

Events & meetings

What	When	Where	More information
DutchBiophysics 2021	11 and 12 October 2021	Online	https://www.nwo.nl/en/meetings/dutchbiophysics
Dutch Chromatin Meeting	12 November	Nijmegen	https://nvbmb.kncv.nl/chromatin
CHAINS	7 and 8 December 2021	Veldhoven/online	https://nwochains.nl/
Physics@Veldhoven	25 and 26 January 2021	Veldhoven/online	https://www.nwo.nl/en/meetings/physicsveldhoven

Meetings

Open Platform Meeting Physics of Life during DutchBiophysics To answer the need to connect with fellow group leaders in the biophysics field (and beyond), the Advisory Committee Physics of Life organises an informal 'Open platform Physics of Life' session for group leaders during the lunchbreak on Tuesday 12 October. We kindly invite you to attend this open platform to discuss the latest developments, problems and needs within our research community. You can access this meeting via the online DutchBiophysics platform.

New appointments, vacancies, grants, prizes, and other news.

- Six researchers awarded the highest distinction in Dutch Science¹.
- New national strategy for a large-scale research infrastructure. This Roadmap is intended as a guide for making strategic choices for investments in an innovative research infrastructure.²
- Jop Kind appointed professor by special appointment of Single Cell Epigenomics³

¹ <https://www.nwo.nl/en/news/six-researchers-awarded-highest-distinction-dutch-science-2021>

² <https://www.nwo.nl/en/news/new-national-strategy-large-scale-research-infrastructure>

³ <https://www.ru.nl/english/news-agenda/news/vm/2021/september/jop-kind-appointed-professor-special-appointment/>

New colleagues

Sonja Schmid (WUR)



Last January, Sonja Schmid joined the laboratory of Biophysics at Wageningen University as a tenure-track Assistant Professor. She is fascinated by ‘things that move at the nanoscale’. In particular, her research interests revolve around biomolecular dynamics and their time-resolved observation in single-molecule experiments using fluorescence/FRET and electrical nanopore detection. On the shoulder of giants, she aims to expand these versatile tools in her newly minted [NanoDynamicsLab](#), to reveal the vibrant nature of proteins and to study how protein function arises at the nanoscale (e.g. in molecular chaperones, bacterial microcompartments, CRISPR/Cas systems). For a protein enthusiast like Sonja Schmid, WUR’s Biomolecular Sciences Cluster appears as the ideal ‘candy shop’ where most exciting protein systems are discovered just next door, and she is proud and thankful to be embedded in the creative Dutch biophysics community.

Sonja Schmid studied Nanosciences at the Swiss Nanoscience Institute at Basel University, and earned her PhD in 2017 from TU Munich, where she developed single-molecule fluorescence/FRET experiments, designed a pattern-recognition approach to quantify single-molecule kinetics ([SMACKS](#)), and used both to study diverse regulatory effects of protein conformational dynamics. The excellence of Dutch Biophysics was hard to miss, and hence she decided to expand her expertise in single-molecule biophysics with a postdoc at TU Delft, where she developed the [NEOtrap](#), a new nanopore-based approach to trap single proteins and detect their conformational rearrangements in a label-free way. She was awarded a Postdoc.Mobility fellowship from the Swiss National Science Foundation; she initiated and leads an international multi-laboratory benchmark study on single-molecule kinetics software (the [kinSoftChallenge](#)); and since 2020 she is an elected member of the advisory board of the international [FRET.community](#). Now, with her NanoDynamicsLab, she is setting up new optical and electrical single-molecule experiments to study biomolecular dynamics beyond current detection limits. She likes cycling rivers from spring to ocean, and enjoys the Dutch coast and waters rather than missing the Alpes – in particular as the Rhine is still close.

Florian Berger (UU)

All living systems operate away from equilibrium to generate order and biological function. How they achieve this remarkable organization and what physical principles are behind it are far from obvious.

Studying physics at the University of Stuttgart in Germany, I was intrigued by nonequilibrium systems and joined Prof. Dr. Seifert’s group to investigate actively driven transport. In cells, active transport relies on molecular motors that transduce chemical energy into mechanical work. To further understand how motor molecules operate cooperatively, I started my Ph.D. with Prof. Dr. Lipowsky at the Max Planck Institute Potsdam in Germany. From these studies, we were able to predict the cooperative transport by molecular motors based on their single-molecule properties. During this period, I realized that the biggest ‘pleasure of finding things out’ comes from a combination of theory and experiments. Thus, I collaborated with Prof. Dr. Gennerich at the Einstein College of Medicine in New York, investigating optical-trapping data of the motor molecule dynein.

