



Physics & Astronomy Newsletter

The Faculty of Science
Physics and Astronomy Department
Issue 2 - 27 November 2024

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“Photonic integrated circuits (PICs) are driving breakthroughs in fields like quantum computing, wearable sensors, Lidar, and medical imaging.”

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Grant & Awards



FNS grant for Juan Rojo to study the feeblest particles in the universe

The Swiss National Research Council (FNS) has awarded a CHF1.250M grant to a team composed by Prof. dr. Anna Sfyrta (Univesite de Geneve) and Prof. dr. Juan Rojo (VU Amsterdam & Nikhef) to fingerprint neutrinos and feebly interacting particles with the FASER experiment at CERN's Large Hadron Collider (LHC). Complementing the program of larger LHC experiments such as ATLAS and CMS, FASER explores the new physics landscape by seeking to detect feebly interacting particles (FIPs).

[Read more →](#)



EU grant awarded to Roberta Croce as member of Solar Fuels Production Consortium

Biophysicist Prof. dr. Roberta Croce is a member of a European consortium aimed at converting solar energy and CO2 into butanol, an efficient and sustainable biofuel. The project, titled S2B - Solar to Butanol, has received over



Demonstrator funding for Imran Avci

Associate professor Imran Avci, Biophotonics and Medical Imaging Group, receives funding for the project SOHO: A new approach for photonic microchip measurements with ultrahigh precision, speed, and sensitivity. "The versatility and efficiency of photonic integrated circuits (PICs) are paving the way for groundbreaking advancements in various emerging fields including quantum computing, neuromorphic processors, wearable sensors, Lidar systems, medical diagnostics and imaging, and more," Avci explains.

[Read more →](#)

€4 million in Horizon Europe funding. The consortium, coordinated by Professor Yagut Allahverdiyeva-Rinne from the University of Turku, aims to develop innovative technology for the direct production of solar fuels.

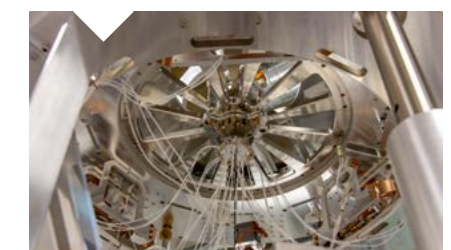
[Read more →](#)

Development of vibration-free cooling technology Einstein Telescope

Assistant professor Joris van Heijningen, of the (Astro-)Particle Physics Group, is part of the Consortium ICVI that receives a NGFT ET subsidy for the development of vibration-free cooling technology Einstein Telescope. The consortium will receive the grant for research and development

of technology that cools the telescope's measuring setup to cryogenic temperatures without introducing new vibration sources. The plan was proposed to the Limburg Institute for Development and Financing (LIOF) and National Growth Fund. This is a three-year project with a total budget of € 1,625,289.60, of which € 1,375,000 will be provided as a subsidy.

[Read more →](#)

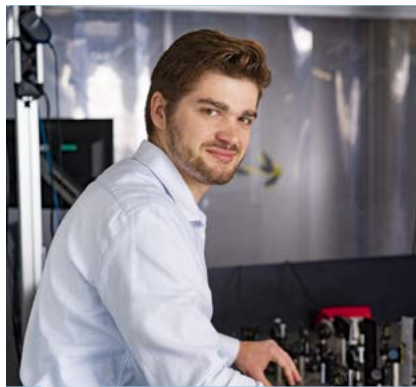




NWO Take-off Phase2 Grant for the Startup Company of Dr. Imran Avci

The Dutch Research Council (NWO) has awarded a Take-off Spring Round 2024, Phase 2: Early phase trajectories, grant to Rapid Photonics, which was co-founded by Associate professor Imran Avci. The grant totals €250,000. Rapid Photonics B.V. (RP) develops and commercialises a unique technology for manufacturing Photonic Integrated Circuits (PICs) in Lithium niobate (LN). LN is a widely used material in conventional optics. RP's technology enables for the first time the use of LN in PICs on an industrial scale. This can both increase the speed and reduce the power consumption of data communications.

[Read more →](#)



Peter Kraus takes next step towards application with ERC Proof of Concept grant

Associate professor Peter Kraus, of the Quantum Metrology & Laser Applications and group leader of the "High-Harmonic Generation and EUV

Science" team at ARCNL, receives an ERC Proof of Concept grant amounting to 150k€. This grant will help advance the innovations from Kraus' ERC Starting Grant on correlated materials closer to the application stage. The new project is titled 'Super-Resolution Microscopy for Semiconductor Metrology' (MICROSEM).

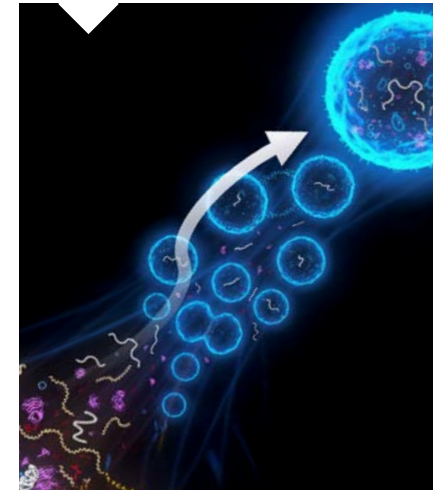
[Read more →](#)

NWO Summit Grant for the evolution of living cells from lifeless molecules

A large consortium involving Prof. dr. Gijs Wuite as a Task Leader, full professor of Physics of Living Systems has been awarded an NWO Summit Grant to work on the EVOLF programme. This program aims to bridge the knowledge gap between non-living and living matter by proposing to assemble a living synthetic cell

from lifeless molecules. The ten-year funding from the Summit Grant will enable research groups to start the programme and play a prominent international role, thereby strengthening the long-term position of Dutch science.

