incoherent and inelastic processes. We thus provide an experimentally feasible prescription for equilibrating and thermalizing large finite quantum systems. Our calculations are based on extending methods originally developed to treat subsystem dynamics (such as impurity), namely, the quantum Langevin equation method, the well known fermionic trace formula, and an iterative path integral approach. We also explore the role of interactions. While the fermionic system [1,2] shares many common features with the bosonic analog [3], we will describe certain crucial differences that arise as a result of different statistics.

[1] M. Kulkarni, K. L. Tiwari, D. Segal, arXiv:1206.2408
[2] M. Kulkarni, K. L. Tiwari, D. Segal, arXiv:1208.5725
[3] M. Kulkarni and D. Segal (in preparation)

Manas Kulkarni
Princeton University

Date submitted: 25 Sep 2012 Electronic form version 1.4