



School of Nano Science



IPM Condensed Matter &
Statistical Physics Group

Weekly Seminar

Membrane Remodeling in Cellular Organelles

Invited Speaker:

Dr. Amir H. Bahrami

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Abstract:

Membrane remodeling plays a crucial role in the formation and function of organelles. Prime examples are the extensive network of tubular structures in the ER and the unusual cup-shaped membranes in autophagy. We investigate the membrane shape remodeling processes establishing and maintaining these structures by using a membrane elastic model combined with explicitly modeled proteins.

Our simulations indicate that control of the area-to-volume ratio is a key factor in driving biological membrane shape transitions to form tubular ER structures. Large area-to-volume ratios are generated by osmotic regulation of membrane volume, by lipid synthesis, and by vesicle fusion. Once formed, the tubular structures are metastable, separated by high energy barriers separate from disk-like membrane shapes.

Our simulations also identify an important role for the Atg17 complex in yeast autophagy. Atg17 can both tether Atg9 vesicles and scaffold the fused vesicles to form the initial phagophore structure. Overall, our simulations point to a new mechanism for forming and stabilizing tubular structures in the ER, and identify the Atg17 complex as a major player in generating cup-shaped phagophores in autophagy.

Wednesday, 13 Day 1396 (Jan. 03, 2018), 14:00-15:00

Seminar Room (classroom A), Farmanieh Building, IPM