Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Solvable Models for a Few Atoms in a Few One-Dimensional Wells NATHAN HARSHMAN, Department of Physics, American University — This project identifies networks of one-dimensional, few-particle, few-well models that can be smoothly connected by tuning trap shape and two-body interaction parameters. Solvable models within these networks are identified and analyzed by exploiting symmetries in few-body configuration space and phase space. In one-dimension, ordering permutation symmetry is particularly effective for generating new models. Ordering permutation symmetry is distinct from particle permutation symmetry and arises when there are similar regions in configuration space that are completely disconnected due to unitary interactions and/or infinite well barriers. Realistic experiments with a few atoms or with ultracold gases trapped in effectively one-dimensional wells are analyzed by comparison with nearby solvable models using approximation schemes like perturbation theory or variational methods. The transition from systems with a few particles in a few wells to systems with many particles in large lattices can be explored using these techniques.

Nathan Harshman
Department of Physics, American University

Date submitted: 05 Nov 2015 Electronic form version 1.4