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Supplemental Information

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Cytoplasmic RNA-Protein Particles Exhibit Non-Gaussian Subdiffusive Behavior: Supplemental Information

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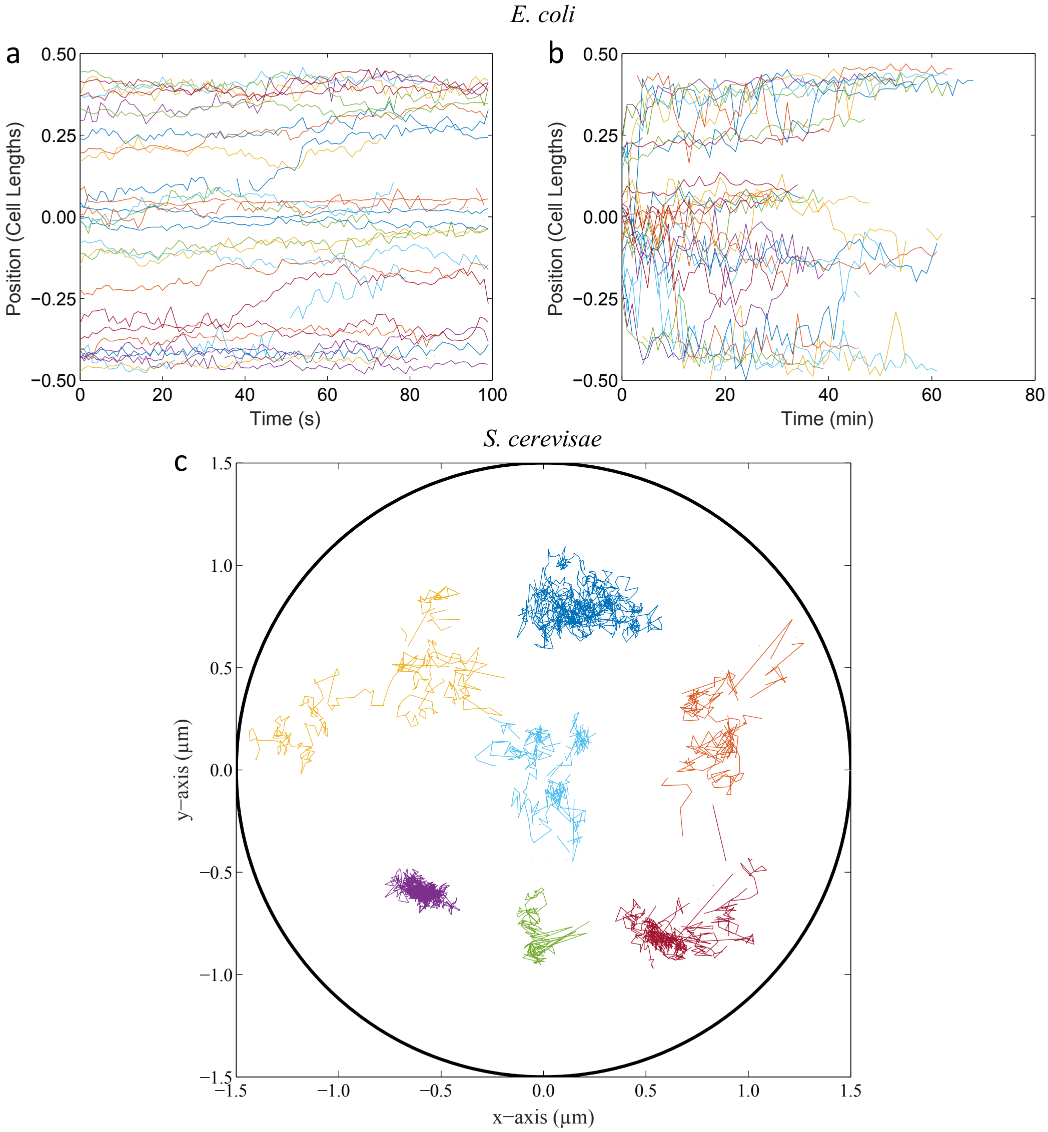

FIG. 1: **Representative trajectories of RNA-protein particles.** (**ab**) Sample trajectories of RNA-protein particles diffusing in the *E. coli* cytoplasm for (**a**) 1 s and (**b**) 1 min intervals between position measurements. (**c**) Sample trajectories placed arbitrarily in a circle with a diameter of 3 μm (typical size of an *S. cerevisiae* cell).

