

Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Discovery of a fundamental force related to a membrane's order-disorder transition that can govern protein self-assembly in membranes
SHACHI KATIRA, KRANTHI MANDADAPU, University of California, Berkeley, SURIYANARAYANAN VAIKUNTANATHAN, University of Chicago, BEREND SMIT, DAVID CHANDLER, University of California, Berkeley — The clustering of proteins in cell membranes is a controlling factor in biological processes such as cell signaling and membrane fusion. Using large-scale molecular simulations and a theoretical framework inspired by modern theories of the hydrophobic effect, we have uncovered a fundamental physical force for assembly of trans-membrane proteins in lipid bilayers. This force is a mesoscopic manifestation of the transition between ordered (i.e., gel) and disordered (i.e., fluid) phases of lipid bilayers. It is a pre-transition effect, occurring below the order-disorder transition temperature, nucleated by the protein's disturbance of the ordered phase. This powerful force acts over several nanometers in range. Conditions at which this force occurs and can lead to clustering of proteins in cell membranes will be discussed.

Shachi Katira
UC Berkeley

Date submitted: 11 Nov 2014

Electronic form version 1.4