The goal of the unit is to uncover the role of physical laws in the architecture and functions of cellular systems. To this end, the teams follow cross-disciplinary approaches involving physics, chemistry and biology.

Studies cover a breadth of topics ranging from single molecules (molecular motors, DNA-protein interactions, membrane proteins) to cellular functions (cell adhesion, cell division, cell motility, intracellular transport) and the collective behaviour of cells in tissues and organisms (wound healing, morphogenesis). They include the use of many experimental systems going from isolated molecular assemblies and biomimetic systems to cellular and multicellular systems.

The approaches combine theoretical studies – including statistical physics of non-equilibrium systems – and a variety of experimental techniques such as optical and electron microscopy, as well as microfluidics and micropatterning, optogenetics, or mechanical micromanipulation using optical or magnetic tweezers.

Key publications

Year of publication 2019

Jamecna D, Polidori DJ, Mesmin B, Dezi M, Lévy D, Bigay J, Antonny B (2019 Mar 22)
An intrinsically disordered region in OSBP acts as an entropic barrier to control protein dynamics and orientation at membrane contact sites
Developmental cell: DOI: doi.org/10.1016/j.devcel.2019.02.021

**Actin dynamics drive cell-like membrane deformation**  
*Nature Physics* : [DOI : 10.1038/s41567-019-0464-1](https://doi.org/10.1038/s41567-019-0464-1)


**Membrane reshaping by micrometric curvature sensitive septin filaments**  
*Nature communications* : [DOI : 10.1038/s41467-019-08344-5](https://doi.org/10.1038/s41467-019-08344-5)

Year of publication 2018


**Forces drive basement membrane invasion in Caenorhabditis elegans**  
*Proceedings of the National Academy of Sciences USA* : 115 : 11537-11542 : [DOI : 10.1073/pnas.1808760115](https://doi.org/10.1073/pnas.1808760115)


**RAB-35 and ARF-6 GTPases Mediate Engulfment and Clearance Following Linker Cell-Type Death**  
*Developmental Cell* : 47 : 222-238 : [DOI : 10.1016/j.devcel.2018.08.015](https://doi.org/10.1016/j.devcel.2018.08.015)


**Kalman Inversion Stress Microscopy.**  
*Biophysical journal* : [DOI : S0006-3495(18)31065-8](https://doi.org/S0006-3495(18)31065-8)