
========== 物理学教室 ==========

========== 物性コロキウム ご案内 ==========

日時：2023 年 6 月 6 日(火) 16:20-17:50

場所：理学研究科合同 B 棟 743 号室 (Room 743, Science Complex B)

講師：竹内 一将 氏（東京大学大学院理学系研究科 物理学専攻 准教授）

題目: Glassy state of active matter and its realization in bacterial populations
（アクティブマターのガラス状態とバクテリア集団を用いた実験）

要旨：

An interesting question in active matter physics is what states of matter may arise in active matter and how different they are from thermal systems. This, in the case of glassy states of matter, is what I want to discuss in this Colloquium. After reviewing some characteristic properties of thermal glass and existing studies on active glass, I will present our recent experimental finding of an active glass state in populations of swimming bacteria, namely Escherichia coli. Unlike thermal glass, bacteria may grow and divide in a nutrient-rich condition and spontaneously transition to a glassy state. Interestingly, this takes place in two steps, the first one suppressing only the orientational degrees of freedom, and the second one vitrifying the population completely. Characterizing statistical properties of this bacterial glass, we find both similarities and dissimilarities compared with thermal glass. The latter include anomalous signals in the dynamic susceptibility and an unusual value of a power-law exponent hinting at non-equilibrium nature of the transition. I will also describe the relevance of such dense populations of bacteria in nature and in our lives.

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