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**Transport dynamics – one particle at a time<sup>1</sup>**

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By watching particles and molecules diffuse, one-by-one, the full displacement probability distribution can be measured, enabling one to see experimentally how, how fast, and with what fidelity to classical assumptions, particles and molecules diffuse through complex environments. This allows us to measuring the confining tube potential through which thin actin filaments reptate, and also some of the amazing differences in diffusion rate between colloidal particles and phospholipid vesicles of the same size. Pervasively, we find that Brownian diffusion can be non-Gaussian.

<sup>1</sup>Work performed in collaboration with Bo Wang, Stephen M. Anthony, Juan Guan, Sung Chul Bae, Jian Yang, and Kenneth S. Schweizer.