KAVLI NEWSLETTER
Kavli Institute of Nanoscience Delft
No.18
February 2017

IN THIS ISSUE:

A new gift from the Kavli Foundation

Great news for our Institute: The Kavli Foundation has decided to make a third donation to the Kavli Institute of Nanoscience Delft (KIND). Whereas the two previous gifts established an endowment that yields revenues of which we benefit yearly, the new gift entails an additional annual gift of 200 k$ for the next ten years which can be spent on activities that are to the benefit of the Institute and its members. This gift is annually matched by another 200 k$ by TU Delft to the Kavli Institute, aimed at the same goal.

We are grateful for these new funds that mark a significant expansion of the funds available to the Institute. We will continue building the Kavli community at Delft, with the well-known initiatives such as the high-quality Kavli Colloquia, workshops, the Kavli Day, the local Kavli Prizes, etc. All these initiatives contribute to the intellectual enrichment of our Kavli Institute and have in the course of time become essential pillar activities that contribute to the success of the Institute. We will continue these activities in the coming years, even as their costs have been increasing with the steady increase in the number of members of KIND.

Next to that, in line with brainstorm discussions on future directions among the Kavli faculty members in the past half year, we plan to initiate a number of new initiatives with these new resources:

We will establish an annual Kavli Chair for an external visiting scientist. This prestigious position will be offered to a scientist in nanoscience with a very high international reputation. He/she will be invited to come to KIND for a period of at least two months, and will join in scientific interactions with the researchers at the Institute. The Kavli Chair will give a Kavli Colloquium as well as some specialized lectures. See page 7 for the announcement of the first Kavli chair.

We will establish a new postdoctoral fellowship program for synergistic quantum-bio projects at KIND, to stimulate interaction across the disciplines of our institute. The concept is that excellent postdoc candidates will work with two different KIND supervisors, one with expertise in quantum nanoscience and one with expertise in bionanoscience.

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FROM THE DIRECTORS

These are great times for our Institute. Following discussions with the Kavli foundation over the past year, we are happy to announce that we will receive a third donation to support our activities. On this page, you can read about the exciting new plans that are made possible by this third gift. You will see the first new activities in place already in 2017.

On March 2nd, we will have Markus Aspelmeyer give a Kavli Colloquium. Markus has been a pioneer in exploring the boundary between classical and quantum physics. He is full of wild and appealing ideas, and speaks on his work with great enthusiasm. His Kavli Colloquium will focus on exploring the motion of massive mechanical objects in the quantum regime – how large can a massive object be and still behave quantum mechanically? On March 3rd, he will give a hot-topics seminar on quantum tests of gravity, covering a series of profound past and planned experiments. To learn more about Markus Aspelmeyer, read the interview on page 2.

Furthermore in this newsletter, there is a self-interview with Claire Wyman (page 4), a column by Martin Depken (page 2), and news on a great new Microsoft research activity in Delft led by our Kavli member Leo Kouwenhoven (page 6).

Lieven Vandersypen

COLUMN

The stares of primates

In 2007, Bokito—a 180 kg silverback gorilla at Rotterdam zoo—jumped the wall separating him from the public. The impressive escape was prompted by the persistent stare of a frequent visitor. Bokito did not react well to the attention, perceiving a threat to his social status. With his fight-or-flight response triggered by a simple stare, only one reaction was available to this dominant male, and the unfortunate visitor ended up in hospital. Though no one foresaw the escape, Bokito's response was no surprise to his keepers.

Humans are not usually too fond of being stared at either, and while only the more aggressive of us will be drawn into a fight, most people react with clear unease. Our sympathetic nervous system reacts with a shot of adrenaline to perceived threats, making us ready for explosive action, and with the common symptoms being all too familiar: increased heart rate, increased blood pressure, increased perspiration, dilated pupils, and a dry mouth.

Compared to giving a scientific talk, the challenge to Bokito's tranquillity seems rather trivial. Speaking publicly often thrusts you in front of hundreds of large primates, often with a disconcerting number of scientific silverbacks facing you, staring directly at you. It is maybe not so surprising then that it can at first be quite hard to relax and to connect with the gaze of the audience. Giving a talk also exposes you to the social anxiety of being rejected by your peers, which can also trigger a flight-or-flight response. Consequently, public speaking is incredibly hard for social animals like us, and there are even studies suggesting that most people fear public speaking more than death (Croston, G. "The Real Story of Risk", Psychology Today 2012).

