



Newsletter Physics of Life Research Community
14 June 2023

Please find below the latest newsletter of the NWO Physics of Life Research Community. It contains information about colleagues in the field, the advisory committee, relevant meetings, calls, and it lists granted projects related to our field. Are you a new member and do you want to introduce yourself or one of your colleagues in the upcoming newsletter? Submit your contribution by sending an email to ResearchCommunity-PoL@nwo.nl. If you have any suggestions to strengthen the community you can always contact us. 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.

Best regards,
on behalf of the PoL advisory committee*,
Greg Stephens (VU) and Naomi Chrispijn (NWO, Dutch Research Council)

* NWO Advisory committee Physics of Life:



Alessandra Cambi	RUMC
Greg Stephens (chair)	VU
Kristina Ganzinger	AMOLF
Lukas Kapitein	UU
Mattijs de Groot	LUMICKS
Nicholas Kurniawan	TU/e
Peter Peters	MU
Rifka Vlijm	RUG
Sonja Schmid	WUR

Browse through our Physics of Life open registry and make sure you are included



Are you curious whom make up the Dutch Physics of Life Research Community? Browse through our open registry [here](#). You can search for specific key words and you might come across future collaborators. To be included in this registry, please fill in your data [here](#). To be as inclusive as possible and to enhance the visibility of the Dutch Physics of Life Research Community we need your contribution.

New appointments, grants, prizes, and other news

- Sonja Schmid was awarded the Steinhof Prize for her contributions to our understanding of protein dynamics.

[read more >](#)

- Embassy Science Fellowship (ESF-NL) programme: opportunity for researchers, during a short period (1 to 3 months), to go abroad and contribute to a scientific and/or societal issue from the Dutch embassies, consulates, permanent representations or (trade) offices. [read more >](#)
 - Siewert-Jan Marrink has been elected as one of the new KNAW members. [read more >](#)
 - New NWO funding instrument to explore unforeseen opportunities for impact. [read more >](#)
-

New colleagues

Every newsletter new colleagues in the field of Physics of Life are invited to introduce themselves to the community.

Do you want to introduce yourself? Contact us via [email](#).

Farshid Jarafpour (UU)

It is my pleasure to introduce myself to the Physics of Life Community in the Netherlands. I am an assistant professor at the Institute for Theoretical Physics at Utrecht University. My expertise is in stochastic processes and their application in biological systems. My long-term research interests are driven by fundamental questions of the physics of life: Is the phenomenon of life an unavoidable consequence of laws of physics, or was its origin an exceptionally rare event? Can laws of physics be extended to describe the living state of matter?



I have a diverse educational background, ranging from chemical and biomolecular engineering to mathematics and physics. I received my PhD. from the University of Illinois where I worked on the statistical physics of early life. In particular, I worked on the Darwinian transition (evolution of early modes of evolution), and the origin of homochirality (parity symmetry breaking during the emergence of life). Following my PhD, I started an experimental postdoctoral position at Purdue University where I used Microfluidics technology to study statistics of bacterial growth and division in controlled environments. Subsequently, I joined the soft matter theory group at the University of Pennsylvania, focusing on the role of cell-size regulation on the population dynamics of bacteria.

In 2021, I joined the Institute for Theoretical Physics at UU, employing methods from stochastic processes and nonequilibrium statistical physics to study biological systems across scales, ranging from molecular and single-cell levels to populations and ecosystems. More specifically, I am interested in understanding laws governing the growth and division of bacteria and their responses to perturbation and environmental fluctuations using abstract models of biochemical reaction networks, and at a larger scale, how these growth laws determine the dynamics of growth and response in populations and interacting bacterial communities.

Biosketch

We also give the floor to researchers already part of the PoL community for a longer time to write a biosketch. Do you want to introduce yourself? Contact us via [email](#).

Rifka Vlijm (RUG)

I am fascinated by the ability of biomolecules as simple as DNA to fulfil exceedingly complex roles. In my research I aim to understand their mechanistic behaviour in the finest detail.

During my PhD (Cees Dekker, TUDelft) I used single-molecule techniques, including magnetic tweezers, high-speed AFM and fluorescence microscopy, to characterize DNA and its higher order structures. Surprising findings in this in vitro bottom-up work triggered the interest to visualize the functioning of DNA and cell

division in vivo. Changing fields, I mastered Stimulated Emission Depletion (STED) microscopy in the lab of Stefan Hell (German Cancer Research Center / MPI Medical Research, Heidelberg), to investigate cell division under native conditions. In the Hell lab I among others built a STED microscope and developed live-cell labelling for centromere nucleosomes. I furthermore showed that earlier models of DNA inactivation through liquid-liquid phase separation do not hold, and deciphered centriole linking. Although my new protocols enabled live-cell STED imaging, the low throughput hindered to study 'rare' biological processes such as cell division (<1% cells in a specific cell division stage).



