Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Lie-algebraic Approach to Dynamics of Closed Quantum Systems and Quantum-to-Classical Correspondence[1] VICTOR GALITSKI, Joint Quantum Institute and Physics Department, University of Maryland — I will briefly review our recent work on a Lie-algebraic approach to various non-equilibrium quantum-mechanical problems, which has been motivated by continuous experimental advances in the field of cold atoms. First, I will discuss non-equilibrium driven dynamics of a generic closed quantum system. It will be emphasized that mathematically a non-equilibrium Hamiltonian represents a trajectory in a Lie algebra, while the evolution operator is a trajectory in a Lie group generated by the underlying algebra via exponentiation. This turns out to be a constructive statement that establishes, in particular, the fact that classical and quantum unitary evolutions are two sides of the same coin determined uniquely by the same dynamic generators in the group. An equation for these generators - dubbed dual Schrödinger-Bloch equation - will be derived and analyzed for a few of specific examples. This non-linear equation allows one to construct new exact non-linear solutions to quantum-dynamical systems. An experimentally-relevant example of a family of exact solutions to the many-body Landau-Zener problem will be presented. One practical application of the latter result includes dynamical means to optimize molecular production rate following a quench across the Feshbach resonance.

[1]This work was supported by NSF-CAREER award and US-ARO.

So Takei
University of Maryland

Date submitted: 10 Nov 2011

Electronic form version 1.4