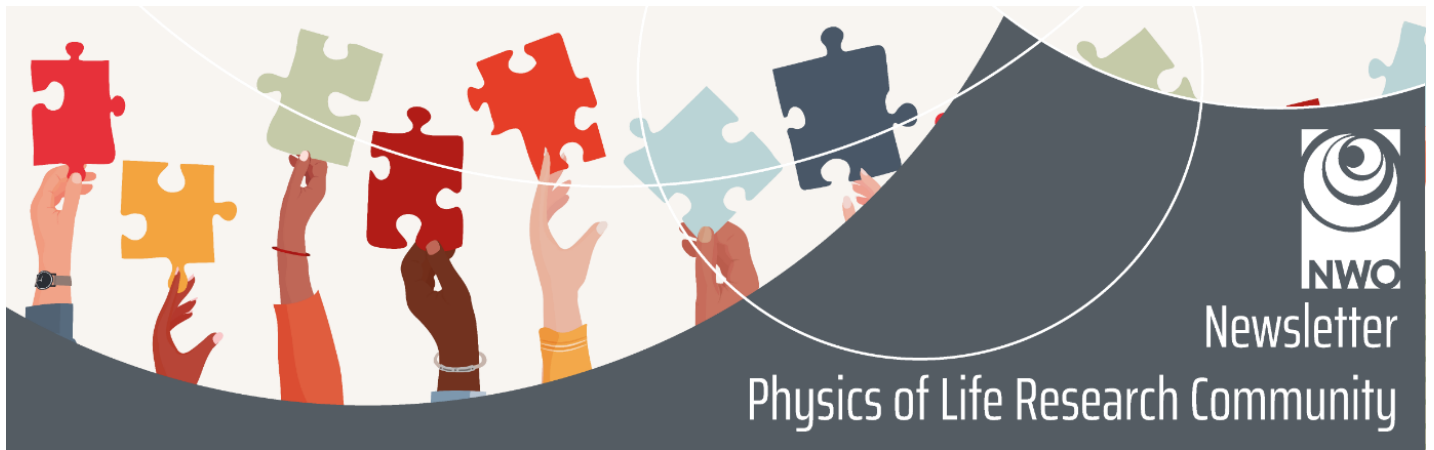




Newsletter Physics of Life Research Community

11 March 2024

Dear registered members of the research community physics of life,

Please find below our Q1 newsletter of 2024.

For your POL colleagues to receive future newsletters and event invitations please point out to them that this community exists and that they can register, without further obligations, here:

<https://www.nwo.nl/en/register-for-research-community-for-physics>

Content of this newsletter:

- News from the advisory committee and the Round Table Physics
- New appointments, grants, prizes, and other news
- Physics of life calendar
- Projects granted by NWO
- Bio sketches by Christian Kaiser (UU) and Nynke Dekker (TUD)

Best regards,

on behalf of the PoL advisory committee,

Kristina Ganzinger (AMOLF) and Naomi Chrispijn (NWO, Dutch Research Council)



NWO Physics of Life advisory committee:

Chair: Dr. Kristina Ganzinger (AMOLF)

Vice-chair: Dr. Greg Stephens (VU)

Prof. Alessandra Cambi (RUMC)

Dr. Johannes Hohlbein (WUR)

Dr. Kristin Größmayer (TUD)

Prof. Lukas Kapitein (UU)

Dr. Mattijs de Groot (LUMICKS)

Dr. Nicholas Kurniawan (TU/e)

Prof. Remus Dame (LEI)

Dr. Rifka Vlijm (RUG)

Secretary: Dr. Naomi Chrispijn (NWO)

Website: www.nwobiophysics.nl/pol



Dr Naomi Chrispijn-Steenbeek
Programme officer

+31 (0)70 349 4063

+31 (0)6 1274 5856

n.chrispijn@nwo.nl

ResearchCommunity-PoL@nwo.nl

Team
NWO Domain Science

News from the advisory committee physics of life and the Round Table Physics

The PoL advisory committee ("werkgemeenschapcommissie") has the formal role of advising the Round Table Physics (RTP) on aspects of the NWO research landscape related to physics of life. One of our primary tasks is to act as an interface to those working in fields related to PoL: engaging you, listening to how things are going with you, and on the basis of this, make recommendations to the RTP, who then can make recommendations to the Board of NWO Domain Science. The RTP expects us to have an overview of what is going on in the field of PoL and be able to advise them on things that come down from the NWO organization on what

is important for our field. At the same time, we can provide advice to the RTP based on what we hear from you. A visual explanation of the structure can be found here: <https://www.nwobiophysics.nl/structure>

