# Quantifying anomalous single-molecule dynamics in living cells and beyond

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Recent advance of single-particle tracking (SPT) technique has significantly elevated the understanding of single-molecule dynamics in living and soft-matter complex systems. Without in priori assumption on the underlying dynamics, the SPT tools make it possible to access the information on transport and/or conformational dynamics of individual molecules and, further, to obtain physical observables in a single-molecule level, without ensemble-averaging. It has been found that the viscoelastic and active (nonequilibrium) nature of the intracellular environment often induce, so called, "strange kinetics". Currently this field, a.k.a. anomalous diffusion, is rapidly growing at the intersection of biophysics and statistical physics. In this talk, we overview this field with some recent academic achievements for observing and quantifying the anomalous diffusion, in terms of the stochasticity and fluctuations shown in SPT data. It is shown that the information on the stochastic properties of the motion is a fingerprint of identifying the physical origins of the anomalous diffusion as well as the clue for establishing the corresponding dynamic model. Related research problems undertaken in my group will be introduced. Beyond these studies, currently, investigations on the impact of the anomalous diffusion on the cellular dynamics becomes an important topic. A related research problem currently undertaken in my group is shortly explained.