DY 30: Invited talk

Time: Wednesday 9:30–10:00 Location: HÜL 186

Invited Talk DY 30.1 Wed 9:30 HÜL 186

Fast quantum processes without excitations: shortcuts to adiabaticity — •Sebastian Deffner — University of Maryland Baltimore County (UMBC), Baltimore, USA

Achieving effectively adiabatic dynamics in finite time is a ubiquitous goal in virtually all areas of modern physics. So-called "shortcuts to adiabaticity" refer to a set of methods and techniques that allow to produce in a short time the same final state that would result from an adiabatic, infinitely slow process. After briefly reviewing the major techniques to achieve such shortcuts to adiabaticity, we discuss two recent developments: (i) We generalize the "fast-forward technique" to driven Dirac dynamics. As a main result we find that shortcuts to adiabaticity for the (1+1)-dimensional Dirac equation are facilitated by a combination of both scalar and pseudoscalar potentials. (ii) In a second part of the talk, we focus on how to thermodynamically quantify the cost of implementing "transitionless quantum driving". We find that there is a trade-off between speed and cost, i.e., the faster such a shortcut shall be implemented, the higher the corresponding thermodynamic cost.