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Microrheology of freestanding lipid bilayers CHRISTOPHER HARLAND, University of Oregon, MIRANDA BRADLEY, RAGHUVEER PARTHASARATHY, University of Oregon — The macroscopic material properties of cellular membranes, determined by the composition and interactions of their constituent lipids, are important factors in the structure and function of all living cells. Fluidity is a key material property of membranes, yet the underlying lipid bilayer viscosity and other rheological parameters remain poorly quantified. We adopt recently developed microrheological methods to study multiple composite freestanding "black" lipid membranes. Using high speed video particle tracking, we monitor dynamics of membrane-anchored nano- and micro-particles across a range of temperatures that span bilayer phase transitions. Two particle spatial correlation functions and the complex shear modulus are extracted from such measurements and provide information about fundamental membrane material properties. We find striking and previously unreported signatures of viscoelasticity in these lipid bilayers whose properties are sensitive to the bilayers' temperature dependent liquid ordered to liquid disordered phase transitions.

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