On behalf of the RTP we would also like to point out the following:

The board of the NWO Science Domain (DB-ENW) is currently doing a so-called 'Beta Tour' to all Dutch universities. During the visit they'll speak with the deans of the science faculties and researchers. You probably received an invitation for the meeting between researchers and the DB-ENW from your university, which should also include information on how you can indicate which topics you would like to discuss with us. Many visits have already taken place. These are the ones remaining which you can still join:

- 12 March: TU/e
- 14 March: TUD
- 15 March: UvA
- 15 March: LEI
- 28 March: UT

The DB-ENW has received signals on the evidence based CV, as implemented in the Talent scheme (Veni, Vidi, Vici). In response to that, the working group which was previously put in place to give input on the evidence based CV has come together again. The group consists of Round Table members from all different disciplines. They have provided input and recommendations which are currently further discussed within NWO. We'll keep you updated.

New appointments, grants, prizes, and other news

- In 2024, The Young Academy will again welcome ten new members. Among which is David Fernandez Rivas (technology for medicine and chemistry, University of Twente) [Read more >](#)
- The ERC has awarded proof of concept awards to researchers to turn their science into practice. Researchers based in the Netherlands who received this PoC-grant include Chirlmin Joo (TUD), project: SPARXS - High throughput development platform for oligonucleotide aptamers and Giovanni Maglia (RUG), project: MC-Nano - Multianalyte Continuum Nanopores Sensing, Jaap den Toonder (TU/e), TOMAC: Bioinspired Flow Generation in Tubeless Organ-on-a-chip using Magnetic Artificial Cilia. [Read more >](#)
- Do you know or do you have a company with a challenging problem that only (bio)physicists can solve? Than register your case for Physics with Industry 2024. Get to know PhD students and postdocs in the field of physics that can help solve your case. [Read more >](#)
- Rathenau report provides basis for budget allocation in Open Competition and Talent Programme. NWO will examine whether and how the demand for research funding can be taken into account in the future allocation of the available budget for the Open Competition and the Talent Programme (Veni, Vidi, Vici). The science-funding body has decided this based on a new report by the Rathenau Institute. At NWO's request, the institute conducted research into possible bases for the allocation of the budget for non-programmed, curiosity-driven research. [Read more >](#)
- Possibility for outreach at Lowlands. Lowlands, the NWA, New Scientist and BKB | The Campaign Office invite scientists to submit a research proposal to perform at Lowlands Science. On August 16-18, festival-goers from all over the Netherlands will flock to Biddinghuizen for one of the Netherlands' largest and best-known festivals. Researchers can now submit their research proposal that will allow them to collect data on the Lowlands Science grounds while introducing festival visitors to scientific research in an accessible way. Application for this unique way of doing research can be done until March 31, 2024 at the latest. [Read more >](#)
- NWA call Research along Routes by Consortia 2024 now open. Deadline: 9 April 2024. For the POL community it is interesting to know that the theme 'nanomedicine' has been put forward by the Quantum/Nano Route and selected by the Dutch Research Agenda (NWA) committee. More info on the Route: [read more](#). More info on the Call for proposals: [Read more >](#)
- NWO: No immediate changes to Talent Scheme target group. For the time being, researchers can continue to submit proposals to the NWO Talent Scheme according to the current target group specifications (number of post-PhD years). This has been decided by the Executive Board. However, in the coming years, an alternative scenario based on post-PhD years

of the Veni, Vidi and Vici will be explored in consultation with the field. In two years' time, the Board will decide whether to abandon the criterion of the number of post-PhD years. [Read more >](#)

- TU Delft professor Gary Steele took up his post as the new chair of the Physics Round Table in the Science (ENW) domain on 1 January, 2024. What drives Steele and what are his plans as the new chair? [Read more >](#)
- At NWO Physics, 22 January, both the Dutch Physics Council (DPC) and the Round Table Physics (RTP) have organised sessions for group leaders. The DPC afternoon meeting focused on new PIs and included plenty of network possibilities and plenary discussions on what it takes to be successful as a starting PI. During the strategic dinner, organised by the RTP, panel discussion on stage took place and over 240 PIs had the opportunity to discuss in small groups multiple topics regarding the future of physics.