Just like a treatment for irrational phobias is repeated exposure, so it is with the fear of public speaking. Exposure therapy is tough and time consuming though, and learning to enjoy being on stage can seem dauntingly distant at first. Spending time analysing my own fear of public speaking, I realized that I amplified my instinctive fight-or-flight response with the fear that the resulting nerves would be obvious to the audience, giving me even more to worry about. This vicious circle of unhelpful thinking eventually started to piss me off, and instead of feeling ashamed I decided to see my fight-or-flight response as an annoying but natural response that has lost its usefulness in this artificial setting—not as a personal failure. Owning this fear, accepting it, being open about it, and stopping to see it as a problem, broke the vicious circle and my discomfort lessened drastically.

If you get nervous by giving talks, realize that almost all people do in the beginning. You should probably resist the temptation to whine to others to sooth yourself, but do not hide how you feel, be kind to yourself, and stop berating yourself for being nervous in the first place. If you start showing understanding for other people's nerves, it will soon be easy to be kind to yourself too. After all, these automatic responses that might be tripping you up now, helped your ancestor to win in the evolutionary game, and put you here. Owning and accepting your fear might loosen its grip on you too, and you might even learn to enjoy the stares!

Martin Depken

INTERVIEW

Interview with Markus Aspelmeyer

Q: Dear Prof. Aspelmeyer, you are now leading a highly recognised group in quantum optics and optomechanics. Your PhD studies however focussed on solid state physics. What has motivated you for the chance?

I was confronted with two questions: 'What is it that I am most interested in?', and 'Which field do I know least about?'. Since the answer to both questions was 'quantum optics' it was clear what I was going to do. . .

Q: Was there any hurdle you had to overcome or was it a rather fluent change to the field of quantum optics?

It was certainly a big change. I had been working nightshifts on accelerator beamlines before and quantum optics laboratories suddenly felt so – so small! But seriously: I was lucky to work in an extremely open-minded environment. Everyone was so supportive! The quantum optics and AMO physics community is probably the most friendly and most inspiring one you can wish for! I wanted to learn from the best, and in Austria I was given the chance to learn from the 'big guys' – Zeilinger, Zoller, Blatt, . . . you name it – and their incredibly strong teams. I received a PostDoc Fellowship from the Alexander von Humboldt Foundation and started out in Anton's labs in Vienna to learn all about photonic entanglement. He certainly took a risk in adding a complete outsider to his team, but it seemed to have worked out.

Q: Since a few years, countries like the UK and Denmark are investing heavily in the commercialisation of quantum technologies, especially information technologies. What do you anticipate as the most important novelty that quantum technologies can provide?

We have many brilliant and highly motivated young students and researchers in our labs that are constantly pushing available technologies beyond the current state of the art to make their experiments work, sensing and control tools, optimization protocols, specialized software packages, etc. I definitely see a huge market potential for such 'quantum-inspired' technologies, that is, 'classical' technologies coming out of quantum-labs around the world. What we need is a better communication with industry and the outside world to learn where practical lab solutions are hitting an actual demand from the market. Concerning 'quantum-enabled' technologies, whose working principles rely on genuine quantum effects, I have high hopes for novel sensing technologies. For example, I am extremely enthusiastic about the developments of portable atom interferometers for inertial and gravitational sensing.

Q: How far are we from using such technologies in our every day life?

These things exist and you can already buy them! [Such as atom interferometer-based gravimeters and devices for cryptography; author's note] And they are getting better and better. . .

Q: Your work on optomechanics offers a natural interface between quantum mechanics and gravity, which is furthermore a topic of your research. What is your approach towards such experiments to test the validity of quantum mechanics and then deduce an extended theory or do you prefer to design experiments according to a certain theoretical model?

I am interested in making gravity a relevant interaction in table-top quantum experiments. Not just Earth's gravity but ideally involving gravitational fields that are generated by the quantum systems themselves. In the long run I would like to answer the question how a quantum system in a superposition, gravitates directly in an experiment. I would like to see an experiment whose outcome requires a quantum description of the gravitational field. This is the moon-shot we are after. Of course, to some extent such experiments will also allow to test possible extensions of either general relativity or quantum theory. Together with colleagues from Vienna and Imperial we have recently proposed a gravity variant of the electron EDM search, which would test gravity-induced Planck scale modifications to the canonical commutator of a mechanical system. We will see if nature leaves some room for them.