Motor molecules play critical roles in biological function. They not only distribute molecules to the right location in cells, but they also power an active process in hearing organs that underlies the ear’s remarkable properties such as sensitivity, frequency selectivity, and nonlinear compression. To further investigate this active process, I joined Prof. Dr. Hudspeth’s lab for Sensory Neuroscience at The Rockefeller University in New York. Driven by curiosity, I transitioned from a full-time theoretician to a part-time experimentalist using single-cell electrophysiology and nano-mechanical stimulations for response measurements. With these measurements, we can characterize the nonequilibrium energetics of the activity in the inner ear and relate it to physiological function.



Since 2019, I lead the group for Theoretical Biophysics in the division of Cell Biology, Neurobiology, and Biophysics at Utrecht University. My group works on how active processes generate the operational organization of living systems and I am very excited to contribute to and shape the biophysical community in the Netherlands.

Assistant Professor

Utrecht University / Cell Biology, Neurobiology and Biophysics / Department of Biology / Faculty of Science

Granted projects NWO

Vidi⁴

How should we re-wire our immune cells against cancer?

Dr. K.A. (Kristina) Ganzinger, AMOLF

Promising recent cancer therapies equip our immune cells with bespoke receptors for killing tumour cells, but so far they can only cure few cancer types. Researchers will use advanced microscopy to understand how these receptors re-program immune cells and map out design principles to construct new receptors against different cancers.

Droplets and fibers: the physics of neurodegeneration

Dr. L.M. (Louise) Jawerth, Universiteit Leiden

To more fully understand and treat neurodegeneration, researchers investigate the mechanisms through which liquid-like protein phases found in healthy neurons could cause, promote or hinder harmful fiber growth associated with the disease.

Finding a recipe to fabricate cell types on command

Dr. A. (Anna) Alemany, LUMC

All cells in our body share the same genetic information but have different functions and morphologies. The understanding of how the different identities are originated will make us better at generating desired cells from patient-derived stem cells. Here, researchers will investigate the mathematical rules of cell identity establishment.

⁴ <https://www.nwo.nl/nieuws/nwo-vidi-van-800000-euro-voor-78-ervaren-onderzoekers>

A programmable real time sensor for DNA repair*Dr. ir. J.H.G. Lebbink (Erasmus MC)*

In our laboratory we study the mechanisms of DNA repair in the test tube by mixing DNA that contains an error with purified DNA repair proteins. We can verify whether repair has properly occurred only after the reaction is completed. Here we propose to construct a fluorescent sensor that can report the kinetics of the repair reaction in real time. This sensor will be based on the well-characterized CRISPR-Cas9 nuclease. The sensor will be programmed to exclusively bind to repaired DNA, resulting in an increased fluorescent signal that can be constantly monitored.

Fishing with LOV for the “right chemistry”*Prof. dr. R. Leurs (VU Amsterdam)*

A single cell is considered to have 100,000,000 proteins with many different functions. To ensure proper cell function, not every protein is interacting with each of the 100,000,000 different proteins, but only interact with preferred partners in specialized protein networks. A protein can select the right protein partner via e.g. recognition of chemical “barcodes”. Fundamental knowledge about such processes is key for understanding cell function in health and disease. In this project we will develop a new technique to selectively select and isolate 2 interacting proteins from living cells in order to determine the chemical barcoding for their interaction.

3D engineered brain cancer microenvironments for proton radiobiology*Dr. A. Accardo (Technische Universiteit Delft)*

Glioblastoma is a devastating cancer of the brain with an extremely poor prognosis. A relatively new cancer treatment is radiotherapy with proton beams, which can be targeted to destroy cancer cells while sparing surrounding healthy tissue. However, despite the treatment’s compelling biological and medical rationale, little is known about the effects of protons on glioblastoma at the cellular level. We will pioneer the most realistic three-dimensional in-vitro model of glioblastoma networks to date by exploiting two-photon polymerization. The model will pave the way for routine, and even per-patient assessment of the efficiency of proton therapy on glioblastoma cells.

