1060-92-204 **Benjamin B Machta*** (ben.machta@gmail.com), **Stefanos Papanikolaou**, **James P Sethna** and **Sarah L Veatch**. *Implications of Ising Criticality in Live Cell Membranes.* Preliminary report.

Recent work demonstrates that plasma membrane vesicles that are isolated from the cortical cytoskeleton contain two liquid phases at low temperatures and exhibit critical behavior that is strongly manifest near their transition temperature. Here we present a minimal model of plasma membrane heterogeneity that combines criticality with connectivity to cortical cytoskeleton. We incorporate criticality using a conserved order parameter Ising model coupled to a simple actin cytoskeleton interacting through point-like pinning sites. Using this model, we recapitulate several experimental observations of membrane raft heterogeneity. Small (r 20nm) and dynamic fluctuations at physiological temperatures arise from criticality. Including connectivity to cortical actin disrupts large fluctuations and macroscopic phase separation at low temperatures (T<23C) and provides a template for long lived fluctuations at physiological temperature (T=37C). In addition we consider more abstractly the benefit cells derive by tuning near to criticality. We use conformal field theory to bound the entropic forces between membrane components and information theory to quantify bandwidth of critical fluctuations for inter-protein communication. (Received March 30, 2010)