# Symposium Physics of Collective Mobility (SYCM)

jointly organized by
the Physics of Socio-economic Systems Division (SOE),
the Dynamics and Statistical Physics Division (DY),
the Biological Physics Division (BP), and
the Working Group "Young DPG" (AGjDPG)

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How public and private mobility systems operate, currently drastically changes due to recent developments in information and communication technology. Traditional systems typically fall into extremes such as individual car traffic or line-based public transport. In contrast, future mobility becomes more decentralized, more flexible as well as more autonomous and demand-based. Whereas existing technological hurdles are likely solved within the next few years, flexible and more self-organized mobility systems induce a range of novel collective phenomena, including spatially and temporally correlated routing and shareability or new types of spontaneous congestions. Optimization schemes adapted from collective dynamics in biology, as swarm intelligence, provide classical analogies and approaches. Methods from Statistical Physics can help to reveal options, constraints, and mechanisms underlying such collective phenomena. Recently, artificial nanoswimmers have been developed towards medical applications. This Symposium gives a concise overview of topical questions that to date arise on flexible mobility systems and how physicists might address them.

(Symposium organizers: Marc Timme, Hartmut Löwen, and Vitaly Belik)

## Overview of Invited Talks and Sessions

(Lecture room HSZ 02)

### Invited Talks

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|---|---|---|---|---|
| SYCM 1.1 | Wed | 9:30–10:00 | HSZ 02 | **Mobility in shareability networks** — •Michael Szell |
| SYCM 1.2 | Wed | 10:00–10:30 | HSZ 02 | **Trail-following bacteria: from single particle dynamics to collective behaviour** — Anatolij Gelimson, Kun Zhao, Calvin K. Lee, W. Till Kranz, Gerard C. L. Wong, •Ramin Golestanian |
| SYCM 1.3 | Wed | 10:30–11:00 | HSZ 02 | **Mobility and Self-Organization in Multi-Layer Networks: A Meta-Foodweb example** — •Thilo Gross, Andreas Brechtel, Philipp Gramlich, Daniel Ritterskamp, Barbara Drossel |
| SYCM 1.4 | Wed | 11:15–11:45 | HSZ 02 | **Temporal Percolation in Critical Collective Mobility Systems** — •Andreas Sorge, Debsankha Manik, Jan Nagler, Marc Timme |
| SYCM 1.5 | Wed | 11:45–12:15 | HSZ 02 | **Modeling the evolution of cities** — •Marc Barthelemy |

### Sessions

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| SYCM 1.1–1.5 | Wed | 9:30–12:15 | HSZ 02 | **Physics of Collective Mobility (Symposium SYCM, joint SOE / DY / BP / jDPG)** |