Q: What is the biggest challenge for such tests of quantum gravity?

That we don't have yet the required technology working. We have a good understanding of the protocols that are required to perform such experiments. The last 10 years have seen huge successes all

KAVLI COLLOQUIUM

"Quantum Optomechanics: exploring mechanical motion in the quantum regime"

Markus Aspelmeyer

University of Vienna

March 2, 2017 will feature a Kavli colloquium by Markus Aspelmeyer

The quantum optical control of solid-state mechanical devices, quantum optomechanics, has emerged as a new frontier of light-matter interactions. Devices currently under investigation cover a mass range of more than 17 orders of magnitude - from nanomechanical waveguides of some picograms to macroscopic, kilogram-weight mirrors of gravitational wave detectors. This development has been enabled by the insight that quantum optics provides a powerful toolbox to generate, manipulate and detect quantum states of mechanical motion, in particular by coupling the mechanics to an optical or microwave cavity field. Originally, such cavity optomechanical systems have been studied from the early 1970s on in the context of gravitational wave antennas. Advancements in micro-fabrication and micro-cavities, however, have resulted in the development of a completely new generation of nano- and micro-optomechanical devices. Today, 10 years after the first demonstrations of laser cooling of micromechanical resonators, the quantum regime of nano- and micromechanical motion is firmly established. Recent experimental achievements include the generation of genuinely non-classical states of micromechanical motion such as quantum squeezing and entanglement. This level of control over solid-state mechanical degrees of freedom is now also being utilized in diverse application domains ranging from classical sensing, to low-noise optical coatings for precision interferometry, and also to photon-phonon quantum interfaces.

From the fundamental physics point of view, one of the fascinating prospects of quantum optomechanics is to coherently control the motional degree of freedom of a massive object in an unprecedented parameter regime of large mass and long coherence time, hence opening up a new avenue for macroscopic quantum experiments. The availability of quantum superposition states involving increasingly massive objects could enable a completely new class of experiments, in which the source mass character of the quantum system starts to play a role. This addresses directly one of the outstanding questions at the interface between quantum physics and gravity, namely "how does a quantum system gravitate?".

15.00 hr	Pre-programme
	Introduction of the new Kavli members from QuTech - dreams and ambitions
15.45 hr	Break
16.00 hr	Kavli colloquium by Markus Aspelmeyer: "Quantum Optomechanics: exploring mechanical motion in the quantum regime"
17.15 hr	Drinks & time to meet

Markus Aspelmeyer studied physics and philosophy in Munich, Germany. After a PhD in solid state physics (LMU Munich) he switched to the field of quantum optics. Since 2009 Aspelmeyer is Full Professor at the Faculty of Physics of the University of Vienna, Austria. He is regarded as one of the pioneers of the field of cavity optomechanics. His research combines the development of new quantum technologies with fundamental quantum experiments. Markus is a founding member and present Speaker of the Vienna Center for Quantum Science and Technology, and Speaker of the Vienna graduate programme "Complex Quantum Systems". In 2012 he co-founded the high-tech company "Crystalline Mirror Solutions", which provides novel optics for laser precision measurements. For his contributions to quantum science and technological innovation he has received several prizes, among them the Innovation Award of the AMA Association for Sensors and Measurement, the Ignaz Lieben Prize of the Austrian Academy of Sciences, the Bessel Award of the Alexander von Humboldt Foundation and the Fresnel Prize of the European Physical Society. He is a Fellow of the American Physical Society, a Member of the Young Academy of the Austrian Academy of Sciences and a Member of the European Academy of Sciences and Arts.