[Read more →](#)



Research begins to make plastics circular

Ten research proposals, including one by assistant professors Sven Askes and Charusheela Ramanan from PhotoConversion Materials group, have been awarded funding under the call "Making Plastics Circular: Technical Innovations." These research projects will commence within the National Growth Fund Program Circular Plastics NL of NWO. Currently, only fifteen percent of the one million tons of plastics discarded annually in the Netherlands is recycled in a high-quality manner. The goal is to recycle fifty percent of all plastics by 2030 and achieve full circular production by 2050. The question being investigated in "Making Plastics Circular: Technical Innovations" is what technical innovations can ensure that plastics are reused more frequently. [Read more →](#)

ERC Advanced Grant for Johannes de Boer

Physicist Johannes F. de Boer, full professor of Biophotonics & Medical Imaging group, has been awarded an Advanced Grant from the European Research Council (ERC). In this five-year research program 'Immuno-OCT', he will develop a new optical endoscopic imaging technique to detect cancer in the human body with a resolution 10 to 100 times higher than currently possible. The major challenge is to develop very small motorized catheters that can penetrate deep into the body to determine both the structure and the molecular composition of tissue with light. The ERC Advanced Grant, which consists of **2,5 million euros**, provides long-term funding to leading principal investigators who want to pursue a ground-breaking, ambitious project. [Read more →](#)



UT-VU Grant for Dr. Askes

Dr. Sven Askes, in collaboration with UT colleagues from civil engineering, has received a UT-VU grant of 40k€! This funding will support the innovative project aimed at enhancing landmine detection in conflict areas using thermal imaging with drones.

the Amsterdam node, Prof. dr. Juan Rojo will lead efforts to develop novel AI strategies to scrutinize proton structure. The awarded funding of **EUR 700,000** will support these cutting-edge research activities over the next four years.

[Read more →](#)

The Marie Skłodowska-Curie Actions - Staff Exchanges (SE) European Award

A consortium of researchers from several European institutes, including VU Amsterdam and Nikhef, along with international partners, has been awarded a prestigious MARIE SKŁODOWSKA-CURIE Staff Exchange action. This award will facilitate new cross-domain collaborations in fundamental physics and artificial intelligence under the project titled High-Energy Intelligence (Hel). From



ERC Advanced Grant for Roberta Croce

Photosynthesis is necessary to sustain life on earth, but it is very inefficient. Biophysicist Roberta Croce, full professor of Biophysics of Photosynthesis group, receives an ERC (European Research Council) Advanced Grant for her research into improving photosynthesis. Currently, less than one percent of accessible solar energy is turned into biomass in crops, and plants only utilize visible light, discarding more than half of the sunlight that reaches us. This is particularly limiting for crops. Croce aims to understand how these cyanobacteria utilize far-red light and explore if and how these mechanisms can be adapted to plants. To achieve these goals, she combines molecular biology, ultrafast spectroscopy, and modeling. The ERC Advanced Grant, which consists of **2,5 million euros**, provides long-term funding to leading principal investigators who want to pursue a ground-breaking, ambitious project.

[Read more →](#)

Outstanding results for Physics and Astronomy in 2024 at the 2024 Nationale Studenten Enquête (NSE; National Student Survey) for the Bachelor in Physics and Astronomy

The NSE is a comprehensive, nationwide survey that gathers students' opinions on their course programs and institutions, providing invaluable insights into the quality of Dutch higher education. [Read more →](#)

Highlights from the 2024 NSE results;

- High Overall Satisfaction: Students have given very positive feedback on their overall satisfaction with the program.
- Excellent Teacher Scores: The program received high scores for the quality of its teachers.
- Outstanding Study Guidance: Students rated the study guidance provided by the program highly.
- Strong Career Path Connections: The program excelled in connecting students to potential career paths.



Annual LaserLaB Best Paper Award 2024

The winner of the Best Paper Award competition for young scientists was announced during the Laser-Lab Symposium at Vrije Universiteit Amsterdam. This year's prize goes to Frank Cozijn from the Physics of Light group for article *Lamb Dip of a Quadrupole Transition in H2* at Physical Review Letters vol 131, 073001, doi: <https://doi.org/10.1103/PhysRevLett.131.073001> [Read more →](#)



New investment in VU spin-off Rapid Photonics for even faster internet

Rapid Photonics B.V. is a spin-off of the Vrije Universiteit Amsterdam. Through the new convertible loan of €300,000, the company will be getting their technology market-ready to

produce integrated photonic chips with lithium niobate, a next-generation material for integrated photonic chips. The use of lithium niobate in integrated photonic chips makes it possible to drastically increase the speed of fiber optic connections and greatly reduce the power consumption of data traffic. [Read more →](#)



NWO Open Competition Science-M grant for dr. Matz Liebel

NWO Open Competition Science-M grant for assistant professor Matz Liebel of the Biophotonics & Medical Imaging Group. The Dutch Research Council (NWO) has awarded an ENW-M grant to dr. Matz Liebel for his project Table to Farm: turnkey SERS for real-life applications. Analytical techniques play a crucial role in our daily lives, aiding medical diagnostics, ensuring clean food, water, and safe travel. The design of analytical platforms involves balancing specificity, precision, sensitivity, speed, and cost. [Read more →](#)

Imran Avci Secures Nationaal Groeifonds Grant through the Biotech Booster Programme for Cancer Research

