

プログラム共同セミナー

日時: 令和7年 12月 22日(月) 16:20~17:50

場所: 理学部 E104 講義室/ハイブリット開催

講師: 平岩 徹也 氏

(Institute of Physics (IOP), Academia Sinica (AS), Associate Research Fellow)

演題: Computer simulations of chromatin organization and dynamics:
how mechanical perturbations caused by actions of
subnuclear molecules influence them

要旨:

Genetic information in a eukaryotic cell is stored in its chromatin, a long polymer-like composite of DNA and proteins, densely packed in the nucleus. It is now recognized that physical spacing of chromatin is critical in regulating bio-chemical and transcriptional abilities of genes, and proper functionality depends on the nonrandom organization of chromatin. Meanwhile, in a living cell, other subnuclear molecules, like polymerases and topoisomerases, act to facilitate cellular functions. Such actions of subnuclear molecules may bring mechanical perturbations on chromatin, which can affect its organization and dynamics.

In this talk, we will introduce our computational studies about such possible effect, based on polymer-physics concepts, where we focused on a type of actions of molecules which we describe as catch-and-release. We will share the results of our computer simulations on how such mechanical perturbations by actions of subnuclear molecules affects chromatin organization and dynamics. The results clarified (i) it enhances fluctuating dynamics of inclusions in chromatin through the newly-proposed dynamic mode of chromatin remodeling [1], and (ii) it can modulate the phase separation organizations of chromatin called heterochromatic and euchromatic regions [2].

References: [1] Das, Sakaue, Shivashankar, Prost, Hiraiwa "Chromatin Remodeling Due to Transient-Link-and-Pass Activity Enhances Subnuclear Dynamics" PRL 132, 058401 (2024). [2] Das, Sakaue, Shivashankar, Prost, Hiraiwa "How enzymatic activity is involved in chromatin organization" eLife 11, e79901 (2022).

※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。

Zoom: <https://us06web.zoom.us/j/83316694168?pwd=rhHkQ4oG91QHqza4oCJ7cs3opSHY01.1>

ミーティング ID: 833 1669 4168

パスコード: 677143

注意: オンライン参加は 100 名が参加上限です。

授業言語: 英語

問い合わせ先: 統合生命科学研究科数理生命科学プログラム

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