Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Protein clusters in biomembranes NICOLAS DESTAINVILLE, University Paul Sabatier - Toulouse 3 — We propose that proteins embedded in lipidic bio-membranes can spontaneously self-organize into stable membrane nano-domains (or clusters), due to the competition between short-range attractive and longer-range repulsive forces between proteins, specific to these systems, and propagated by the lipidic membrane. We compare different long-range potentials (including notably three-body terms) and we demonstrate that the existence of cluster phases in this context should be quite generic. Furthermore, a real membrane contains hundreds of different protein species that are far from being randomly distributed in these nano-domains, which is crucial in terms of biological functions. We take this protein diversity into account by modulating protein-protein interactions both at short and longer range. Both theoretical and numerical investigations explain why protein clusters recruit only a few protein species, thus leading to cluster biological specialization. In this respect, we highlight that cluster phases can turn out to be an advantage at the biological level, for example by enhancing the cell response to external stimuli.

Nicolas Destainville
University Paul Sabatier - Toulouse 3

Date submitted: 07 Nov 2012 Electronic form version 1.4