Associate Professor Imran Avci, from Biophotonics and Medical Imaging Group, receives €200,000 in funding from the Nationaal Groeifonds through the Biotech Booster Programme. With around 1.8 million new cases per year, lung cancer is the second most commonly diagnosed cancer and the leading cause of cancer deaths globally. Early diagnosis is crucial for increasing survival rates and reducing treatment costs. [Read more →](#)



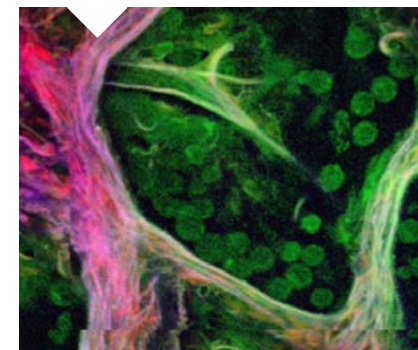
NWO Open Technology Program Grant for DoPredict

The research project DoPredict: Dynamic 3D Biopsy Based Response to Treatment Prediction, led by Prof. dr. Marloes Groot, Biophotonics and Medical Imaging group, has been awarded funding by the Open Technology Program from the NWO domain of Applied and Technical Sciences. With the DOPREDICT project, the research team, consisting of Marloes Groot from VU LaserLab, Jan Willem Duitman (Respiratory Medicine, Amsterdam UMC), and Francesco Ciompi

(Pathology, Radboud UMC), will develop a system to predict the outcome of lung treatment relatively quickly and simply by testing a combination of potentially applicable drugs on a small piece of the patient's tissue (biopsy). [Read more →](#)

Dr. Anouk Post received NWO Faculty of Impact Award

From radiotherapy against prostate cancer to detecting biomarkers in sweat, and from new drugs against Alzheimer's disease to a camera the size of a pill, the new Faculty of Impact fellows want to bring these and more ground-breaking innovations to the market. Dr. Anouk Post from the Biomedical and Imaging group received the NWO Faculty of Impact reward for her proposal "LightUP: a pill-sized imaging device for the early detection of oesophageal cancer". [Read more →](#)



Prestigious NWO grant for research to understand the sense of touch in plants

You probably don't realise it when you walk on the grass: the blades of grass not only feel the pressure of your feet, but adapt their growth accordingly. But how do plants register forces, without a brain and central nervous system? The Green TE (Green Tissue Engineering) consortium will investigate how this works over the next 10 years. The group has been awarded a Gravitation subsidy of **22.8 million euros** for this purpose. Prof. dr. ir. Gijs Wuite from the Physics of Living Systems group is one of the main co-applicants in this interdisciplinary consortium which is led by Prof. Dolf Weijers and Prof. Joris Sprakel of the Laboratory of Biochemistry of Wageningen University & Research. [Read more →](#)

Recent PhD Theses

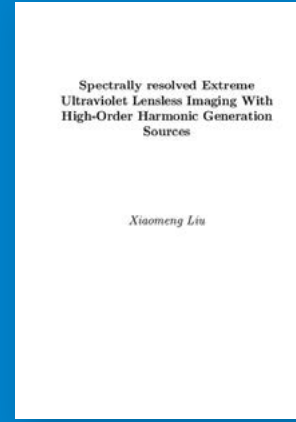


Eleftheria Malami
The Beauty of Flavour Physics: B Meson Decays: Do They Reveal New Physics?

Promotors:

prof. dr. R. Fleischer, prof. dr. M.H.M. Merk
 Defense: 6 November 2024

📖 [More information on the thesis](#)



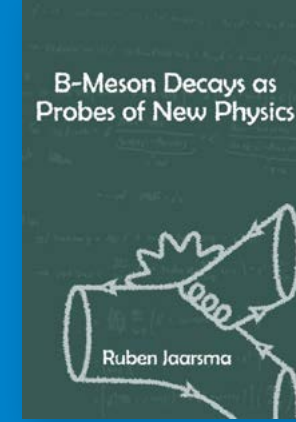
Xiaomeng Liu
Title Spectrally Resolved Extreme Ultraviolet Lensless Imaging With High Order Harmonic Generation Sources

Promotor: dr. S.M. Witte,
 prof. dr. K.S.E. Eikema

Defense: 16 September 2024

Section: Quantum Metrology and Laser Applications

📖 [More information on the thesis](#)



Ruben Jaarsma
B-Meson Decays as Probes of New Physics

Promoter: prof. dr. R Fleischer

Copromotor: prof. dr. Piet Mulders

Defence: 26 June 2024

Section: (Astro-) Particle Physics

📖 [More information on the thesis](#)



Valeriia Lukashenko
Measurement of CP-violation in decays of strange beauty mesons

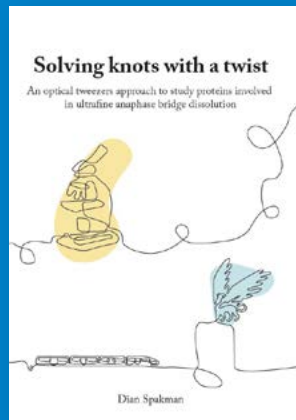
Promoter: Prof.dr. H.G. Raven

Copromotor: Prof. dr. W.D. Hulsbergen

Defence: 28 May 2024

Section: (Astro-) Particle Physics

📖 [More information on the thesis](#)



