Center for Theoretical Biological Physics

Northeastern University

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177 Huntington Avenue, 13th Floor, Boston, MA 02115
https://northeastern.zoom.us/j/93428254350

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Collective epigenetic processes in space and time

Abstract. The functioning of complex organism relies on a precise timing of molecular processes. But how do fast and noisy molecular processes allow for the timing of much slower events during development or ageing? Experiments using single-cell genomics give access to detailed molecular states of cells, but they do not provide time-resolved measurement and do not have spatial resolution. In this talk, I will show how we use tools from theoretical physics to infer molecular processes in space and time from single-cell sequencing experiments. With a focus on epigenetics, I will use these tools to unveil the collective molecular processes underlying the timing of early lineage decisions during development and the changes in the epigenome during aging.

Biography. Steffen Rulands is a professor for theoretical physics at the LMU in Munich, Germany. After his PhD in statistical physics in Munich he moved to the University of Cambridge as a Herchel-Smith postdoctoral fellow, where he began working on single-cell genomics. In 2017, he became a group leader at the Max-Planck-Institute for the Physics of Complex Systems in Dresden, Germany, and took a professorship at the LMU in 2022. His group works at the interface between theoretical physics, biology, and artificial intelligence.