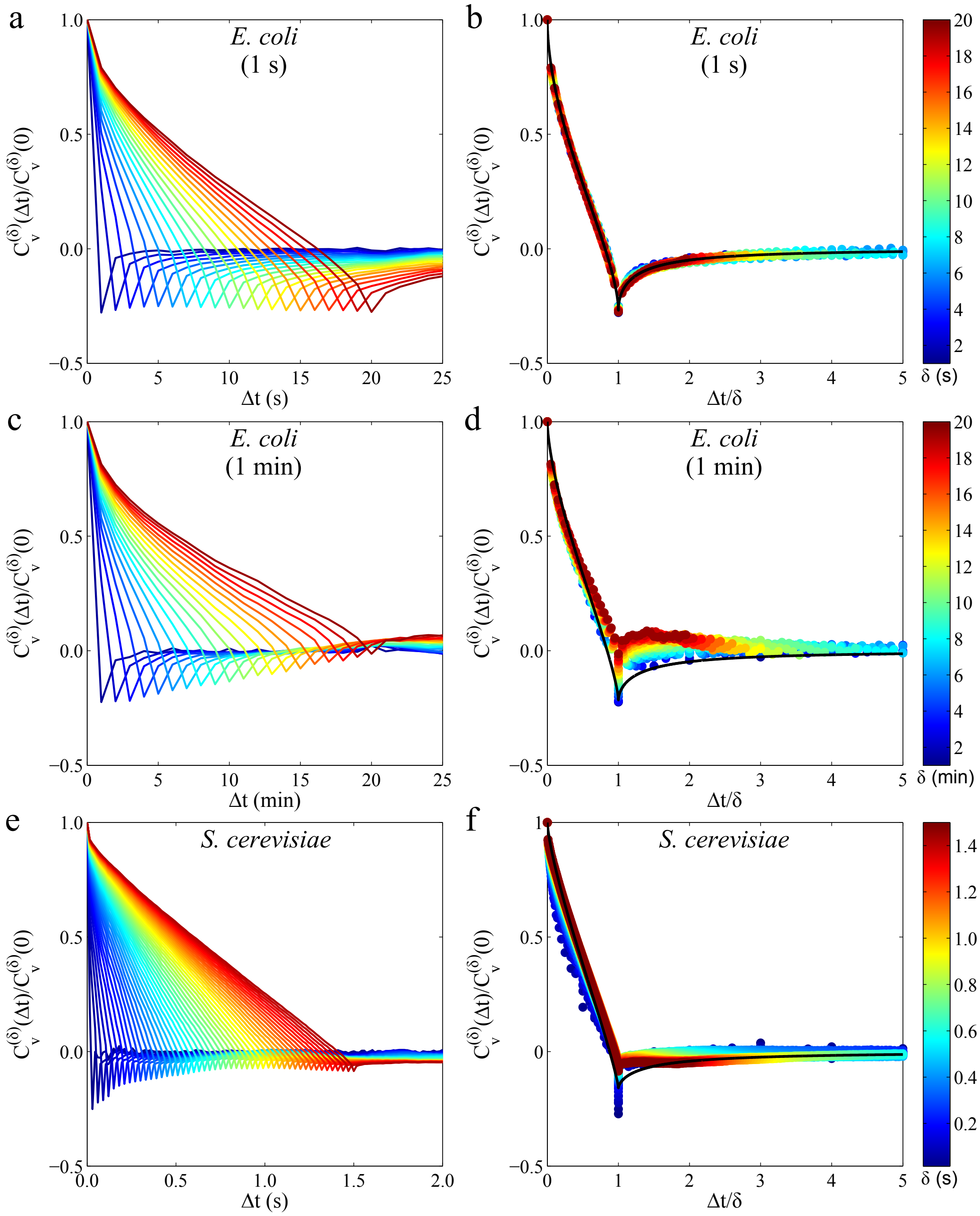

FIG. 2: **RNA-protein particles exhibit viscoelastic behavior.** (**a-d**) Velocity autocorrelation function of RNA-protein particles in *E. coli* for particle position measurements taken at one second intervals (**a,b**) and one minute intervals (**c,d**) [1] and corrected for drift due to cell growth. (**e,f**) Velocity autocorrelation function of RNA-protein particles in *S. cerevisiae* [2]. The velocity autocorrelation function is defined as $C_v^{(\delta)}(\Delta t) = \langle v_\delta(\Delta t) \cdot v_\delta(0) \rangle$ where the velocity $v_\delta(t) = [x(t+\delta) - x(t)]/\delta$ for the discrete time interval δ. (**b**), (**d**), and (**f**) are the same as (**a**), (**c**), and (**e**) respectively but with a differently scaled x-axis to show that the negative correlation peak occurs at $\Delta t/\delta = 1$. The black lines in (**b**), (**d**), and (**f**) are theoretical predictions for fractional Brownian motion with the measured values of α from the eMSD inserted into the equation $[(\eta+1)^\alpha + |\eta-1|^\alpha - 2\eta^\alpha]/2$, where $\eta = \Delta t/\delta$ [3].

