BiophysTO Lunchtime Seminar Series

Date

Thursday, November 22, 2018
12:00 pm

Location

McLennan Physical Labs, MP606
60 St George Street

Dr. Nika Shakiba

Massachusetts Institute of Technology

Pizza and refreshments provided

Controlling Heterogeneity within Multicellular Populations

As evolution guided the development of multicellular animals by uniting unicellular organisms, single cells have had to adapt their social interactions and engage in mainly co-operative relationships with their neighbours. Nevertheless, remnants of natural selection and competition have remained an innate component of cell-cell interactions and govern the dynamics of cell populations. In the era of cellular engineering, where scientists can direct cell behaviour by engineering gene regulatory networks, cell competition remains an unexplored parameter by which we may be able to control population dynamics. Perhaps the most prominent example of cellular engineering is the recent discovery of induced pluripotent stem cells (iPSCs) in a process called reprogramming – a discovery which was recognized with a Nobel Prize in 2012. iPSCs provide an interesting model system in which to probe the impact of key transcription factors (TFs) on cell competition outcomes. In this talk, I will explore cell competition dynamics in reprogramming populations, utilizing a combined cellular barcoding, mathematical modelling, and lineage tracing approach. I will also discuss ongoing efforts towards constructing a feedback-mediated synthetic genetic circuit for tunable control of TF overexpression, enabling precise control over the reprogramming trajectory of cells while eliminating sources of heterogeneity.

BIO:

Dr. Nika Shakiba is a postdoctoral fellow in the Department of Biological Engineering at Massachusetts Institute of Technology (MIT). Her work in synthetic biology uses engineering principles to control the behaviour of stem cells through the design, construction, and optimization of decision-making genetic circuits. Dr. Shakiba completed her doctoral training in Dr. Peter Zandstra's Stem Cell Bioengineering lab at the University of Toronto, where she focused on uncovering the role of heterogeneity and clonal competition in the reprogramming process.

Host: Prof. Sid Goyal

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