Ultra-sensitive Photonic Biosensors for Early-stage Cancer Screening*Dr. H. Nikbakht (VU Amsterdam)*

Early diagnosis of cancer is crucial for increasing survival rates and reducing treatment costs. In this project, we will develop the first ultra-sensitive, fully integrated optical biosensor platform for label-free detection of cancer biomarkers. In this platform, the light source, the detector, and the sensing element will be on a single chip, which would constitute a breakthrough in the field. It will be a compact, low-cost, and easy-to-use diagnostic tool, which is expected to become a Point-of-Care (PoC) test in the general practitioners' office for fast screening for multiple types of cancers and other diseases.

⁵ <https://www.nwo.nl/en/news/twenty-six-groundbreaking-research-projects-launched-open-competition-domain-science-xs>

The role of kinesin motors in shaping the Endoplasmic Reticulum in mammalian cells

Prof. dr. Anna Akhmanova (UU)

Diverse processes occurring in human cells critically depend on a complex network of intracellular membranes, called the Endoplasmic Reticulum. Perturbation of this network is linked to neurological diseases and viral infections. In this project, we will investigate how different motor proteins that are able to walk along cytoskeletal fibres and pull membrane tubules work together to shape these membranes in order to enable their normal function.

3D cell-instructive engineered stem cell models of human brain networks

Prof. dr. Vivi Heine & Dr. Angelo Accardo (VU/TUD)

Recent developments in the stem cell and organoid field provided new tools to study cellular mechanisms in the healthy and diseased brain. However, these model systems lack structural and biochemical properties of the 3-dimensional microenvironment that majorly influence cellular and network properties. By combining expertise in developmental neurobiology and microfabrication, we aim to engineer multi-scale brain-inspired 3D scaffolds to mature induced pluripotent stem cells into neural cultures of healthy subjects and patients. This integrated approach can be potentially used to 'diagnose' patient cell phenotypes and to screen compounds for the treatment of disease.

Replication of repetitive DNA—telomere rescue at nuclear pores

Dr. Michael Chang & Prof. dr. Liesbeth Veenhoff (UMCG/UMCG)

As cells divide, the DNA is replicated (copied). The ends of chromosomes, called telomeres, have a special DNA sequence that is difficult to replicate. When problems with replication arise, the DNA moves to structures at the periphery of the nucleus, the nuclear pore complexes. The researchers will use a new method to identify genes that are important for safeguarding the replication of these difficult to replicate DNA regions, and they hope to discover why these regions move to the nuclear pore complexes to be repaired.

From sensing chemicals to avoiding them: how *C. elegans* detects its chemical environment and responds to it

Prof. dr. ir. Erwin Peterman (VU)

As soon as an organism tastes or smells something harmful, it tries to retract to protect itself. In this project, we will use the nematode *Caenorhabditis elegans* to study how recognition of a toxic compound by cilia, antenna-like extensions of neurons, is translated into neuronal activation leading to avoidance behaviour. To investigate this, we will make use of a microfluidics device to provide chemical solutions to the tail of the worm. Simultaneously we will perform fluorescence microscopy to observe molecular responses in the cilium and neuronal activation.

⁶ <https://www.nwo.nl/en/news/seventeen-innovative-research-projects-launched-through-open-competition-domain-science-m>

NWO calls

Instrument	Deadline	Phase	Domain
Vidi	2-11-2021	Full proposals	Science
NWO Open Competition Domain Science - XL	20-5-2021	Pre-proposals	Science
	25-1-2022	Full proposals	
NWA-ORC 2020/21	1-10-2020	Letter of intent	NWA
	14-1-2021	Pre-proposals	
	7-10-2021	Full proposals	
Open Technology Programme	Continuous submission until 31-12-2021	Full proposals	AES
Research Infrastructure (RI): national consortia	2-12-2021	letters of intent	
	15-2-2021	Full proposals	

For questions, ideas, announcements, new appointments, grants, and other news items, please contact:

Dr. Naomi Chrispijn, secretary of the advisory committee for the Physics of Life research community

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If you are interested to join the Advisory Committee, let us know by sending an email to ResearchCommunity-PoL@nwo.nl