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Cytoplasmic Flow Enhances Organelle Dispersion in Eukaryotic Cells ELENA KOSLOVER, SAURABH MOGRE, UC San Diego, Dept of Physics, CALEB CHAN, JULIE THERIOT, Stanford University, Dept of Biochemistry —
The cytoplasm of a living cell is an active environment through which intracellular components move and mix. We explore, using theoretical modeling coupled with microrheological measurements, the efficiency of particle dispersion via different modes of transport within this active environment. In particular, we focus on the role of cytoplasmic flow over different scales in contributing to organelle transport within two different cell types. In motile neutrophil cells, we show that bulk fluid flow associated with rapid cell deformation enhances particle transport to and from the cell periphery. In narrow fungal hyphae, localized flows due to hydrodynamic entrainment are shown to contribute to optimally efficient organelle dispersion. Our results highlight the importance of non-traditional modes of transport associated with flow of the cytoplasmic fluid in the distribution of organelles throughout eukaryotic cells.

Elena Koslover
UC San Diego, Dept of Physics

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