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Shortcuts to Adiabaticity in Transport of a Single Trapped Ion<sup>1</sup> SHUOMING AN, DINGSHUN LV, Tsinghua Univ, ADOLFO DEL CAMPO, University of Massachusetts, KIHWAN KIM, Tsinghua Univ — We report an experimental study on shortcuts to adiabaticity in the transport of a single 171Yb+ ion trapped in a harmonic potential. In these driving schemes, the application of a force induces a nonadiabatic dynamics in which excitations are tailored so as to preserve the ion motional state in the ground state upon completion of the process. We experimentally apply the laser induced force and realize three different protocols: (1) a transitionless driving with a counterdiabatic term out of phase with the displacement force [1], (2) a classical protocol assisted by counterdiabatic fields in phase with the main force [2], (3) and an engineered transport protocol based on the Fourier transform of the trap acceleration [3]. We experimentally compare and discuss the robustness of these protocols under given experimental limitations such as trap frequency drifts.

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