Physics of life calendar <https://nwobiophysics.nl/calendar>



Calendar

Submit information on conferences, symposia, colloquiums etc. via <https://nwobiophysics.nl/calendar>

The picture is a screenshot of the longlist of calendar items listed on our website.

Help your fellow biophysicists to be aware of the interesting conferences available.

WomenNetPhysics  (Utrecht)	22 March 2024	The first women in physics conference in the Netherlands. This network event will gather all that are interested in the position of women in physics, ranging from different stages in their careers and research fields.
Symposium: Soft Solids and Viscoplastic Fluids at the Annual European Rheology Conference 2024 (Leeds, UK)	9- 12 April 2024	This meeting will bring together rheologists from all scientific disciplines.
International Conference on Engineering Synthetic Cells and Organelles  (Toulouse, FR)	17 - 19 April	Research results in bottom-up synthetic biology and the prospects for scientific and technological development.
Summerschool BLS2: Single molecule biophysics in cell lysates  (Vestec, CZ)	13 - 17 May 2024	To learn a technique enabling high throughput screening for dynamic parameters of biochemical interactions on a single molecule level.
Instruct-ERIC Biennial Structural Biology Conference  (Lisbon)	22 - 24 May 2024	The IBSBC showcases the latest in integrative structural biology from leading scientists across the world.
Dutch Peptide Symposium  (Amsterdam)	31 May 2024	Yearly event focussing on peptide-associated research.
ELMI  (Liverpool, UK)	4 - 7 June 2024	European Light Microscopy Initiative.

Projects granted by NWO



The projects listed are the projects granted by NWO that have a connection with Physics of Life. Please follow the links for full granting information.

Vici

[Read more >](#)

Next-generation micromaterials for DNA data storage and data editing

Prof. dr. ir. Tom de Greef (TU/e)

DNA holds great promise as a future and sustainable storage medium for archival data. In this project, the researchers will develop smart micromaterials and technologies that will improve the reading of data stored on DNA as well as enable manipulation of the stored data. The developed technology will establish a fundamental new paradigm in DNA data storage based on novel conceptual and experimental advances that integrate material science, robotic automation, micro-engineering and molecular editing of DNA.

What is the role for chromosome organization in determining cell identity?

Prof. Dr. Jop Kind (Hubrecht Institute)

Every cell contains 2 meters of DNA that needs to be condensed into the tiny space of a cell's nucleus. This organization is unique to every cell and for new traits to arise different regions of the DNA need to become accessible and active. With this proposal we will investigate the coordination of this dynamic process by implementing new sensitive methods to study these events in single cells. This knowledge is essential to yield understanding of the mechanisms by which new cells arise during development and what the processes are that may result in establishing pathologies like cancer.

Resolving dangerous DNA structures

Prof. dr. ir. Puck Knipscheer (Hubrecht Institute)

The majority of the genetic material in a cell is folded into a uniform double helical structure as determined by Watson and Crick. Sometimes however, DNA folds into non-canonical shape that can be dangerous. This project reveals novel mechanisms that unfold these alternative DNA structures to ensure genome stability.

Shaping our memories: resolving the nanoscale organization of neuronal synapses in memory circuits

Dr. Harold. MacGillavry (UU)

Our memories shape who we are. However, we still do not fully understand how memories are stored in our brain. The researchers will use advanced microscopy techniques to uncover the structure of the connections between nerve cells, synapses. They will investigate how molecular changes in synapses underlie the formation of new memories. This research will yield valuable insights into how our memory works and could contribute to finding new ways to alleviate conditions such as Alzheimer's disease.

