Graduate School Event

Thesis Defense: An Examination on Phages as a Naturally Composable System

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Host: Caroline Muller

Systems design has classically relied on composable systems, in which individual subsystems have defined inputs, outputs, and interactions with each other; however, attempts at designing complex systems in synthetic biology has often run in to issues of crosstalk and interference, given that these systems must function within the context of the host. In nature, mobile genetic elements are systems that have evolved to travel between hosts, and thus appear to be a good candidate with which to evaluate composability. Selecting temperate phages as a model system, I used mathematical modelling to identify sources of information that temperate phages should respond to. I found that essential proteins of temperate phages can interfere with potential hosts, indicating limitations to composability. I also designed a lysogeny reporter construct and characterize its behaviour across various laboratory and environmental strains, finding differences in phage lambda lysogen, and potential interference from prophages that already exist within the environmental strains. Although the information gathered is not conclusive, it suggests that composability is not a key property of temperate phages, implying that biological systems may not be composable, and that other system design principles should be considered when designing synthetic systems.

Thursday, September 4, 2025 01:00pm - 02:00pm
Central Bldg / O1 / Mondi 2b (I01.O1.008) and Zoom

This invitation is valid as a ticket for the ISTA Shuttle from and to Heiligenstadt Station. Please find a schedule of the ISTA Shuttle on our webpage: https://ista.ac.at/en/campus/how-to-get-here/ The ISTA Shuttle bus is marked ISTA Shuttle (#142) and has the Institute Logo printed on the side.