1163-92-887 **Shamreen Iram**, **Emily Dolson**, **Jacob Scott*** (scottj10@ccf.org) and **Michael Hinczewski**. *Controlling the speed and trajectory of evolution with counterdiabatic driving.*

The pace and unpredictability of evolution are relevant in a variety of modern challenges, such as combating drug resistance in pathogens and cancer, understanding how species respond to environmental perturbations like climate change and developing artificial selection approaches for agriculture. Progress has been made in quantitative modelling of evolution using fitness landscapes, allowing a degree of prediction for future evolutionary histories. Yet fine-grained control of the speed and distributions of these trajectories remains elusive. We propose an approach to achieve this using ideas originally developed in a completely different context—counterdiabatic driving to control the behaviour of quantum states for applications like quantum computing and manipulating ultracold atoms. Implementing these ideas for the first time in a biological context, we show how a set of external control parameters (that is, varying drug concentrations and types, temperature and nutrients) can guide the probability distribution of genotypes in a population along a specified path and time interval. While this control has many possible applications, we focus here on application to evolutionary cancer and pathogen therapy. (Received September 13, 2020)