Dancing on ice

Prof. dr. ir. Ilja Voets (TU/e)

The ability of ice-binders to create and sculpt ice into tiny crystals with unusual shapes is unparalleled. The interaction with ice that is pivotal for this unique ability is not understood. TU/e researchers will use high-resolution microscopy to image how ice-binders dance on ice to understand how ice-interactive materials work and to unravel the ingredients and properties that enable regulation of ice formation and growth. This will lead to a blueprint for the design of new colloidal materials to prevent freeze-thaw damage and bring frozen cells and tissues back to life.

Open Competition XS

[Read more >](#)

Unveiling the connection between air pollutants and Alzheimer's disease via engineered stem cell derived models.

Dr. Angelo Accardo (TUD)

Alzheimer's disease (AD) is one of the leading causes of morbidity in the elderly. An emerging hypothesis points towards a critical role of environmental factors, such as particulate matter (i.e. hazardous microparticles suspended in air) that accelerates the formation of AD hallmarks (i.e.

Developing a light-activatable molecular probe to destabilize and study the septin cytoskeleton.

Dr. Koen van den Dries (RUMC)

Just like humans, cells have a skeleton, the 'cytoskeleton', which allows them to move and divide. It was long thought that the cytoskeleton consists of three types of protein filaments (actin filaments, microtubules and intermediate filaments) but recently, a fourth type has been discovered: the septin filaments. Septin filaments are also involved in cell

amyloid plaques, neurofibrillary tangles). Nonetheless, this theory is limited to cohort and animal studies while the cell-particle connection remains unknown. To verify (or falsify) this hypothesis at the cellscale, we will pioneer physiologically relevant human 3D AD models by combining induced pluripotent stem cells-derived neurons from AD patients and biomimetic 3D engineered microenvironments.

Let's move: 3D printing of contractible hydrogels as muscle tissue mimics.

Dr. Julien Es Sayed (RUG)

3D printing of soft water-based materials such as hydrogels is a powerful technique in the field of tissue engineering to create artificial scaffolds that can replace or reboost tissues. However, once printed, these synthetic tissues are static and cannot dynamically change their shape and dimensions the same way as functional tissues such as muscles do. To bridge this gap, we aim at developing a new 3D printable granular hydrogel based on responsive microparticles, which dimensions can be reversibly changed on-demand after printing. In this way, muscle-like contractible materials will be obtained.

movement and division, but we do not exactly understand how. This is mainly due to limited possibilities to manipulate septins. This project aims to develop a light-activatable molecular tool to destabilize septin filaments. With this tool we will study the cooperation between septin and actin filaments.

Do microbes make mosquito magnets?

Dr. Felix Hol (RUMC)

"Why do they always bite me??" is a common question referring to the fact that mosquitoes have clear preferences regarding whom (not) to bite. Yet despite the familiarity and medical relevance of this question, the reasons why mosquitoes prefer some humans over others remain unclear. Answers to this question can likely be found in human body odor, which depends on the microbes that live on one's skin. We will study the skin microbiome of people that strongly attract mosquitoes, in comparison to the skin microbiome of individuals that hardly attract mosquitoes, to identify key microbes that drive mosquito attraction.

RoboHeart.

Dr. Ir. Mathias Peirlinck (TUD)

For end-stage heart failure patients on the waiting list for a donor heart, mechanical pumps implanted in their chest are often their only option to survive. Given the high risks and severe discomfort of these devices, this project sets out to fabricate an innovative soft robotic ventricle that accurately replicates the natural motion of the heart. Based on a computationally optimized design, we will 3D print our RoboHeart prototype and perform extensive static and dynamic experiments to quantify RoboHeart's acute and chronic performance, its efficiency, and its durability in response to realistic cardiovascular loading conditions.

Revolutionizing protein interaction studies with a novel protein actuation spectroscopy approach.

Dr. Sergii Pud (UT)

Proteins are vital molecules in living organisms and understanding their functions and interactions is crucial for combating diseases linked to protein malfunctions. Numerous experimental methods have been developed to study single proteins, but detecting their interactions with small molecules like hormones or toxins remains challenging. I aim to develop a novel technique called protein actuation spectroscopy to address this issue. By setting a protein molecule in motion, we can observe changes in its physical properties when it binds to small molecules, providing new insights into these elusive interactions and advancing our understanding of protein dynamics.