KAVLI COLLOQUIUM

Date: March 2, 2017 at 15.00 hours
Location: TNW-Zuid, Building 58, Waterman lectureroom, A2.110

HOT TOPICS

For Phd students/postdocs. Register on Casimir website

Quantum tests of gravity (providing an overview on past, current and future tests of gravity using quantum systems)

Date March 3, 2017 at 11.30h incl. lunch
Location TNW, Building 22, Classroom 12, F104

around the world in controlling solid-state nano- and micromechanical devices in the quantum regime of motion. Based on these results we are confident that the underlying principle, quantum optically controlling the centre of mass state of increasingly massive mechanical objects, works. What is going to be crucial is to minimize sources of decoherence, in particular due to blackbody radiation and seismic noise. This is one of the reasons why we are now investigating the quantum control of levitated solids, either dielectric or superconducting: to provide as much decoupling from the environment as possible. We are also collaborating with our friends from the gravitational wave detector community to learn about seismic isolation for our experiments. It is a lot of technology development, but also a lot of fun!

Q: Thank you for the interview!

Clemens Schäfermeier

SELF-INTERVIEW WITH CLAIRE WYMAN

I may be newly appointed as an affiliated professor in BN but I am not new to the Kavli Institute in Delft. In fact my first contacts around 2002 predate its establishment in 2004. In collaboration with Cees Dekker and Nynke Dekker, their expertise and magnetic/optical tweezers, we did some really fun studies on DNA repair proteins working at their native nano-scale. I continue to be a regular presence at BN, now though educational activities as well. It is truly a pleasure to be part of this scientific community populated by interesting people trying to figure out how things work at the most fundamental level currently possible. Science can't get better. If only I could convince everyone to stop dividing us with the labels "Biologists" or "Physicists"

I arrived in the Netherlands in 1995, after PhD and post doc in Molecular Biology at the University of California in Berkeley. My husband and I were on the job market together but, as can happen in two-scientist couples, our achievements were not synchronized. Among his offers Rotterdam was best. I had none at that time. The work that would define my interests, talents and shape my career was not yet published. My post-doc project was to understand DNA-replication by looking at the molecular machinery using electron microscopy. EM is beautiful but involves long hours alone in a dark room in the basement, not an optimal way to spend time in California. I switched to scanning (or atomic) force microscopy after seeing results of this in a seminar by Pete van Hipple and his introduction to Carlos Bustamante. Finding literally new insight from SFM images, which in addition appear on a computer monitor in a well-lit busy lab, I have never looked back. Fortunately quite a few folks in the Netherlands were interested in hearing about this. I quickly secured a position at Erasmus University Medical Center and have worked here ever since. My research is driven by ever-advancing technology and continues the quest to understand how complex living systems work, mostly how genetic information in DNA is maintained and used, based on fundamental principles.

Many people in Delft know me as the academic director of the Nanobiology program. Helping create a new generation of scientists is an added dimension I have the privilege of enjoying. It is great to see the smiles light up when prospective students realize that Nanobiology is just the program they are looking for. Hearing parents say their daughter/son finally has academic challenges to enjoy, tells me we are on the right track. So far the Nanobiology program is a great success. I certainly look forward to seeing our graduates eventually populate places like the Kavli institute and teach me how things *really* work.

Although Holland is a great place to live and I have even officially become Dutch, my ties to the US and connections around the world remain strong. I regularly gather with friends from far-flung places for cycling among (not so steep) hills in varied beautiful places. Every summer I return to my family home on the Chesapeake Bay in Maryland, what my kids refer to as "going to the summer". The photo shows me "in my natural habitat" about to enjoy the afternoon beer on the pier. Coincidently this place is called Holland Point.

NEW EMPLOYEES

Name	Date of employment	Title	Lab
Sabina Caneva	01-11-16	Postdoc	Van der Zant lab/Cees Dekker lab
Luca Petit	01-11-16	PhD	Veldhorstlab
Valeria Cimini	01-11-16	PhD	Hanson lab
Rosario Incandela	01-11-16	PhD	Charbonlab
Francesco Borsoi	15-11-16	PhD	Kouwenhoven lab
David Coffey Blanco	16-11-16	Postdoc	Otte Lab
Moritz Forsch	16-11-16	PhD	Groeblacher Lab
Felipe Bernal	01-12-16	Postdoc	Kuipers lab
Zahra Kolahdouz Esfahani	01-12-16	Postdoc	ZandbergenLab
Nima Kalhor	01-01-17	Postdoc	Vandersypenlab
Bishnu Patra	01-01-17	PhD	Charbonlab
Wouter Westerveld	01-01-17	Postdoc	Hanson lab
Diana Car	01-01-17	Postdoc	Kouwenhoven lab
Amrita Singh	01-01-17	Postdoc	Kouwenhoven lab
Brian Tarasinski	09-01-17	Postdoc	DiCarlo Lab
Alexandra Fursina	15-01-17	Postdoc	Kouwenhoven lab
Aurora Dols Perez	15-01-17	Postdoc	Marie-Eve Aubin lab
Clemens Schaefermeier	16-01-17	Postdoc	Groeblacher Lab
Mario Gely	01-02-17	PhD	Steele Lab
Gertjan Eenink	01-02-17	PhD	Veldhorstlab
Nicolo Sartori	01-02-17	PhD	Kouwenhoven lab
Yuguang Chen	15-02-17	PhD	Nazarov Lab
Ines Corveira Rodrigues	16-02-17	PhD	Steele Lab
Andrea Corna	16-02-17	Postdoc	Vandersypenlab
Arpád Lukács	15-03-17	Postdoc	Nazarov Lab

