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Die Physikalisch-Medizinische Sozietät Erlangen und das Max-Planck-Institut für die Physik des Lichts

lädt Sie zu folgendem Vortrag ein:

„Physics of cellular form and function"

Prof. Dr. Gijsje Koenderink

Systems Biophysics Department, FOM Institute for Atomic and Molecular Physics (AMOLF), The Netherlands
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Cells owe their shape and strength to an internal framework of cytoskeletal filaments. To understand how these protein biopolymers determine the shape and mechanics of cells, we reconstitute minimal model systems that mimic certain functions of cells, using purified cellular components. We currently focus on the interplay of actin filaments, microtubules, and intermediate filaments. These three types of cytoskeletal polymers have rather different structural and physical properties, enabling specific cellular functions. However, there is growing evidence that they also exhibit strongly coupled functions necessary for polarization, cell migration, and mechanoresponse. To identify physical mechanisms that underlie these coupled functions, we use *in vitro* model systems in which we introduce interactions between purified actin, microtubule, and vimentin filaments via crosslinking and motor proteins. We find that steric interactions and the activity of crosslinking molecules are in principle sufficient to enable organizational feedback between microtubule and actin organization in diverse biological contexts. Myosin motor proteins drive nonequilibrium pattern formation according to a complex interplay of cytoskeletal network connectivity and motor activity. We are currently reconstituting more complex models of cells comprising a model biomembrane that encloses a cytoskeleton and physiological actin-membrane linker proteins such as septins. In her talk, Prof. Koenderink will showcase the most recent developments.

Gijsje Koenderink was trained in physical chemistry and moved to biophysics from 2003 onwards. Her research focuses on the physical principles that underlie the self-organization and dynamics of living cells. She develops and uses quantitative physics-based methods based on advanced microscopy and mechanical probing to elucidate how cellular shape changes during cell migration and division are driven by cytoskeletal protein interactions at the molecular scale. In addition, her group studies how cell shape and mechanics are influenced by mechanochemical interactions with the extracellular matrix. She uses mainly *in vitro* reconstitution approaches to study actively contractile cytoskeletal systems encapsulated within cell-sized microfabricated chambers and in lipid vesicles. To study cell-matrix interactions at the tissue scale, her group also reconstitutes artificial tissues by growing living cells inside well-controlled extracellular matrices that mimic connective tissue. By performing quantitative experiments on well-controlled synthetic cell and tissue models, this research provides a sound physical basis for understanding biological functions of the cytoskeleton. At the same time, her work addresses fascinating questions of interest to a broad physics community, given that the cytoskeleton is a paradigmatic example of an emerging new class of soft matter referred to as “active soft matter”. Koenderink received NWO VIDI (2008) and ERC StG (2013) grants and was elected as a member of the "Young Academy" of the KNAW (Royal Netherlands Academy of Arts and Sciences) in 2008.

Montag, 27. Juni 2016, 16:00 Uhr
(45 Minuten Vortrag plus Diskussion)

Veranstaltungsort:
Seminarraum (1.OG) des Instituts für Klinische Mikrobiologie, Immunologie und Hygiene, Wasserturmstraße 3/5
(Zugang: rückwärtiger Hörsaaleingang gegenüber der Orangerie)

Für Rückfragen wenden Sie sich bitte an:
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