Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Wavepacket Dynamics in Energy Space of a Chaotic Trimeric Bose-Hubbard System MORITZ HILLER, Department of Physics, Albert Ludwigs University of Freiburg, Germany, TSAMPIKOS KOTTOS, Department of Physics, Wesleyan University, Middletown CT-USA and MPI for Dynamics and Self-Organization, Goettingen-Germany , THEO GEISEL, MPI for Dynamics and Self-Organization, Goettingen-Germany — We study the energy redistribution of interacting bosons in a ring-shaped quantum trimer as the coupling strength between neighboring sites of the corresponding Bose-Hubbard Hamiltonian undergoes a sudden change δk. In the framework of (ultra-)cold atoms on optical lattices this perturbation corresponds to a modulation of the trapping potential height. Our analysis is based on a three-fold approach combining linear response theory calculations as well as semiclassical and random matrix theory considerations. The δk-borders of applicability of each of these methods are identified by direct comparison with the exact quantum mechanical results. We find that while the variance of the evolving quantum distribution shows a remarkable quantum-classical correspondence (QCC) for all δk-values, other moments exhibit this QCC only in the non-perturbative δk-regime.

Moritz Hiller
Department of Physics, Albert Ludwigs University of Freiburg, Germany

Date submitted: 21 Nov 2008 Electronic form version 1.4