A new gift from the Kavli Foundation

› **Continued from page 1**

We will provide seed money for activities that will specifically facilitate the fast integration of new QuTech faculty members into KIND and strengthen the ties between the quantum and bio tracks, in line with the aims of the postdoctoral fellowship program. This can take the form of exploratory pilot projects, for instance, that can evolve to demonstrators or full collaborations.

We plan to enhance our outreach activities. For example, we are thinking about organizing a high-level workshop for Kavli members about communicating our nanoscience, given by a renowned guest journalist or scientist. We may also attract artists in residence at KIND – journalists or artists that stay at KIND for some time where they will experience life at the lab, and translate that into articles, books, and arts. We will support other activities that will promote the social cohesion and synergy within the KIND community, such as internal sports and artistic competition events.

Furthermore, we may use some of the money for strategic investments, such as enhancing start-up budgets for new junior staff members of exceptional quality, or supporting strategic meetings and workshops. Finally, there is the possibility that we will provide strategic support for our Kavli Nanolab as this is such a crucial facility for all of us.

Details on all of the above are now being worked out, but the overall conclusion can be summed up in one line: it is fantastic that we can expand our activities to continue the exciting research in quantum and bionanoscience at Delft.

Cees Dekker and Lieven Vandersypen

Four new FOM Projectruimte projects for Kavli

Congratulations to our Kavli colleagues whose proposals were awarded by FOM:

Yaroslav Blanter and Gerrit Bauer - *Superconducting Cavity Optomagnonics:* This project is a theoretical study into the unexplored area of quantum coherency of ferromagnets that arises when these are linked to cavity microwave photons.

Nynke Dekker - *The influence of twist and torque on the copying of DNA:* biophysical studies of eukaryotic replication: Researchers will unravel the biophysics behind DNA replication in higher organisms by studying how the rotational direction and torque of the DNA helix can influence the functioning of replisomes (protein systems that facilitate the replication).

Simon Groeblacher - *Entanglement of massive mechanical objects:* Through the realisation of an entangled state between two on-chip mechanical resonators, linked to laser light at telecom frequency, the researchers will study quantum entanglement of larger optomechanical systems, not only to further explore the fundamentals of quantum physics but also with a view to actual applications in quantum information processing.

Menno Veldhorst - *Superconducting mediated long-range coupling between spin qubits in silicon:* In this project the researchers want to combine two highly promising building blocks for quantum computers in a hybrid approach so that both the design flexibility of superconducting qubits and the long coherency times of semiconductor qubits can be used.

Huibregtsen prize awarded to Ronald Hanson

The Huibregtsen prize 2016 was awarded to Prof. Ronald Hanson for his research on 'Safe surfing on the quantum internet'. State Secretary Sander Dekker announced the winner during the annual Avond van Wetenschap en Maatschappij [Science and Society evening]. The prize, consisting of € 25,000 and a sculpture of 'The Thinker', is awarded each year for a research project that is scientifically innovative and could lead to a social application.

Microsoft invest in a larger quantum ecosystem at Delft

Leo Kouwenhoven joins Microsoft

At the end of 2016, Microsoft announced that it is doubling its investment in quantum research. Microsoft has decided to set up its own lab on the TU Delft campus, called Station-Q@ Delft, in addition to extending its ongoing collaboration on topological quantum computing with QuTech.