Blood vessels controlled by light.

Dr. Tommaso Ristori (TU/e)

Angiogenesis, i.e. the formation of blood vessels from pre-existing ones, is a key process to ensure the body's blood supply. Fully controlling this phenomenon is essential for the (re)creation of new tissues and organs, such as pursued in the field of Regenerative Medicine. Despite numerous attempts, spatially directing angiogenesis in three-dimensional environments remains a major challenge. Here, we propose to spatially control the location of newly formed blood vessels via patterns of light, by leveraging on cell-cell signalling, microfabrication, and optogenetics. As a proof of concept, the technology will be tested on in vitro tissue models of angiogenesis.

Powering microrobots with synthetic nanomachines for 3D swimming.

Dr. Hanumantha Rao Vutukuri (UT)

Inspired by the autonomous motion, activity, and transport of microorganisms in fluids, the emerging field of "active" or "autonomous matter" has gained momentum. This rapidly growing area is dedicated to engineering synthetic microrobots with distinctive capabilities such as self-propulsion, collective behavior, and adaptability to local gradients, including temperature, chemicals, pH, and nutrients. Yet, developing microrobots that can swim in three dimensions (3D) remains a formidable challenge. This project aims to develop a facile model system by powering microrobots with light-driven synthetic molecular or nanomachines, enabling them to swim in 3D real space, mimicking microorganisms.

Open Science Fund 2023

[Read more >](#)

OPENOPTICS - Open Science for Optical Simulations

Dr. J.W.M. Beenakker (LUMC), with C. Haasjes (LUMC), L. van Vught (LUMC), M.J. Simpson (Freelance optical scientist, Texas, USA)

Ray-tracing is a widely used technique to study optical systems, such as a telescope or the eye. We have developed ZOSPy to automate these analyses and make them more accessible. Since we made ZOSPy available open-source, scientists from various disciplines are using it as a platform to share their methods and make them publicly available. In this project we will add features to ZOSPy that simplify this sharing of methods and results, together with a better documentation. This will allow ZOSPy to become a tool that stimulates the adoption of Open Science for optical simulations.

Bio sketches

This publication is a combined publication with the mini-profiles of the Tych lab blog: <https://www.ktsinglemolecule.com/blog>
Do you want to introduce yourself? Contact us via [email](#). We aim to put every newsletter two PIs in the spotlight, of which one is (relatively) new and one more established in NL.

Christian Kaiser (UU)

Job title: Professor (Hoogleraar), Department of Chemistry, Utrecht University

Subject area: Single-molecule biochemistry of protein biogenesis

How did you get into science?

Curiosity (the boiler plate answer). I was always interested in how living things work. When I learned about the building blocks of life in school, I wanted to understand something about how they work together to produce the amazing biological complexity that surrounds us. As I started experimental work, I came to appreciate the power of quantitative methods (which I found fascinating all the way back to Gregor Mendel) and got hooked on that type of experimental approach.

Where else have you worked/studied?

I completed my undergraduate education in Biochemistry at Leibniz University in Hannover, Germany. For my PhD work, I joined Ulrich Hartl's group at the Max-Planck-Institute of Biochemistry in Martinsried, Germany. After that, I went to the United States to pursue postdoctoral work, first at the University of Texas Medical School in Galveston, then at the University of California, Berkeley. I started my independent group at Johns Hopkins University, where I received tenure before moving to Utrecht this past Fall. The Dutch Biophysics community is absolutely outstanding, so I am very excited about becoming part of it.

What are your hobbies/what do you do for fun?

I love spending time with my daughters. They are still quite young, but are getting old enough so that I can sometimes steer family activities toward what I like to do, which includes artisan bread baking (and, in their case, bread eating), hiking, and cycling.

Could you share some tips and tricks for someone thinking about pursuing a career in science in academia?

One trick is to find something that you can get really excited about (I know, more boiler plate...) and discover its inherent beauty, because it will motivate you to pursue it with the fierce intensity that is necessary to make meaningful progress. A tip is to try to choose mentors who are inspirational and generous and support you in what you do.

