

# BIOCHEMISTRY SEMINAR SERIES



**“Switches, sensors, and new shapes: from design of new functions to cellular consequences of allostery ”**

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There has been exciting progress in the computational design of proteins with new structures, highlighting the potential to advance many applications in biological engineering, as well as to provide insights into the design principles of natural protein functions. Many significant challenges remain, both in the accuracy of current computational approaches, and in the complexity of protein functions that can be designed at present. I plan to discuss our recent progress with new computational methods and their applications. We have designed new, modular small-molecule sensors, and new protein shapes with atom-level control. I will then focus on a more biological problem: How do protein switches control diverse protein functions in the cell, given the interconnectedness of biological processes? We have focused on a paradigm molecular switch, the small GTPase Ran (or Gsp1 in our model system *S. cerevisiae*). Using systematic mutational perturbations of the switch, quantitative genetic interaction mapping, analysis of rewiring of physical interaction networks, in vitro biochemistry, and NMR, I will propose a model of how different biological processes are sensitive to different quantitative regimes of switch function. Our results highlight a considerable role of allostery in regulating the switch.

**Friday, January 29, 2021**

**via Zoom**

**3:30 pm**

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