



University of Stuttgart

Stuttgart Research Center Systems Biology (SRC SB)

Systems Biology Seminar Talk

„Cellular regulatory circuits
based on
designable modules “

Prof. Dr. Roman Jerala

*National Institute of Chemistry,
Ljubljana*



Abstract:

Construction of genetic devices functional in the complex cellular environment requires orthogonal building elements, which may not be available to harvest from nature. Nucleotide sequence provides a large combinatorial diversity that can be used to program biological systems and could be used to regulate therapeutic cells. Designable DNA-binding domains such as TALEs or dCas9/CRISPR can be used to construct an almost limitless number of artificial transcriptional regulators enabling construction of orthogonal genetic gates, which was demonstrated in mammalian cells. Construction of genetic bistable switches based on designable DNA binding modules required introduction of feedback loops. Recently we devised two strategies to regulate gene transcription and fast protein-based signaling pathways that accelerated cellular response by an order of magnitude.

CV:

Roman Jerala is head of the Department of synthetic biology and immunology at the National institute of chemistry in Ljubljana, Slovenia. He received his PhD at the University of Ljubljana and was a postdoctoral fellow at the University of Virginia. His group contributed to the understanding of the molecular mechanisms of signaling of several Toll-like receptors in infection and cancer. He has been active in synthetic biology since 2006, where he pioneered the design of coiled-coil protein origami as a new principle of designing protein folds, and designed several strategies of information processing in cells, such as layered NOR genetic gates, polarized displacement of DNA binding proteins and split protease orthogonal coiled-coil -based signaling pathways. Roman Jerala was elected member of the European Molecular Biology Organization (EMBO) and Academia Europaea and is a recipient of the ERC Advanced Grant. In synthetic biology community he is also known as a mentor of numerous successful iGEM student research projects.

Wednesday
July 17, 2019
10 a.m. – 11 a.m.

Lecture Hall 0.106
Allmandring 31
Stuttgart