Connected to this development, Leo Kouwenhoven has joined Microsoft Research to head the new Station-Q@Delft, after 30 years of working for TU Delft. Leo will keep his professor appointment and working place at our Kavli Institute at TU Delft and will continue working with his PhD students and postdocs. In addition, a fully Microsoft-owned research lab that employs about 10 new researchers will be started, with the intent to create synergy en fruitful cooperation with the QuTech activities. Ronald Hanson has succeeded Leo as the Scientific Director of QuTech (ad interim).

The increased activity in forefront research in topological quantum computing will further strengthen Delft as a world leading center in nanoscience. Furthermore, the formation of a Microsoft lab in Delft fully aligns with the ambition of TU Delft and QuTech to develop a quantum campus, a true ecosystem voor quantum technology, with a mix of academic and industry research, spin-off companies and other economic activity. QuTech was chosen by the Dutch government as a National Icon, with Minister of Economic Affairs Henk Kamp as its ambassador.

Honorary Doctorates at the 175th Dies Natalis

On Friday 13 January the Delft University of Technology celebrated its 175th anniversary. The main theme of this Dies was 'Technology of Life', highlighting biology at Delft from bio-inspired design to biotechnology and from nanobiology to bioinformatics. During the formal Academic Ceremony, four Honorary Doctorates were granted to internationally renowned researchers and initiators in the diverse field of Biology: Andrew Endy (Bio-engineering, Stanford University), Xiaowei Zhuang (Chemistry and Chemical Biology, Harvard University), Manuel Alvarinho (President and founder of the Water Regulatory Council in Mozambique) and Alessandro Vespignani (Biological Physics, Northeastern University). The purpose of granting these honorary doctorates is to intensify the international collaborations in biology related research.

© Roy Borghouts

Kavli Delft Thesis Prize - Nominations welcome!

A prize will be awarded for the best PhD thesis written by a graduate student at our Kavli Institute of Nanoscience at Delft in the past two years. This prize, which consists of an award and an amount of € 3000,- which can be freely spent by the laureate, is given out every two years and is awarded at the annual Kavli day in September. A PhD thesis is eligible for the 2017 prize when the research was done at the Kavli Institute and when the defense ceremony was held between between 1-4-2014 and 1-4-2016.

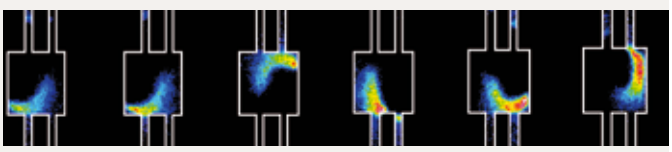
Nominations are now welcome for the 2017 Kavli Delft Thesis Prize. Deadline for submission is **May 1st**. Everyone is welcome to nominate – please send suggestions to Cees Dekker, c.dekker@tudelft.nl. Concretely, please send a motivation letter why you consider this to be the most outstanding PhD thesis from our institute in the past 2 years that is worthy of this prize, and provide access to print 6 copies of the thesis.

Protein sequencing

Under the project leadership of Chirlmin Joo, a consortium consisting of TU Delft researchers (Cees Dekker, Anne Meyer, Rienk Eelkema, Chirlmin Joo), University of Groningen (Giovanni Maglia) and Wageningen University (Dick de Ridder) was awarded a FOM programme with the aim to develop high-resolution single-molecule techniques that can, for the first time, determine protein sequences at the molecule level. The programme budget is 2.3 Million Euros for 5 years"

Mapping out Min protein patterns in fully confined fluidic chambers

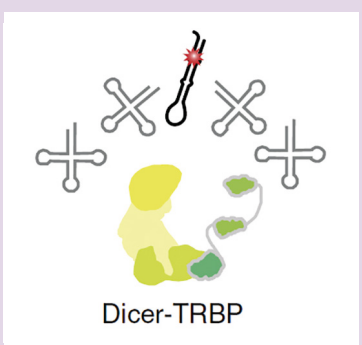
The Min proteins participate in orchestrating the positioning of the division apparatus in E. coli by shuffling back and forth between the two poles of the cell. In this article, the in vitro geometry selection rules of the Min protein patterns were studies in fully confined fluidic chambers. We observed three types of patterns that were established as a function of the geometrical parameters of the chambers - oscillations, running waves and spiral rotations. We showed that both oscillations and running waves are derivatives of spiral rotations that are established as the majority pattern.



