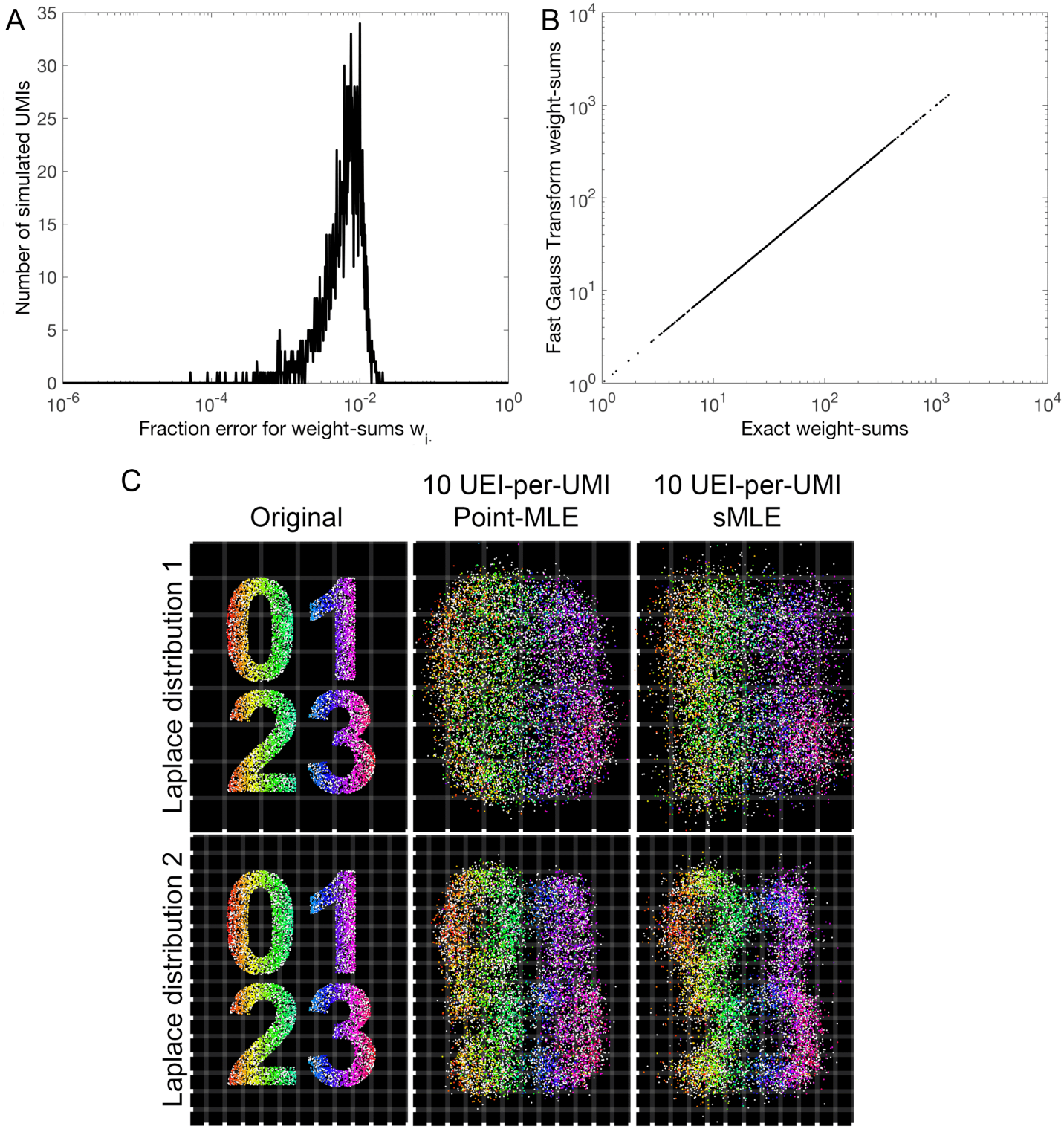

FIGURE S4: Simulations of the Fast Gauss Transform and deviations from the Gaussian-diffusion model, related to Figures 3-6. Fractional error histogram (A) and correlogram (B) using an adapted Fast Gauss Transform on simulated data. The Fast Gauss Transform allows sums of O(N^2) Gaussian interactions between point-sources (here, UMIs) to be calculated in O(N) time. The Fast Gauss Transform is applied above to the weight sums $w_{i\cdot} \equiv \sum_j w_{ij}$ of 2000 simulated UMIs (1000 beacons and 1000 targets) uniformly distributed in a two-dimensional box of side length $10L_{\text{diff}}$ and with amplitudes A_i, A_j (from equation 8) normally distributed with $\sigma = 1$. Maximum fractional error bound is set to 30% for weights $w_{i\cdot}$. Physical simulations (C) with diffusion following the long-tailed Laplace distribution $\sim e^{-\|\vec{x}\|/L_{\text{diff}}}$ in place of the Gaussian distribution ($\sim e^{-\|\vec{x}\|^2/L_{\text{diff}}^2}$) used in Figure 3G. Grid lines indicate the respective lengths L_{diff} for both simulations, as in the simulation in Figure 3.