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The cellular plasma membrane as an active, motor-protein-driven interface

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Host: Fernando López Gallego

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CIC biomaGUNE - Seminar Room

The spatial organisation of lipids and proteins within cell membranes—across nano- to mesoscale length scales—is essential for a wide range of cellular functions. This organisation arises from a complex interplay between passive, equilibrium-based intermolecular forces and active, energy-consuming processes that drive membrane components into non-equilibrium steady-state patterns. Yet, the molecular mechanisms linking cytoskeletal dynamics to membrane organisation remain poorly understood.

In this talk, I will revisit earlier work where we revealed the nanoscale architecture of the cell membrane, and show how this spatial organisation is dynamically assembled to support function during cell spreading. I will then present recent findings identifying two classes of motor proteins that drive the formation of actin-binding protein clusters and lipid domains. These results suggest that the cell surface functions as an active interface, consuming energy to organise membrane components in space and time, thereby enabling functional membrane architectures.