*Title:*
Physical Mechanisms of Membrane Protein Organization and Collective Function

*Speaker:*
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*Abstract:*
Cell membranes are one of the fundamental hallmarks of life. For many of their biological functions, cell membranes rely on the collective properties of lattices of interacting membrane proteins. Here we explore the general physical mechanisms and principles underlying supramolecular organization and collective function of membrane proteins, based on three model systems: (1) We show how the interplay between protein-induced lipid bilayer curvature deformations, topological defects in protein packing, and thermal effects can explain the observed symmetry and size of membrane protein polyhedral nanoparticles; (2) We predict that the observed four- and five-fold symmetric states of mechanosensitive ion channels yield characteristic lattice architectures of channel clusters, with distinctive collective gating properties; (3) We show that lipid bilayer-mediated elastic interactions between chemoreceptor trimers provide a physical mechanism for the observed self-assembly of chemoreceptor lattices, and may contribute to the cooperative signaling response of the chemotaxis system.