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Minimizing losses by variational counter-diabatic driving[1] DRIES SELS, ANATOLI POLKOVNIKOV, Boston University — Despite the time-reversal symmetry of the microscopic dynamics of isolated systems, losses are ubiquitous in any process that tries to manipulate them. Whether it's the heat produced in a car engine or the decoherence of a qubit, all losses arise from our lack of control on the microscopic degrees of freedom of the system. Counter-diabatic driving protocols were proposed as a means to do fast changes in the Hamiltonian without exciting transitions. Such driving in principle allows one to realize arbitrarily fast annealing protocols or implement fast dissipationless driving, circumventing standard adiabatic limitations requiring infinitesimally slow rates. These ideas were tested and used both experimentally and theoretically in small systems, but in larger chaotic systems it is known that exact counter-diabatic protocols do not exist. Here we will present a simple variational approach allowing one to find best physical counter-diabatic protocols. We will show that, while they do not get rid of all transitions, the variational protocols are able to significantly reduce the induced fluctuations in the system.

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