



## Motility regulation as a self-organization principle

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Equilibrium statistical mechanics tells us how to control the self-assembly of passive materials by tuning the competition between energy and entropy to achieve desired states of organization. Out of equilibrium, no such principles apply and self-organization principles are scarce. In this talk I will review the progress which has been made over the past ten years to control the organization of self-propelled agents using motility control, either externally or through interactions. I will show that generic principles apply and illustrate the theoretical developments presented in the talk using recent experiments on run-and-tumble bacteria. I will show how the mediated interactions between the bacteria, that are non-reciprocal by nature, have a subtle fate upon coarse-graining: At large scales, non-reciprocity can indeed fade out, leading to bona fide equilibrium physics, or survive, leading to a wealth of dynamical effects ranging from steady traveling bands to chaotic ones.

**Wednesday, June 26<sup>th</sup>, 2024 at 2:15 pm**

MPI-DS, Prandtl Lecture Hall  
Am Fassberg 11, Göttingen, and  
Zoom Meeting ID: 959 2774 3389  
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