

Abstract Submitted
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Calcium-mediated rigidity in PIP2 lipid domains WOUTER G. ELLENBROEK, Dept. of Applied Physics, Eindhoven Univ. of Technology and Dept. of Physics & Astronomy, Univ. of Pennsylvania, ANDREA J. LIU, Dept. of Physics & Astronomy, Univ. of Pennsylvania — In lipid mixtures containing the highly negatively charged lipid PIP2 (a crucial component in cell membrane mechanics) multivalent ions such as calcium can drive the formation of PIP2-rich domains by mediating attractions between the lipids. Although the existence of ion-mediated attractions is well known in macromolecular systems, their form is poorly understood because they result from strong correlations between the charged molecules and ions. Within a numerical model of a lipid monolayer, we analyze the mechanics of PIP2-rich domains. We show that they are liquid-like at moderate values of the PIP2-charge but rigid at higher PIP2-charge. We use a recently introduced method to extract the effective pair interaction between the charged lipids in the many-body system, in which the calcium ions and remaining lipids are integrated out.

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