


Name:	<b>Ryo Suzuki</b>	
Affiliation:	Center for Integrative Medicine and Physics (CiMPhy), Institute for Advanced Study, Kyoto University	
Email:	suzuki.ryo.8z@kyoto-u.ac.jp	
Academic degree:	PhD (Physics), The University of Tokyo (2012)	
Professional Experience:	2012 – 2015 Postdoc, Department of Physics, Technical University Munich 2015 – 2017 Postdoc, iCeMS, Kyoto University 2017 – 2018 Postdoc, Department of Medicine, Kyoto University 2018 – Assistant Professor, CiMPhy, Kyoto University	
Current Research:	Physics of Active Biological Matter	

## **Emergence of coexisting ordered states in an active filament system**

Ryo Suzuki<sup>1,2</sup>, Lorenz Huber<sup>3</sup>, Timo Krüger<sup>3</sup>, Erwin Frey<sup>3</sup>, Andreas R. Bausch<sup>2</sup>

<sup>1</sup> Center for Integrative Medicine and Physics, Institute for Advanced Study, Kyoto University

<sup>2</sup> Department of Physics, Technical University Munich

<sup>2</sup> Department of Physics, Ludwig Maximilian University of Munich

Using the actomyosin motility assay, we demonstrate the emergence of dynamic coexistence of ordered states by sensitively tuning the interaction between the myosin-driven actin filaments with a depletion agent. Combining experiments with agent-based simulations, which recover the complete phase diagram obtained by the experiment, we identify sufficiently weak interactions that lack a clear alignment symmetry as a prerequisite for coexistence. Thus, the symmetry of macroscopic order becomes an emergent and dynamic property of the active system. Also, the coexistence is observed for a wide range in parameter space. These findings provide a possible strategy in which living systems can express different types of order and hence enable multitasking by use of identical building blocks.