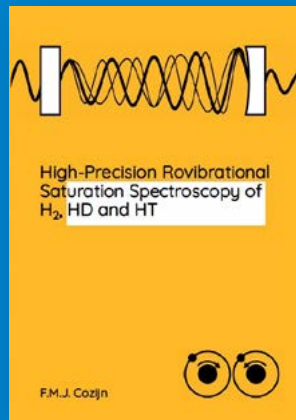
Dian Spakman
Solving knots with a twist: An optical tweezers approach to study proteins involved in ultrafine anaphase bridge dissolution

Promotor: prof. dr. G.J.L. Wuite

Copromotor: prof. dr. E.J.G. Peterman

Defense: 1 November 2024

📖 [More information on the thesis](#)



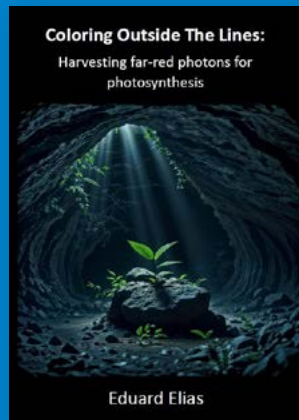
Frank Cozijn
High-Precision Rovibrational Saturation Spectroscopy of H₂, HD and HT

Promotor: prof. dr. W M G Ubachs

Copromotor: dr. E J Salumbides

Defense: 25 October 2024

📖 [More information on the thesis](#)



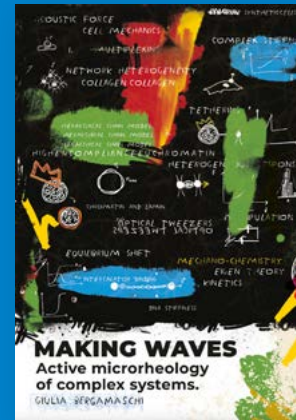
Eduard Elias
Coloring Outside The Lines: Harvesting far-red photons for photosynthesis

Promotor: prof dr. R Croce

Defence: 30 September 2024

Section: Biophysics of Photosynthesis

📖 [More information on the thesis](#)



Giulia Bergamaschi
Making waves: active microrheology of complex systems

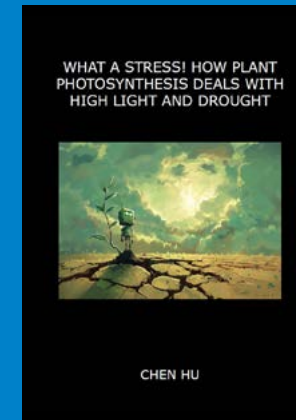
Promoter: Prof.dr.ir. G.J.L. Wuite

Copromotor: Prof.dr.ir. E.J.G. Peterman

Defence: 3 May 2024

Section: Physics of Living System

📖 [More information on the thesis](#)



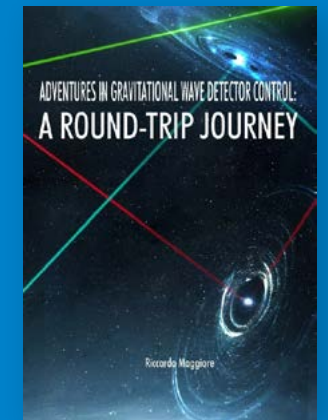
Chen Hu
What a Stress! How Plant Photosynthesis Deals with High Light and Drought

Promoter: Prof. dr. Roberta Croce

Defence: 26 April 2024

Section: Biophysics of Photosynthesis

📖 [More information on the thesis](#)



Riccardo Maggiore
Adventures in Gravitational Wave Detector Control: A Round-Trip Journey

Promoter: Prof. dr. Andreas Freise

Copromotor: Dr. Conor Mow-Lowry

Defence: 11 April 2024

Section: (Astro-) Particle Physics

📖 [More information on the thesis](#)



"My highlight has been the harmony among our staff members to weather this financial storm. We all worked very hard to improve the situation; by writing grants and being successful and we showed solidarity."

Interview

Prof. dr. Johannes de Boer Head of Department

What is your personal highlight over the course of your term?

It has been a pleasure to serve as your department head over the past three years. These were not easy times, when I started the situation was rosy, in the spring of 2022 the dean wanted the departments to spend even more money. That turned around quickly, with our strict financial supervision in Dec 2022 because of deficits in our department budget. We were very fortunate that Jordi Dahlberg joined our department as a department manager in January 2023, he has been instrumental in clearing up our budgets and in helping

us understand the money streams. Right now our budget looks a lot better. I also liked working with our new dean, Aletta Kraneveld, she has the right core values. My highlight has been the harmony among our staff members to weather this financial storm. We all worked very hard to improve the situation; by writing grants and being successful and we showed solidarity.

What has surprised you most, learning more about the functioning of the department?

We have a complex department, with research spanning several institutes such as Nikhef, ARCNL and LaserLab, and teaching in several programs, such as the N&S joint degree, MNW, ME with Twente, and SBI. Managing all these interests takes quite some time. I am proud of our staff for all their teaching efforts, and our third year in a row best ranking of the N&S joint degree and now also ME@VU as the best program in the Netherlands!

What are you looking forward to most once your term ends?

I am happy to take a step back, and spend more time with my PhD students, I think they suffered a bit due to my time commitments as Department Head. We are on the brink of great results. I also look forward to starting the research

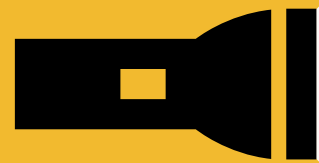
for my Advanced ERC, my involvement with ARCNL on Digital Holographic Metrology, and possibly starting a company to detect esophageal cancer earlier.

What advice would you give to Juan Rojo, who will succeed you?

