

セミナーのお知らせ

日時 Day & Time : 2026 年 11 月 20 日 (金) 13 時 00 分から 14 時 30 分

場所 Location : 中央図書館ライブラリーホール Library Hall, Central Library

異種ペア系で生まれる自己駆動・集団運動

Self-propulsion and collective motion of pairs with different species

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Abstract

Under nonequilibrium conditions, effective interactions between elements can become nonreciprocal, violating action–reaction symmetry. A familiar example is found in human interactions, where one individual may chase another without an equivalent response. Such a chasing pair can exhibit persistent motion, providing a simple mechanism for generating self-propulsion.

In this talk, we present experimental realizations of active motion arising from nonreciprocal interactions between different species. We discuss three examples: a camphor–water system, a binary droplet system, and a bidisperse colloidal particle system. These systems are driven by nonequilibrium interfacial flows, such as Marangoni flows and electrohydrodynamic flows. When the interacting elements are of different types, the resulting effective interactions can become nonreciprocal.

We will discuss the characteristics of the resulting pair-induced motion in each system and show how such nonreciprocal interactions give rise to distinct spatiotemporal dynamics and collective organization.

Biography

Yutaka Sumino received his Ph.D. in Physics from Kyoto University in 2009. He subsequently worked as a JSPS Postdoctoral Fellow at the University of Tokyo before joining Aichi University of Education as an Assistant Professor in 2011, where he was promoted to Lecturer in 2013. In 2014, he moved to Tokyo University of Science, where he is currently a Professor in the Department of Applied Physics.

Throughout his research career, he has sought to uncover the physical principles underlying living systems through a combination of experimental investigations and theoretical modeling. His research focuses on nonequilibrium physics, self-organization, and active matter, with the broader ambition of establishing artificial life physics as a new research field.

本セミナーは、統合生命科学研究科セミナーとして、プログラム共同セミナーの対象です。

This program seminar will only provide slides and a part of Q&A in English.

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