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**Non-Gaussian yet normal diffusion of a bead near a wall**[1]
MPUMELELO MATSE, JOHN BECHHOEFER, Simon Fraser University — Brownian motion of microscopic particles in a simple fluid exhibits two key properties: the mean-squared displacement (MSD) increases linearly with time ($\langle \Delta x^2 \rangle = 2D\Delta t$, where $D$ is the diffusivity) and the displacement distribution is Gaussian. Although linear MSD ("normal diffusion") was initially assumed to always imply Gaussian displacements, recent experiments by Granick et al. show that this is not so. Chubynsky et al. [PRL **113**, 098302, 2014] have argued that such behavior arises when $D$ has temporal and/or spatial fluctuations that are convoluted together and form a non-Gaussian distribution. Experiments to date have been in complex settings where direct measurements of $D(x,t)$ have not been possible. Here, we report experiments on a simple system where $D(x,t)$ is known: the Brownian motion of a colloidal sphere near a wall. By choosing the particle size carefully, we ensure that the bead explores a wide range of $D$. We observe a linear MSD curve and non-Gaussian displacements for vertical motion and directly confirm the proposed mechanism of Chubynsky et al. for such "diffusing diffusivity."

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