Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Effective adiabatic guiding of quantum systems: Continuous tracking vs. stroboscopic hopping RAFAEL HIPOLITO, PAUL GOLDBART, Georgia Institute of Technology — Time-dependent Hamiltonians generally induce transitions between their corresponding instantaneous eigenstates. In cases where parameters in the Hamiltonian change slowly enough (compared with intrinsic dynamical timescales), the adiabatic theorem tells us that transitions are strongly suppressed. When parameters change more quickly, Berry has shown that the addition of a specific term H_1 to the Hamiltonian suppresses transitions completely, thus recovering transition- less driving. We discuss a convenient reformulation of Berry's approach in which H_1 is given in terms of an integral formula involving only operator quantities, including the nonabelian extension required for degenerate systems. We show that the integral formula is well suited to many-body problems and approximation schemes. Finally, we address a complementary issue: how to hop to an instantaneous eigenstate without necessarily tracking it. To do this, we construct a variational approach to seeking paths in parameter space that optimize the overlap between the time-evolved state and a given instantaneous eigenstate. This approach has the advantage that one can limit the types of operators appearing in the Hamiltonian which is useful when limiting the search to local or readily applicable operators.

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Date submitted: 11 Nov 2016 Electronic form version 1.4