



H2020 MSCA - ITN - 2017 - 766007

Magnetics and Microhydrodynamics, from guided transport to delivery

ESR 2 Harvesting cilia and localizing them with surface patterning

Research project	<p>Cilia and flagella are slender cellular appendages whose regular beating pattern pumps fluids, for example, mucus in mammalian airways, or propels unicellular organisms such as green algae <i>Chlamydomonas reinhardtii</i>. The coordinated beating of collections of cilia is important for efficient fluid transport and fast swimming. Assembled in large fields, cilia beat neither randomly nor completely synchronously—instead they display a striking self-organization in the form of metachronal waves. Theory and simulations of physical model systems have shown that hydrodynamic interactions can provide the physical mechanism for the synchronization of cilia motion [1]. In this project, cilia/flagella will be isolated from <i>Chlamydomonas</i> and demembrated using various detergents. In the presence of ATP, the cilia beat with typical frequencies ranging from 20–60 Hz, is an oscillating pattern of propagating curvature waves generated by dynein molecular motors. The main aim is to build a cilia carpet and to investigate the beating patterns. The distal ends of isolated axonemes will be functionalized with adhesion proteins for specific anchoring on conjugate anchoring sites. These sites will be located on nano/micro-patterned surfaces or micron size para/ferromagnetic particles or with alternative technology.</p> <p>[1] J. Elgett, G. Gompper, PNAS 110 4470 (2013)</p>
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Host Institution	<p>Max-Planck Institute for Dynamics and Self-Organization Laboratory for Fluid dynamics, Pattern formation and Biocomplexity Am Faßberg 17 37077 Göttingen</p> 
Required profile	<p>The candidate should hold a MS degree in Physics or Chemistry, ideally with a strong interest in Fluid Physics, Physical Chemistry, Soft and Condensed Matter, and Magnetism. Interest for interdisciplinary research is important. Research stays are planned in France, Spain, and Slovenia.</p>