Who are your scientific role models?

I could not (and would not want to) point to a single role model.

There are way too many giants, past and present, who have been doing heroic work (although I am particularly drawn to elegant in vitro approaches). I find it very impressive and uplifting when I meet or read about colleagues who are not only intellectually brilliant, but also demonstrate integrity and kindness.

What does your working area (desk, office) look like and what does it say about you?

My office is still cluttered with a bunch of moving boxes, which I guess says that I just completed a pretty big move recently and that I like to spend my time doing science, rather than unpacking and organizing my office.



Nynke Dekker (TUD)

Job title: Professor. At TU Delft, of "Single-molecule nanoscale biophysics" At the University of Oxford, of "Biophysics" (since February 2024)

Subject area: Single-molecule biophysics, with a focus on DNA and RNA replication. It's about seeing molecular machines that copy DNA or RNA in action, while they are doing their job. I love it, it's super interdisciplinary and very creative. I have outstanding people in my group who are highly motivated, and together we can do great things. Also the communities are very friendly – both on the single-molecule side and on the replication side – which I really appreciate. I also organize meetings in the field to help bring people together. That makes it easier, and more fun, for everyone.

How did you get into science?

I would say I enjoyed all subjects in high school, but especially math. I wanted to study some type of math or science in university, but didn't know which specific subject to focus on. When I started at Yale University as an undergrad, I was thinking I would major in molecular biochemistry and biophysics, because it was a mix of everything. But, I didn't enjoy the chemistry labs that went along with that major, there were too many pre-meds taking them who only cared about their grades. Whereas I did enjoy the physics labs and the physics classes. Perhaps because they were very challenging, but fortunately not so very challenging that I gave up on them. And so I ended up being a physics major.

Where else have you worked/studied?

Besides at Yale, I studied at Leiden University (MSc) and Harvard University (MSc and PhD).

I then went to do a postdoc in Paris, at the Ecole Normale Supérieure, for two years. And then I started my position at TU Delft, in 2002.

At present I am transitioning to the University of Oxford, where I was appointed in February of this year. I still maintain my TU Delft connection, as my lab still needs to move, but at a lower level.



What are your hobbies/what do you do for fun?

I like to go hiking in the outdoors – in any case, I have a little dog who needs to be walked, so I regularly go outside. I also enjoy most sports and practice a variety of them, like running/biking/swimming/yoga. And I like to play the piano and to sing.

Could you share some tips and tricks for someone thinking about pursuing a career in science in academia?

If you love doing science, I think you will naturally work to become good at it. And in that case I think things will always work out. But, I would recommend following a laboratory management course, because there's doing the science and then there's the stuff you need to take care of in order to be able to do the science. Both are important.

Who are your scientific role models?

I don't really have a specific one, perhaps because I work in an interdisciplinary field and so I learn different things from different people. I have a lot of respect for people who manage to stay focused on science over the years, that is also what I try and aim to do. But I do think that institutions need to be more enabling to allow scientists to maintain that focus, by providing more funding for management and technical support. Because running a research group is like running a small company – one needs a core to be able to rely on.

What does your working area (desk, office) look like and what does it say about you?

My desk itself is at least reasonably clear, so that when I come in things aren't cluttered and I have room to work. But the only reason it's clear is that there's tall stacks of papers and documents all around it! Most years I find a few days in the summer to clear those out, but this past year, what with organizing the transition to Oxford, I didn't succeed. So my desk and the area around it say that I can focus on the most important things at hand, but that having an extra pair of hands to help organize things would be very helpful!



Contact

Dr. Naomi Chrispijn-Steenbeek, secretary of the advisory committee for the Physics of Life research community
NWO Utrecht, Winthontlaan 2, 3526 KV Utrecht

Do you have a news flash or research highlight interesting for the Dutch PoL community that you would like to add to the PoL newsletter? Send us an email.

Email: ResearchCommunity-PoL@nwo.nl

Website: nwobiophysics.nl/pol

T: +31 (0)70 349 4063

[Unsubscribe](#) | [Subscribe](#)