Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Conformational phases of membrane bound cytoskeletal filaments

DAVID A. QUINT, University of California Merced, GREGORY GRASON, University of Massachusetts Amherst, AJAY GOPINATHAN, University of California Merced — Membrane bound cytoskeletal filaments found in living cells are employed to carry out many types of activities including cellular division, rigidity and transport. When these biopolymers are bound to a membrane surface they may take on highly non-trivial conformations as compared to when they are not bound. This leads to the natural question; What are the important interactions which drive these polymers to particular conformations when they are bound to a surface? Assuming that there are binding domains along the polymer which follow a periodic helical structure set by the natural monomeric handedness, these bound conformations must arise from the interplay of the intrinsic monomeric helicity and membrane binding. To probe this question, we study a continuous model of an elastic filament with intrinsic helicity and map out the conformational phases of this filament for various mechanical and structural parameters in our model, such as elastic stiffness and intrinsic twist of the filament. Our model allows us to gain insight into the possible mechanisms which drive real biopolymers such as actin and tubulin in eukaryotes and their prokaryotic cousins MreB and FtsZ to take on their functional conformations within living cells.

David A. Quint
University of California Merced

Date submitted: 09 Nov 2012 Electronic form version 1.4