I think we are very lucky that Juan is willing to take over the helm. I have worked with him for 3 years in the MT, and I have found him to be very pro-active and energetic. He has been a great support for all the tasks in the MT and a voice I always listened to carefully. Without him I could not have done it. He has shown great commitment, and I am sure he will give his all to represent us well and make our department a better place. It is always difficult to take a step back but knowing that Juan will take over makes it a lot easier. I am also very grateful for the support of Marja, Brigit and Melike, and the latest addition to the support team, Karin, for helping us with all the issues we need to deal with and being really nice people to work with.

On a personal note, what's a hobby or interest you have outside of academia that might surprise people?

Tinkering with electronics and building things with my hands, home automation and apps I created myself, playing indoor soccer and swimming for my back.



Highlighted Papers

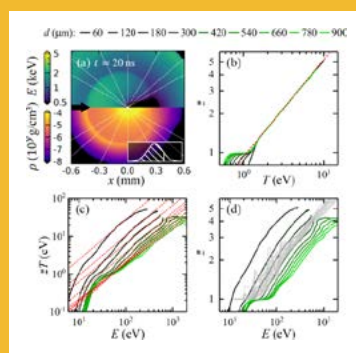
Power-Law Scaling Relating the Average Charge State and Kinetic Energy in Expanding Laser-Driven Plasmas

A universal power-law scaling $\bar{z} \propto E^{0.4}$ in the correlation between the average ion charge

state \bar{z} and kinetic energy E in expanding laser-driven tin plasmas is identified. Universality here refers to an insensitivity to all experimental conditions: target geometry, expansion direction, laser wavelength, and power density. The power law is accurately captured in an analytical consideration of the dependence of the charge state on temperature and the subsequent transfer of internal to kinetic energy in the expansion. These analytical steps are individually, and collectively, validated by a two-dimensional radiation-hydrodynamic simulation of an expanding laser-driven plasma. This power-law behavior is expected to hold also for dense plasma containing heavier, complex ions such as those relevant to current and future laser-driven plasma light sources.

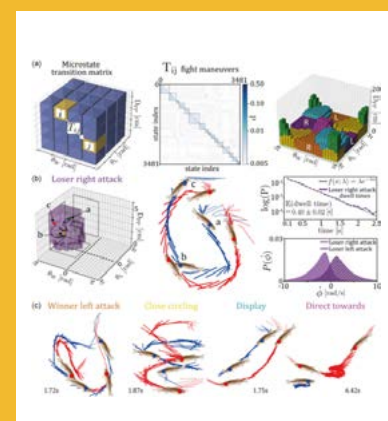
J. Sheil, L. Poirier, A.C. Lassise, S. Schouwenaars, N. Braaksma, A. Frenzel, R. Hoekstra, and O. O. Versolato, Power law scaling relating the average charge state and kinetic energy in expanding laser-driven plasmas, Phys. Rev. Lett. 133, 125101 (2024).

[Read paper online](#)



Dynamics of Dominance in Interacting Zebrafish

While two-body fighting behavior occurs throughout the animal kingdom to settle dominance disputes, important questions such as how the dynamics ultimately lead to a winner and loser are unresolved. Here we examine fighting behavior at high resolution in male zebrafish. We combine multiple cameras, a large volume containing a transparent interior cage to avoid reflection artifacts, with computer vision to track multiple body points across multiple organisms while maintaining individual identity in three dimensions. In the body point trajectories we find a spectrum of timescales which we use to build informative joint coordinates consisting of relative orientation and distance. We use the distribution of these coordinates to automatically identify fight epochs, and we demonstrate the postfight emergence of an abrupt asymmetry in relative orientations—a clear and quantitative signal of hierarchy formation. We identify short-time, multi-animal behaviors as clustered transitions between joint configurations, and show that fight epochs are spanned by a subset of these clusters, which we denote as maneuvers. The resulting space of maneuvers is rich but interpretable, including motifs such as “attacks” and “circling.” In the longer-time dynamics of maneuver frequencies we find differential and changing strategies, including that the eventual loser attacks more often towards the end of the contest. Our results suggest a reevaluation of relevant assessment models in zebrafish, while our approach is generally applicable to other animal systems.



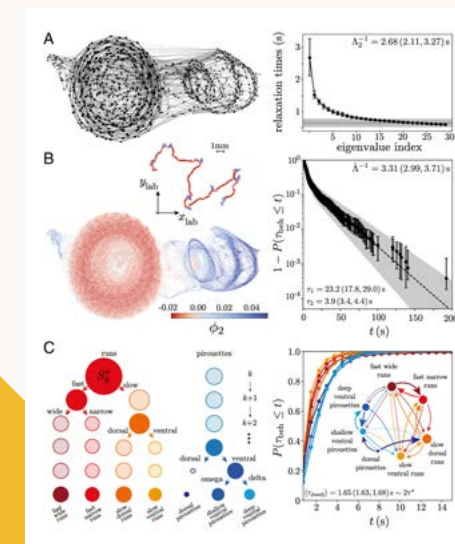
Liam O’Shaughnessy, Tatsuo Izawa, Ichiro Masai, Joshua W. Shaevitz, and Greg J. Stephens PRX Life 2, 043006.

[Read paper online](#)

A Markovian dynamics for Caenorhabditis elegans behavior across scales

How do we capture the breadth of behavior in animal movement, from rapid body twitches to aging? Using high-resolution videos of the nematode worm *Caenorhabditis elegans*, we show that a single dynamics connects posture-scale fluctuations with trajectory diffusion and longer-lived behavioral states. We take short posture sequences as an instantaneous behavioral measure, fixing the sequence length for maximal prediction. Within the space of posture sequences, we construct a fine-scale, maximum entropy partition so that transitions among microstates define a high-fidelity Markov model, which we also use as a means of principled coarse-graining. We translate these dynamics into movement using resistive force theory, capturing the statistical properties of foraging trajectories. Predictive across scales, we leverage the longest-lived eigenvectors of the inferred Markov chain to perform a top-down subdivision of the worm’s foraging behavior, revealing both “runs-and-pirouettes” as well as previously uncharacterized finer-scale behaviors. We use our model to investigate the relevance of these fine-scale behaviors for foraging success, recovering a trade-off between local and global search strategies.

