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Spatiotemporal-dependent dynamics of small molecules in Escherichia coli STELLA STYLIANIDOU, NATHAN J. KUWADA, PAUL A. WIGGINS, University of Washington — Despite its relative biological simplicity, many biophysical details of the bacterial cytoplasm remain unknown. In order to isolate active dynamics in *E. coli*, such as the chromosome segregation mechanism, we need to define totally passive motion. Using time-lapse wide-field fluorescence microscopy, we imaged small, non-functional fluorescent MS2-mRNA molecules throughout the entire *E. coli* cell cycle. By analyzing the trajectories of these molecules, we find that the dynamics of small non-functional molecules in the cell depend on spatial position along the long-axis of the cell as well as temporal location in the cell cycle lifetime. We present a biophysical model and possible consequences of these results on understanding passive and active transport systems in the cell.

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