

量子物理学・ナノサイエンス第 445 回特別セミナー

※本セミナーは学術変革領域(A)「動的物質科学の創成 量子と古典の枠を超える」との共催です。

Regulation of bacterial cell size and shape

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- 日程** : 7月1日(水) 13:30 -
- 場所** : 南5号館5階 503CD 大会議室 および Zoom*

概要

All living cells are bounded by envelopes that protect them from the environment and confer their sizes and shapes. These shapes help cells to spatially organize their internal biological processes, allowing them to divide and faithfully segregate genetic material to each daughter. Yet, we still know very little about how cells obtain and control cell shape, even in the arguably simplest and best understood organism: the rod-shaped *Escherichia coli*.

To resist a high intracellular osmotic pressure, bacteria and many other single-celled organisms are surrounded by a cell wall, an elastic, covalent meshwork of sugars and peptides. For walled cells to grow, they must enzymatically cut cell-wall bonds while inserting new cell-wall material to prevent envelope rupture. How do cells control a straight rod-like cell geometry with a well-defined diameter, while also maintaining cell-wall integrity and increasing cell length at a rate that accommodates biomass growth? We have made important progress in the past two decades.

Here, I will present two related vignettes that answer aspects of these questions in Gram-negative rod-shaped bacteria: First, I will present experiments showing that cells couple the *global* rate of envelope growth to metabolism, i.e., they increase their envelope in proportion to the production of biomass, likely at the level of the outer membrane. Second, I will present how mechanical forces and envelope curvature contribute to the regulation of cell shape *locally*, through cytoskeletal proteins and autolytic enzymes, based on coarse-grained computer simulations.

※本 ZOOM セミナーに参加されます場合には、事前に下記より登録を済ませてください。

https://zoom.us/meeting/register/_HDG8eelQfa4fMUVRtLP3A

当日会場にお越しいただけます方は、登録不要ですので、是非、対面でご参加ください



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