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“Physics of Cellular Communication“

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Cells – central building blocks of life – communicate among each other or with their internal organelles via complex pathways. The outer membrane of cells plays a central role in these processes allowing for selective transport of materials and signal transduction, respectively. We seek to understand the physics pertaining to the biological membranes using well-defined, simple membrane models. In particular, we focused on determining membrane structural and elastic parameters (membrane thickness, bending rigidity, spontaneous curvature, Gaussian curvature modulus) using small angle x-ray scattering. This allows us to predict, for example the ratio of open to closed states of ion-channels in a given molecular environment. I will discuss in this framework our recent findings on the elasticity of membrane domains and implications for signaling activity..