A.C. Costa, T. Ahamed, D. Jordan, G.J. Stephens, A Markovian dynamics for *Caenorhabditis elegans* behavior across scales, Proc. Natl. Acad. Sci. U.S.A. 121 (32) e2318805121, (2024). [Read paper online](#)

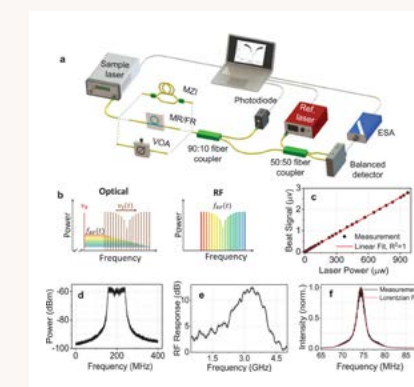


Real-Time Measurements of Photonic Microchips with Femtometer-Scale Spectral Precision and Ultrahigh Sensitivity

Photonic integrated circuits (PICs) are enabling breakthroughs in several areas, including quantum computing, neuromorphic processors, wearable devices, and more. Nevertheless, existing PIC measurement methods lack the spectral precision, speed, and sensitivity required for refining current applications and exploring new frontiers such as point-of-care or wearable biosensors. Here, the “sweeping optical frequency mixing method (SOHO)” is presented, surpassing traditional PIC measurement methods with real-time operation, 30 dB higher sensitivity, and over 100 times better spectral resolution. Leveraging the frequency mixing process with a sweeping laser, SOHO excels in simplicity, eliminating the need for advanced optical components and additional calibration procedures. Its superior performance is demonstrated on ultrahigh-quality factor (Q) fiber-loop resonators ($Q = 46 \times 10^6$), as well as microresonators, realized on a new optical waveguide platform. An experimental spectral resolution of 19.1 femtometers is demonstrated using an 85-meter-long unbalanced fiber Mach Zehnder Interferometer, constrained by noise resulting from the extended fiber length, while the theoretical resolution is calculated to be 6.2 femtometers, limited by the linewidth of the reference laser. With its excellent performance metrics, SOHO has the potential to become a vital measurement tool in photonics, excelling in high-speed and high-resolution measurements of weak optical signals.

Real-Time Measurements of Photonic Microchips with Femtometer-Scale Spectral Precision and Ultrahigh Sensitivity Laser and Photonics Reviews 18(8) Wiley 2024 1863-8880 10.1002/lpor.202301396

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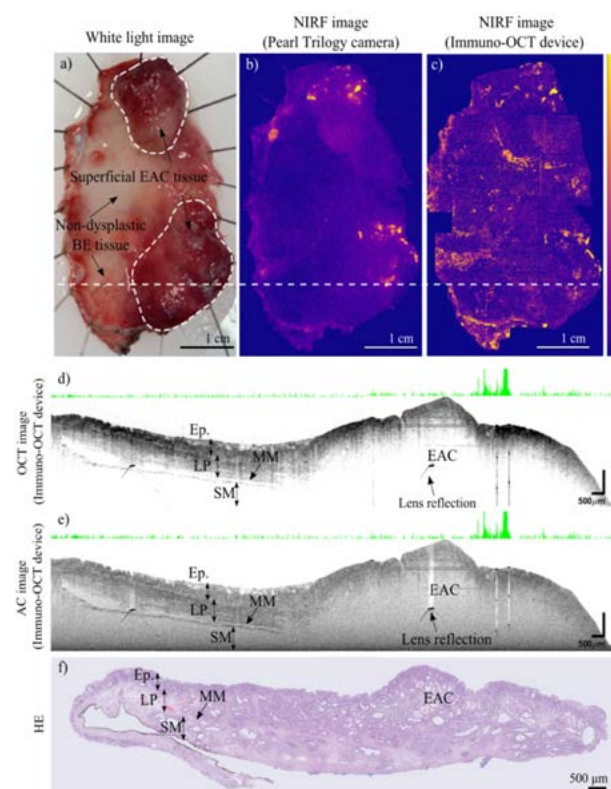
Ex vivo optical coherence tomography combined with near infrared targeted fluorescence: towards in-vivo esophageal cancer detection

Early detection of (pre)malignant esophageal lesions is critical to improve esophageal cancer morbidity and mortality rates. In patients with advanced esophageal adenocarcinoma (EAC)

The detection sensitivity of our system (0.3 nM) is sufficient to detect increased tracer uptake with micrometer resolution using an imaging dose of labelled antibodies. Moreover, the absence of layered structures that are typical of normal esophageal tissue observed in OCT images of dysplastic/malignant esophageal lesions may further aid their detection. Based on our preliminary results, immuno-OCT could improve the detection of dysplastic esophageal lesions.

Margherita Vaselli, Ruben Y. Gabriels, Iris Schmidt, Andrea J. Sterkenburg, Gursah Kats-Ugurlu, Wouter B. Nagengast, and Johannes F. de Boer, «Ex vivo optical coherence tomography combined with near infrared targeted fluorescence: towards in-vivo esophageal cancer detection,» *Biomed. Opt. Express* 15, 5706-5722 (2024).