In my group (started October 2019, University of Groningen) we therefore work on advancing STED microscopy for live cell imaging. Important recent developments are high-throughput (live-cell) super-resolution imaging, increasing the output roughly hundred times. This automated imaging allows to find dividing cells without using synchronization methods, which both circumvents potential artefacts and it allows to study cell division in cells which are difficult to synchronize (e.g. archaea). With our custom-designed STED microscope, we now have a one-of a kind setup enabling long-term (24h) live-cell imaging. In the coming years we will continue to push for non-invasive live cell super resolution imaging, and apply our method to investigate DNA organization and cell division.

Events, meetings, and workshops

Are you organising a meeting of interest for the PoL community and would you like to have it included in this list? Please submit the details [here](#).

What	About	When	Where
Population Dynamics Seminars	Series of virtual seminars on Population Dynamics and more broadly about Quantitative Biology, Computational Life Science, and Theoretical Biophysics.	Every ~3 weeks Fridays at 3:30pm	online
Biological Physics & Physical Biology Seminar	The goal of the online series is to highlight interesting current research in biophysics, broadly defined.	Every Friday 5:00pm	online
NanoBioPhysX Club	Seminar series covering fundamental interdisciplinary science at the nanoscale	Every last Wednesday of the month	Wageningen
IUPAC CHAINS	International chemistry conference themed 'Connecting Chemical Worlds'.	20-25 August 2023	World Forum The Hague
Gene Regulation Workshop	Meeting on molecular mechanisms controlling transcriptional and post-transcriptional responses in gene expression to cell-type specific, developmental or environmental cues	4 September 2023	Lausanne, Switzerland
CellMech	European Cell Mechanics Meeting which will bring together	26-29 September 2023	Marseille, France

	researchers from the various fields of physics, biology, mathematics and engineering to discuss the origins, roles and consequences of mechanical signals in biological systems.		
<u>Physics Of Living Matter Symposium 17th Edition</u>	International two-day symposium focusing on a diverse set of biological problems that are tackled through the lens of the physical sciences.	28 and 29 September 2023	Cambridge
<u>EMBO EMBL Symposium: Seeing is believing: imaging the molecular processes of life</u>	The symposium will bring together the leading developers of imaging methods with cutting-edge applications that illustrate how imaging can answer biological questions.	4-7 October 2023	EMBL Heidelberg and Virtual
<u>NWO Biophysics</u>	The annual Dutch conference on physics of life.	9 and 10 October 2023	Veldhoven
<u>Workshop on STED super resolution microscopy</u>	Lectures, hands-on sample preparation, imaging and data analysis.	6 and 7 November 2023	Groningen
<u>BSI Meeting</u>	Integrative structural biology meeting with talks on in the fields of viruses, microbes, machine learning, cell biology, drug design, cancer, neurons, methods, and plants.	13-17 November 2023	Marseille, France
<u>WomenNetPhysics</u>	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.	22 March 2024	Utrecht Science Park

Meet the Physics of Life community members during NWO Biophysics



Monday afternoon 9 October, the PoL advisory committee will organise its annual group leader session during NWO Biophysics. We hope to see many of you there, more information will follow.

Check out the programme and register at <https://www.nwobiophysics.nl/>

Open Stage: Biophysics got talent!

After an electrifying first edition at NWO Physics, the Open Stage is returning to NWO Biophysics! Do you want to show your talents outside academia to your peers? If so, make sure to sign up for this unique opportunity which will take place during the festive evening on Monday 9 October.

We are looking for a variety of talents to excite the NWO Biophysics audience. So if you happen to play an instrument, can dance your heart out, or possess any other form of performing talent and would like to showcase this, sign up via the button below! It is also possible for visitors to combine acts, for instance performing as a band. In your email, please mention your name(s), the act you want to perform, and if you need any attributes to be present at the conference for this act (such as a piano or drums).

Euro-Bioimaging, virtual Pub, newsletter and funding opportunities



Euro-BioImaging is the European landmark research infrastructure for biological and biomedical imaging. Through Euro-BioImaging, life scientists can access imaging instruments, expertise, training opportunities and data management services that they might not find at their home institutions or among their collaboration partners. All scientists, regardless of their affiliation, area of expertise or field of activity can benefit from these pan-European open access services, which are provided with high quality standards by leading imaging facilities.

