Title: When diffusion has memory: anomalous transport and thermodynamics in living cells

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Living cells exhibit rich dynamical behaviors that often deviate from classical Brownian motion. In particular, the motion of particles in the crowded intracellular environment frequently displays anomalous diffusion and pronounced memory effects, reflecting the viscoelastic and active nature of the medium. In this talk, I will provide a pedagogical overview of these phenomena and recent efforts to understand non-Markovian anomalous transport in living cells, with a focus on theoretical frameworks such as fractional dynamics and generalized Langevin descriptions. I will also discuss experimentally controlled active systems that mimic nonequilibrium dynamics in living cells, and briefly introduce recent research activities of my group along these directions.