Yaron Caspi and Cees Dekker, eLife 2016, 5

TRBP ensures efficient Dicer processing of precursor microRNA in RNA-crowded environments

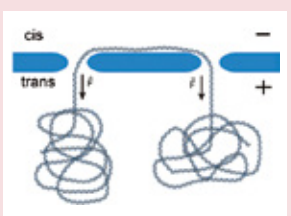
The RNA binding protein TRBP is a component of the Dicer complex but its role in microRNA biogenesis remains poorly understood.



Here the authors use a crowded RNA environment and single-molecule imaging to show that TRBP acts as a gatekeeper to prevent Dicer engagement with pre-miRNA-like substrates.

Mohamed Fareh, Kyu-Hyeon Yeom, Anna C. Haagsma, Sweeny Chauhan, Inha Heo and Chirlmin Joo
Nature Communications, 2016, doi:10.1038/ncomms13694

Mechanical Trapping of DNA in a Double-Nanopore System

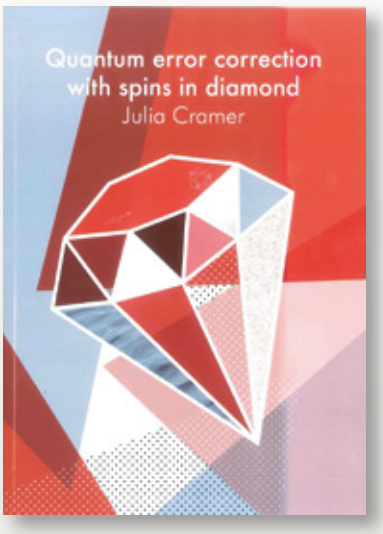


DNA is the most essential molecule in living matter as it is the principal genetic information carrier for all living systems. Developing methods to sequence DNA and study its physical and chemical properties has been at the forefront of biophysics research for decades. We developed a novel mechanistic method for manipulating single DNA molecules using a nanoscale tug-of-war between two solid-state nanopores. Our method is ultimately aimed to achieve motion control of a DNA molecule through a solid-state nanopore, bringing this sequencing platform one step closer to reality.

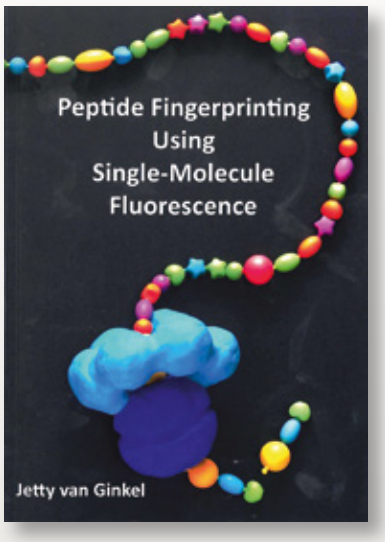
Sergii Pud, Shu-Han Chao, Maxim Belkin, Daniel Verschueren, Teun Huijben, Casper van Engelenburg, Cees Dekker, and Aleksei Aksimentiev
Nano Letters, 2016, 16, 8021–8028

Amir Yacoby first Kavli Chair

The Delft Kavli Chair is a prestigious newly established visiting professor program that aims to attract the very best nano scientists for a visit to Delft of two months or more. We are delighted to announce that Prof. Amir Yacoby will be the first to hold the Kavli Chair. Amir's work ranges from semiconductor qubits to topological states and from 2D materials to sensing and imaging with NV center spins. He plans to visit from mid May through the end of July (exact dates to be confirmed). We look forward to a highly stimulating visit!