Every Friday at 13.00 CET, staff from the different imaging facilities Europe-wide join for a virtual meeting about myriad of topics regarding imaging. Examples include success stories and expertise from individual facilities, exciting science, travel grants, new technologies - and more! This meeting is ideal for PhDs and young Post-docs to join to get more familiar with the imaging field and expand their network. See [here](#) for more info on the schedule, and how to subscribe.

Get funding to visit Euro-BioImaging imaging facilities

A number of funding opportunities are available to support user access. Learn about some topic-based opportunities below and visit the Funding User Access page on the website for more: <https://www.eurobioimaging.eu/about-us/funding-user-access>



Cancer research

If your project is cancer related, you will likely be eligible for funding through the canSERV project,

Infectious disease research

ISIDORE is a Horizon Europe-funded project that provides free of charge access to cutting-edge technology platforms and resources across a wide spectrum ranging from characterization of pathogens to vaccine development. Eighteen Euro-BioImaging Nodes participate in the ISIDORE project, offering state-of-the-art imaging expertise to enhance basic research, drug discovery, diagnostics, vaccines, and clinical disease management. Please visit the following websites to see if ISIDORE could support your research on infectious diseases, vaccine development, pathogens of concern, or related topics:

<https://www.eurobioimaging.eu/content/isidore>

<https://isidore-project.eu>

Agroecology research

For researchers in the field of agroecology, plant biology, soil or marine microorganisms,

which supports research on cancer by facilitating access to European Research Infrastructures. Twenty-eight out of thirty-five Euro-Biolmaging Nodes provide services in canSERV, spanning from biological to preclinical to human imaging services. The first regular calls for free access to these services will open in May 2023. Stay tuned to get more information on the next calls and related opportunities!

Please find more information on the currently open calls [here](#).

crop sciences or related topics, funding opportunities will be available via the AgroSERV project. The project will provide researchers in the field with access to relevant RI services from a broad range of participating RIs, including a spectrum of imaging services from nine participating Euro-Biolmaging Nodes. The available imaging services will range from plant-adapted electron and super-resolution microscopy to plant phenotyping and application of medical imaging technologies, such as PET and MRI, on plant samples.

The calls for funded access to services in AgroSERV are expected to launch in September 2023, so stay tuned for these opportunities.

Connect with NWO to start a large programme

Within Demand-Driven Partnerships for Consortia NWO provides an opportunity for consortia to organise, develop and grow to a size from which societal (including economic) impact may be expected. The project proposal arises from a self-chosen knowledge and/or development question that fits within one or more Knowledge- and innovation agendas (KIAs).



<https://www.nwo.nl/en/calls/kic-demand-driven-partnerships-consortia-round-2023>

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.

Open Competition XS

[Read more >](#)

Dynamics of virus-like particles during respiratory fluid droplet evaporation.

Prof. dr. D. (Daniela) Kraft (LEI)

Many respiratory diseases such as COVID-19 are transmitted through viruses in aerosols produced during breathing, talking or coughing. Predictive understanding of this transmission route remains limited because of the complex nature of respiratory aerosols, with their rapid evaporation generating additional complexities for viral stability. To make progress, it is essential to probe how key parameters such as polymers, humidity, temperature and ions act on viral stability via their influence on evaporative dynamics. By singling out and quantifying these parameters in a controlled experimental environment, we aim to improve our fundamental understanding of airborne virus transmission.

A multiscale study of the role of tissue mechanics in ultrasound-induced neuromodulation.

Dr. N.A. (Nicholas) Kurniawan (TU/e)

Focused ultrasound stimulation (FUS) is a relatively new and very promising tool for non-invasive brain stimulation with an improved spatial resolution and penetration depth, compared to conventional techniques. This technique is based on creating pressure waves and causing neurons to fire upon membrane deformation. However, a lack of understanding of the biomechanics of ultrasound neuromodulation at the cellular and tissue level has resulted in contradictory and inconsistent clinical outcomes. Here we propose to decipher the interplay between cells and tissue mechanics and FUS-induced functional responses, combining advanced bioengineering and mechanobiological tools.

A bottom-up approach to create synthetic tissue.

Dr. I.A.A. (Iain) Muntz (TUD)

All tissues that make up our bodies comprise two distinct parts: living cells, which provide the biological activity to keep us alive, and a non-living extracellular matrix, a scaffold which confers mechanical functions. Our bodies undergo stresses throughout our daily lives: our knees compress with every step, while our lungs compress and decompress with each breath. How do different tissues of our bodies achieve the properties required for their function by combining cells and matrix in different ways? I will answer this question by building synthetic tissues, allowing me to study the contributions of cells and matrix separately and together.