[Read paper online](#)



who undergo neoadjuvant chemoradiation therapy, the efficacy of therapy could be optimized and unnecessary surgery prevented by the reliable assessment of residual tumors after therapy. Optical coherence tomography (OCT) provides structural images at a (sub)-cellular level and has the potential to visualize morphological changes in tissue. However, OCT lacks molecular imaging contrast, a feature that enables the study of biological processes at a cellular level and can enhance esophageal cancer diagnostic accuracy. We combined OCT with near-infrared fluorescence molecular imaging using fluorescently labelled antibodies (immuno-OCT). The main goal of this proof of principle study is to investigate the feasibility of immuno-OCT for esophageal cancer imaging. We aim to assess whether the sensitivity of our immuno-OCT device is sufficient to detect the tracer uptake using an imaging dose (~100 times smaller than a dose with therapeutic effects) of a targeted fluorescent agent. The feasibility of immuno-OCT was demonstrated ex-vivo on dysplastic lesions resected from Barrett's patients and on esophageal specimens resected from patients with advanced EAC, who were respectively topically and intravenously administered with the tracer bevacizumab-800CW.

Entrepreneurial Self-Efficacy of Scientists: A qualitative study on ATTRACT Phase 2 R&D&I Ventures

We need to understand the antecedents of entrepreneurial self-efficacy (ESE) of actors in science and technology-based commercialisation when we

want to foster the commercialisation of scientific innovations. Despite the plethora of research on ESE in general, research on antecedents of ESE of scientists is scarce. Yet, there is reason to believe that because scientists develop a scientific self-efficacy, the antecedents to scientists' entrepreneurial self-efficacy differ from the ESE antecedents of other target groups. Therefore, we explored which ESE antecedents resonate with a unique cohort of scientists and how attributes such as cultural and institutional factors, firm capabilities, education, work experience, role models, and individual differences support the building of entrepreneurial competence. This study provides practical relevance to educators and science entrepreneurs, identifying a need for tailored education for science and technology-based entrepreneurship to foster the development of a dual self-efficacy that reflects scientific norms and commercialisation needs.

Fisher, A., Blankesteyjn, M. L., Harms, R., & van Muijlwijk-Koezen, J. (2024). Entrepreneurial Self-Efficacy of Scientists: A qualitative study on ATTRACT Phase 2 R&D&I Ventures. *CERN IdeaSquare Journal of Experimental Innovation*, 8(1), 20-25.

[Read paper online](#)

Improving super-resolution microscopy with donut-shaped light and multicolored sources

Researchers from the High-harmonic generation and EUV science group led by Peter Kraus have recently made two groundbreaking

advances in the field of high-harmonic generation (HHG). This unlocks new potential for imaging and light generation at wavelengths up into the extreme ultraviolet (XUV), that are necessary for studying extremely small structures in the order of 100nm with a microscope. The studies highlight innovative ways to push the limits of light-based technologies for applications ranging from super-resolution microscopy to compact XUV light sources. The research led to publications in *Science Advances* on November 13th and *Nature Communications* on September 27th.

[Read more](#)

1. Sylvianne D. C. Roscam Abbing, Nataliia Kuzkova, Roy van der Linden, Filippo Campi, Brian de Keijzer, Corentin Morice, Zhuang-Yan Zhang, Maarten L. S. van der Geest, Peter M. Kraus, "Enhancing the efficiency of high-order harmonics with two-color non-collinear wave mixing in silica", *Nature Communications* 15, 8335, 27 September (2024)

2. Kevin Murzyn, Maarten L. S. van der Geest, Leo Guery, Zhonghui Nie, Pieter van Essen, Stefan Witte, Peter M. Kraus, "Breaking Abbe's diffraction limit with harmonic deactivation microscopy", *Science Advances*, 10, 13 November (2024).



News & Announcements

Revolutionary Thorium Clock

Jeroen Koelemeij, assistant professor of Quantum Metrology & Laser Applications group comments on the revolutionary nature of this innovation, likening its potential impact to that of the atomic clock introduced seventy years ago. The thorium clock, which measures vibrations within the atomic nucleus itself, promises unprecedented precision, with the possibility of advancing technologies like quantum networks, improving internet speeds, and even enabling millimeter-accurate altitude measurements. Koelemeij suggests that this breakthrough is just the beginning, with future advancements likely to further enhance its precision. [Read more →](#)



Juan Rojo new Head of the Physics and Astronomy department

The Faculty of Science of VU Amsterdam has appointed Prof. dr. Juan Rojo as Head of the Physics and Astronomy Department, effective from 1 January 2025, for a period of 4 years. [Read more →](#)



Highest accuracy achieved in laser spectroscopy of tritium molecules

Scientists of VU Amsterdam and the Karlsruhe Institute of Technology (KIT) have employed an ultra-sensitive intracavity absorption technique in the near infrared to measure transition frequencies between ro-vibrational energy levels of the radioactive tritium hydride (HT) molecule. It exceeds the precision of corresponding theoretical predictions at the moment. There, doctoral researchers Frank Cozijn and Meissa Diouf of VU Amsterdam were joined by KIT fellow Valentin Hermann from the TLK for setting up the equipment and for performing the measurements. Despite experimental challenges imposed by the safety measures required for the use of tritium, high-quality spectra could be recorded successfully for the first time. [Read more →](#)



