## Abstract Submitted for the MAR10 Meeting of The American Physical Society

Calcium induced lipid domains: how to glue charge with charge WOUTER G. ELLENBROEK, Physics & Astronomy, Univ. of Pennsylvania, YU-HSIU WANG, Chemistry, Univ. of Pennsylvania, DAVID A. CHRISTIAN, Chemical & Biomolecular Eng'g, Univ. of Pennsylvania, PAUL A. JANMEY, Physics & Astronomy and Bioengineering, Univ. of Pennsylvania, ANDREA J. LIU, Physics & Astronomy, Univ. of Pennsylvania — Multivalent ions such as calcium play an important role in soft and biological matter. In systems containing a fraction of highly negatively charged lipids (PIP2, an important actor in e.g. cell signaling) they can mediate an attraction between the like-charged lipids that is strong enough to promote formation of PIP2-rich domains. Such behavior is determined by charge correlations and therefore not captured by traditional mean-field (Poisson-Boltzmann) treatments. We study this effect experimentally and computationally in a mixed lipid monolayer. The simulations show that electrostatics alone can reproduce many of the trends seen in the experiments. Surprisingly, we find that electrostatic, Ca-mediated attractions between PIP2 lipids are strong enough to lead to nearly complete phase separation, so that domains of PIP2 can be found even at concentrations low enough to approach physiological conditions.

Wouter G. Ellenbroek Dept. of Physics & Astronomy, Univ. of Pennsylvania

Date submitted: 23 Nov 2009 Electronic form version 1.4