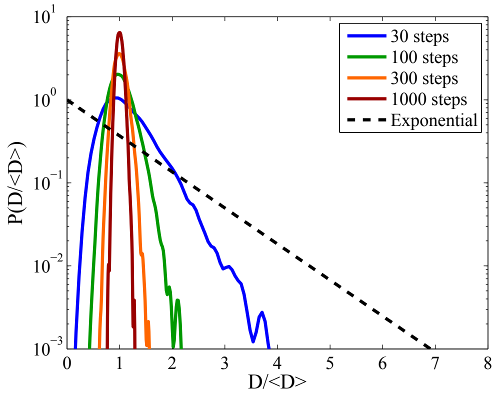

FIG. 3: **The effect of track length on the diffusivity distribution.** The distribution of diffusivities normalized by their mean for 10,000 fractional Brownian motion simulations of varying track lengths. Diffusivities are calculated using a power law fit to the first 15 points of each trajectory's time-averaged MSD. Distributions are plotted using a kernel density estimation with a Gaussian kernel and width determined by Silverman's rule of thumb.

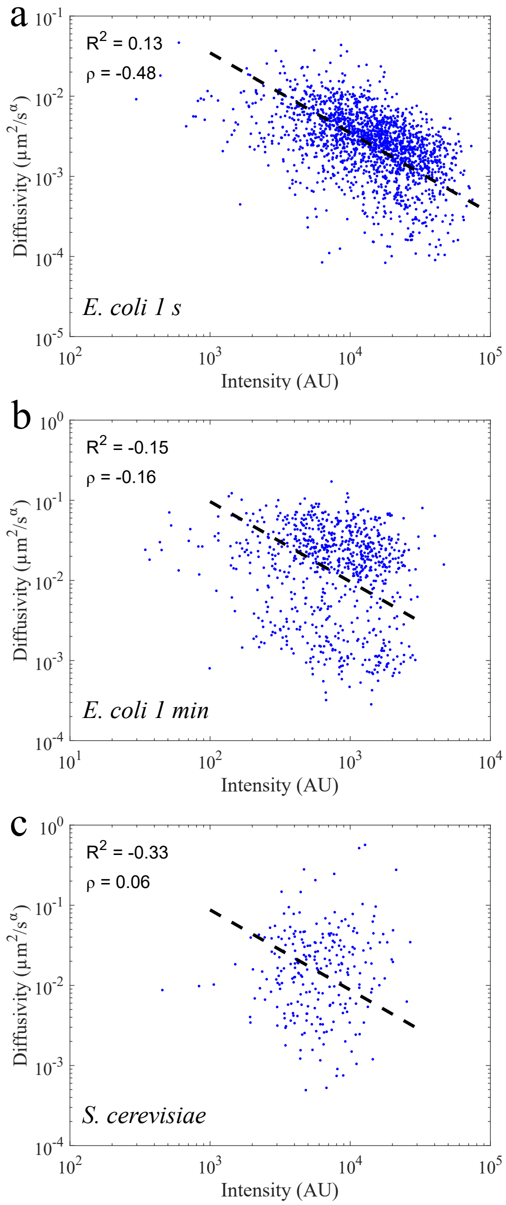

FIG. 4: **The relation between probve diffusivity and fluorescence intensity.** Particle diffusivities as a function of their mean intensity for the *e. coli* 1 s (a), *E. coli* 1 min (b), and the *S. cerevisiae* data (c). The black dashed line represents a best fit of the model $y = A/x$ with fit parameter A. We show R^2 and Pearson correlation coefficient (ρ) for each model fit to the data on a loglog scale.

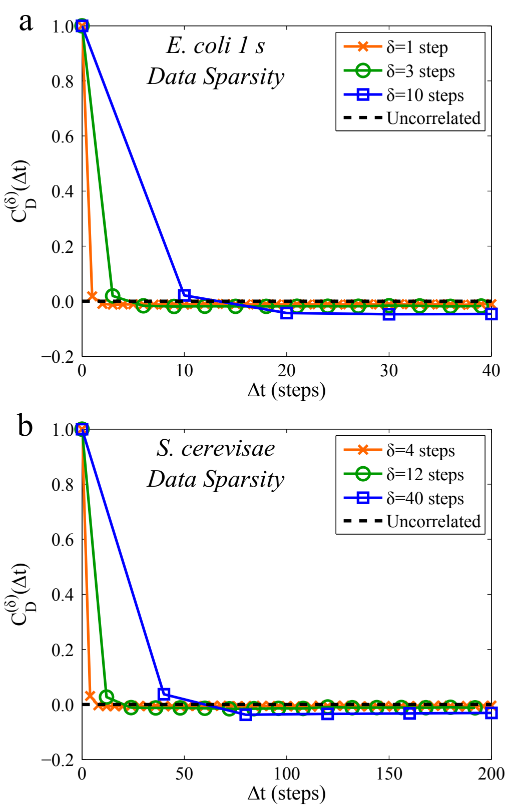

FIG. 5: **The effect of finite track lengths on the diffusivity autocorrelation function.** Diffusivity autocorrelation function for fractional Brownian motion simulations that have the same data sparsity and 10x the size of the *E. coli* 1 s data set (a) and the *S. cerevisiae* (b).