
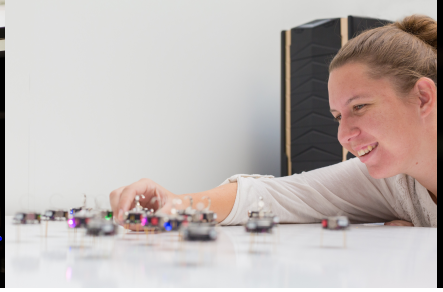


Physics colloquium

Transport and Search Processes in Cellular Structures

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Date: **11/16/18**
Time: **10:30 AM**
Location: **COB2 170**

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Abstract: The interior of a eukaryotic cell comprises a highly structured yet dynamic environment, through which components ranging from nanoscale proteins to micron-sized organelles must move and find each other. Cells make use of a variety of physical transport modes, including diffusion, motor-driven transport, and advection in a flowing cytoplasm to spatially organize their organelles. The distribution of proteins within an organelle, however, is usually thought to rely primarily on diffusion through a complex confining geometry. We use analytical theory and stochastic simulations to examine the physics of intracellular transport and encounter processes, including the multi-modal movement of vesicular organelles (peroxisomes in tubular fungal hyphae) and the diffusive distribution of proteins through the lumen of cell-spanning tubular networks such as mitochondria and the endoplasmic reticulum. In addition, we analyze dynamic organelle trajectories extracted from living cells and explore how physical modeling can help uncover the mechanisms underlying their motion. Our results highlight the potentially under-appreciated roles of tethering to cytoskeletal structures and of reticulated organelle connectivity in dispersing particles within the cell.