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Two-Point Microrheology of Phase Separated Domains in Lipid Bilayers[1] TRISTAN HORMEL, MATTHEW REYER, RAGHUVEER PARTHASARATHY, University of Oregon — Though the importance of membrane fluidity for cellular function has been well established for decades, methods for measuring lipid bilayer viscosity remain challenging to devise and implement. Recently, approaches based on characterizing the Brownian dynamics of individual tracers such as colloidal particles or lipid domains have provided insights into bilayer viscosity. In general, however, methods based on single-particle trajectories can be biased by distortions induced by the tracers, and furthermore provide a limited view of hydrodynamic response. The technique of two-point microrheology, in which correlations between the Brownian dynamics of pairs of tracers report on the properties of the intervening medium, resolves these issues, but has never been applied to lipid systems. We present the first two-point microrheological study of lipid bilayers, examining the correlated motion of domains in phase-separated lipid vesicles and comparing one- and two-point results. We measure correlation functions in excellent agreement with the forms predicted by two-dimensional hydrodynamic models, which reveal a viscosity that corresponds to the average of the lipid phases rather than the viscosity of the local neighborhood of the tracer.

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