Preventing proteins from sticky situations.

Prof. dr. L.M. (Liesbeth) Veenhoff (UMCG)

One of the hallmarks of age-related diseases is the aggregation of proteins. Most of these proteins contain “sticky” domains that makes them prone to shift from a soluble state into liquid droplets and dysfunctional aggregates; a process called phase separation. How cells handle such sticky proteins is not totally understood. The aim of this project is to identify novel regulators of protein phase separation by performing an innovative large-scale microscopy-based screen in baker's yeast. The results will be highly valuable in the emerging field of phase transition regulation and could inspire new strategies for combating aggregating pathologies.

Open Competition M

[Read more >](#)

Visualizing single RNA polymerase complexes upon DNA damage

Dr. ir. Jurgen Marteijn & Dr. Tineke Lenstra (EMC/NKI)

Damage in the DNA inhibits transcription of genes by RNA polymerase II, which copies the genetic information of the DNA into RNA. This inhibition of RNA polymerases results in severe cellular dysfunction and accelerated aging. In this proposal, we develop a novel microscopy-based approach that can measure the effects of DNA damage on individual RNA polymerase complexes in living cells. Using this approach, we will be able to discover what exactly happens to RNA polymerase when it encounters DNA damage, and how this affects transcription of genes.

How neurons achieve life-long memory of their identity.

Dr. Jeroen van Zon & Dr. Gert Jansen (AMOLF/EMC)

Neurons existing in many different kinds and are not renewed during our lifetime. How do neurons ensure that during this entire time they never accidentally lose their cell type identity? The researchers use microscopy, behavioral analysis and computer simulations to uncover the mechanisms that form this memory in the neurons of a simple worm. Because the structure of the molecular networks that form this memory are conserved from worm to man, this project will also give insight into the memory of human neurons and how this is possibly perturbed in neurodegenerative disease.

Man-made microswimmers in 3D.

Dr. Hanumantha Rao Vutukuri (UT)

Autonomous motion, activity, and transport of microorganisms in fluids are the hallmark features of living systems. In recent years, this has fueled an emerging new research field, namely “active matter,” focused on designing synthetic microswimmers with unique capabilities such as self-propulsion, assembly themselves, and response to local environments. But making micron-sized artificial building blocks that are capable of swimming on their own in 3D is challenging. We will develop a new model system to better understand the dynamic self-organization of microorganisms in 3D using optical microscopy techniques.

How do transcription factor proteins choose their partners?

Prof. dr. ir. Richard Immink & Dr. Aalt-Jan van Dijk (WUR/WUR)

To regulate gene activity, proteins named ‘transcription factors’ work together with specific partner proteins in complexes. Identification of these specific partners is essential to understand which genes can be activated or repressed, but currently requires time-consuming laboratory experiments. However, the recently produced wealth of genome information, in combination with the advances in artificial intelligence, now enable the development of computer models that can predict protein-protein interactions. Here, we will combine artificial intelligence with laboratory experiments to develop a robust computer model

that can reliably predict plant protein-protein interactions.

[Read more >](#)

Break and make: the route to self-healing

Dr. Camilla Terenzi & Dr. Thomas Kodger (WUR/WUR)

In nature, biological materials, such as living tissues, are universally capable to self-repair even under constant load, while man-made materials, once deformed, cannot spontaneously re-form. The mission of scientists, inspired by these natural systems is to realize, in novel materials, the intricate dance between the chemistry and the hierarchical mechanics of reversible molecular bonds, at the core of self-healing. In this project, the researchers will quantify the real-time breaking and recovery of smart materials, capturing the whole range of length scales whose interplay has thus far remained elusive, by means of newly developed experimental methods.

Survival of the fittest

Dr. Saskia Suijkerbuijk (UU)

The cells in our body are in a constant battle. Through removal of less fit cells, tissues can make sure they remain strong. Sometimes, this process does not go as planned and this causes disease. For example, tumors can use this mechanism to enhance their growth. To better understand how the interaction between tumors and the surrounding organ tissue works, the researchers will study how cells talk to each other. This allows us to learn which molecules are involved in the formation of tissues and how tissues can remain healthy.

Vacancies

Check out the available vacancies in the field of Physics of Life on our online vacancy board. You can submit vacancies and we will include them on our PoL community webpage. <https://www.nwobiophysics.nl/vacancies>



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](#)