Membrane-mediated colloidal interactions

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Abstract

Membrane-embedded proteins are known to play a key role in many biological processes. Their interplay enables cellular transport, cell division, cell migration, and signal transduction in for instance the brain. Theoretical models and simulations predict that these proteins interact via the curvature they induce on lipid membranes, but experimental measurements have remained elusive.
In order to separate the membrane-mediated interaction from other protein-specific interactions, we have developed a dedicated model system consisting of membrane-adhesive colloidal particles and giant unilamellar vesicles. I will present the quantitative measurements of purely membrane-mediated long-range attractions by confocal microscopy and compare our results with Monte Carlo simulations.[1] We find, that the degree of membrane wrapping of the adhered colloidal particles is crucial in determining their interactions and thus the assembled structures.[2] Our results point towards a common physical origin of interactions mediated by a lipid membrane that only depends on the shape and adhesion strength of the curvature-inducing object.

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[1] van der Wel, Vahid, Šarić, Idema, Heinrich & Kraft (2016) *Lipid membrane-mediated attraction between curvature inducing objects*, Scientific Reports , **6**, 32825.

[2] van der Wel, Heinrich, Kraft, (2017) *Microparticle assembly pathways on lipid membranes***,** arXiv:1612.03581 [cond-mat.soft]