

The statistical physics of evolutionary predictions

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Predictions of future evolutionary processes have recently been developed for a number of systems, including fast-evolving pathogens and cancer populations. The physical basis of evolutionary predictions is two-fold. Biophysical phenotypes, including protein folding stability and pathogen interactions with the host's immune system, have proven informative for predictive models. The dynamics of host and pathogen takes place in mutually dependent fitness *seascapes*, the analysis of which draws heavily on non-equilibrium statistical mechanics. These links highlight the key role of physics in making evolutionary biology a predictive science. I will discuss the current status of evolutionary predictions and map the path from predictions to evolutionary control. This has direct applications in public health: to produce better vaccines for influenza and to improve cancer therapies.

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**MPIDS, Seminar room 0.77,
Am Faßberg 17, Göttingen**

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