New MNW & BMTP Program Director: John Kennis

Prof. dr. John Kennis from Biophysics of Photosynthesis group has been appointed as the new Program Director of the Bachelor Medische Natuurwetenschappen (MNW) and the Master Biomedical Technology and Physics (BMTP) at the Faculty of Science of the VU Amsterdam. At the same time, the Physics and Astronomy department expresses sincere gratitude to the previous program director, Prof. dr. Marloes Groot. Her unwavering dedication and hard work over the past six years have significantly contributed to the success and excellence of the MNW and BMTP programs. [Read more →](#)

New Program Director Physics and Astronomy Joint Degree BSc: Chase Broedersz

Chase Broedersz, associate professor of the Physics of Living Systems group, has been appointed as the new Program Director for the Bachelor's program in Physics and Astronomy. His term as program director commenced in September, 2024. [Read more →](#)



Interview with Jeroen Koelemeij and Florian Schreck in NRC

Jeroen Koelemeij and Florian Schreck were interviewed by journalist Dorine Schenk about the most accurate atomic clock's and GPS navigation. This interview was published on Saturday the 23rd of March in NRC Science section. [Read more →](#)



Wouter Hulsbergen named Professor by Special Appointment

Wouter Hulsbergen was named Professor by Special Appointment to the "Flavour Physics at the LHC" professorial chair at VU Amsterdam. The Executive Board of VU Amsterdam has formally approved this position, on behalf of the Faculty of Science, Department of Physics and Astronomy and the National Institute for Subatomic Physics Nikhef, effective from July 1, 2024, until July 1, 2029. [Read more →](#)



Physics Practicals have moved to a new location in the WN-building at G0.70

We invite you to explore this new space and see where hands-on learning happens! Stop by and discover how we're enhancing our educational environment.

SCIENCE ART

Photosynthesis at the interface of Arts, Sciences and Society

Assistant professor Raoul Frese from the Biophysics of Photosynthesis group gave a speech in Barcelona at "Photosynthesis at the Interface of Arts, Sciences, and Society," scheduled for October 28, 2024. This event, organized by

HacTe and ICFO, supported by S+T+ARTS and local Catalan entities, delves into the collaborative space where science meets art, with a particular focus on photosynthesis and its applications in sustainability and technology. Frese, who leads our Hybrid Forms Lab, engaged in discussions that bridge scientific research and artistic expression, reflecting on the implications for sustainable agriculture, green energy, and environmental conservation.

[Read more →](#)

Berlin Science Week Exploring New Opportunities for Art, Science, and Technology Collaborations

Assistant professor Raoul Frese is taking part in an

inspiring session on "Exploring New Opportunities for Art, Science, and Technology Collaborations" at Berlin Science Week. This session delves into the intersections between art, science, and technology, aiming to uncover new ways these fields can collaborate to foster innovation, creativity, and societal transformation. [Read more →](#)

Photo Credit:
Daniel Cao / HacTe

Weekend of Science

The Physics and Astronomy Department made a significant contribution to this year's Science Weekend at Science, engaging with students with a series of informative talks and dynamic experiments. The department presented discussions on topics such as the precision of atomic clocks, the detection of gravitational waves, the experiences of a CERN scientist, and the intricacies of ASML's computer chip production. Additionally, hands-on demonstrations including a photosynthesis experiment and the synthesis of photoconversion materials provided a practical glimpse into the application of physics and astronomy.

- (Astro-) Particle Physics - Dr. Joris van Heijningen (Nikhef)
- (Astro-) Particle Physics - Dr. Mara Senghi Soares (Nikhef)
- Biophysics of Photosynthesis - Dr. Volha Chukhutsina
- The Photoconversion Materials (PCM) - Dr. Charusheela Ramanan & Dr. Loreta Muscarella & Dr. Andrea Baldi & Dr. Sven Askes (AMOLF)
- Quantum Metrology and Laser Applications - Dr. Laura Dreissen (FNWI/UvA)
- Quantum Metrology and Laser Applications - Dr. Oscar Versolato (ARCNL)

A special thanks to our participants, volunteers, and organizers who made it all possible. [Read more →](#)



Ten new members for Amsterdam Young Academy (AYA)

Laura Dreissen, Assistant Professor from Quantum Metrology & Laser Application group, has been appointed as a new member of the Amsterdam Young Academy (AYA). This prestigious network comprises dynamic young scholars from VU Amsterdam, the University of Amsterdam (UvA), and Amsterdam UMC who are committed to interdisciplinary research and shaping the future of research policy. AYA is a network of promising, young Amsterdam academics whose research extends beyond their own discipline. It was founded in 2018 by a number of Amsterdam-based members of De Jonge Akademie and commits to interdisciplinary research, social dialogue and research policy. [Read More →](#)



Diversity, Equity, and Inclusion (DEI) Workshop

The DEI Council organized a workshop inspired by the VU Mixed Classroom Model, which leverages diversity to enhance learning, critical thinking, and creativity. It fostered open dialogue and actionable strategies to promote inclusivity and fairness, reinforcing our commitment to a supportive, diverse workplace culture.

Source Workshop 2024

On October 21-23, a record number of 129 participants from many countries attended the successful 2024 Source Workshop in Amsterdam. This premier yearly workshop, with Chinese, Japanese, American and European speakers from industry and academia, focused on the light source technology driving the chip revolution. The Source Workshop was organized and hosted by ARCNL and EUV Litho, Inc. If you have questions, please contact Oscar Versolato (email: O.Versolato@arcnl.nl), group leader of EUV Plasma Processes at ARCNL. [Read more →](#)

More information

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For subscriptions or inquiries about the articles and news featured in this newsletter, please reach out to the editorial team. We welcome your interest and look forward to engaging with you.

Upcoming Colloquium Dates

January 22, 2025

March 19, 2025

May 14, 2025