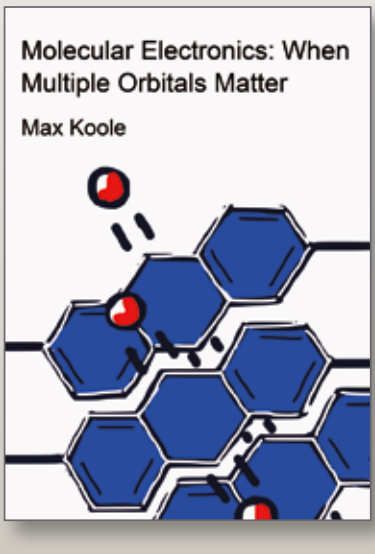


Julia Cramer
08 december 2016



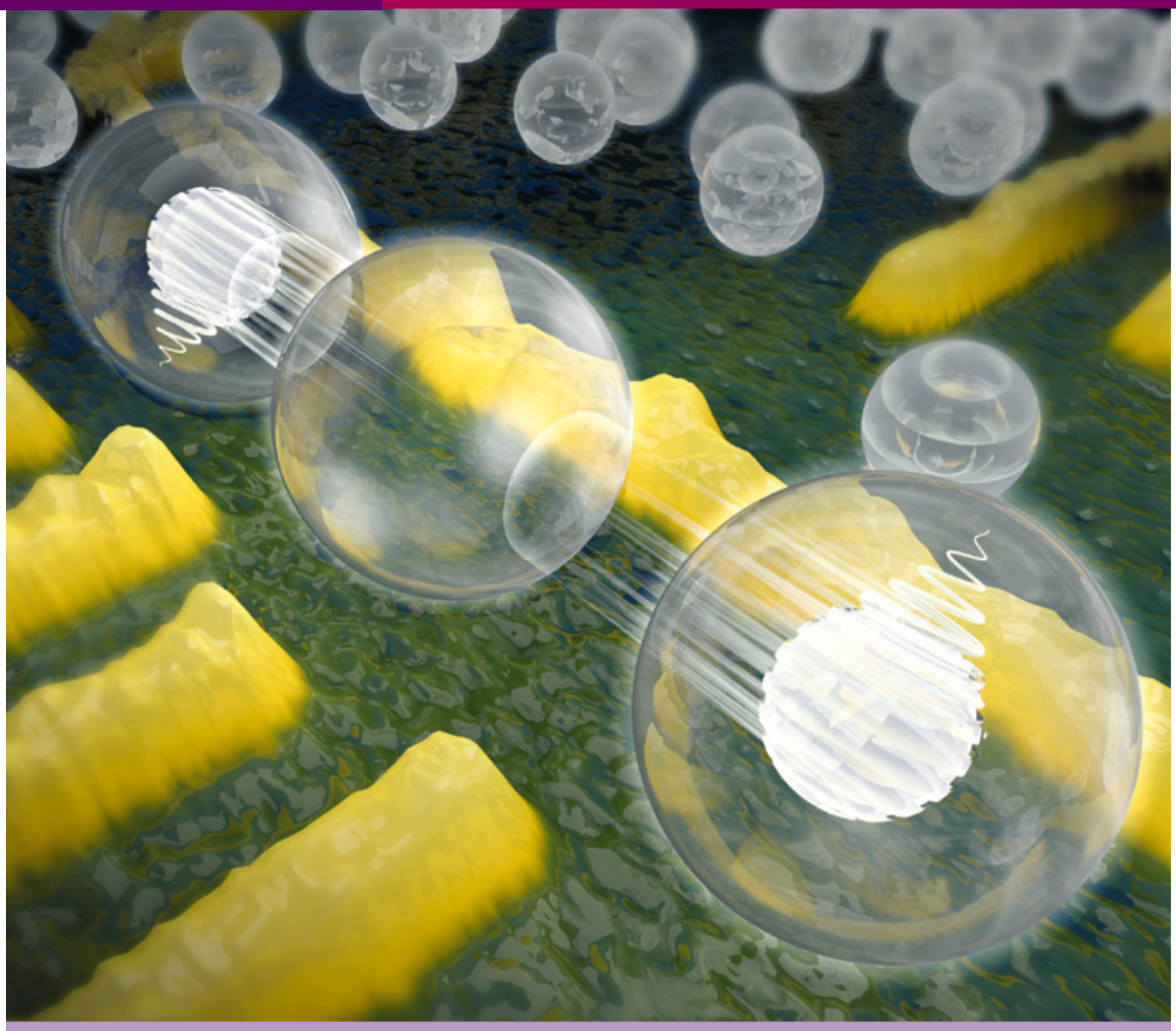
Jetty van Ginkel
20 december 2016

Reinier Janssen
26 january 2017



Max Koole
03 february 2017

SCIENCE ART



Artist impression of two electron spins that talk to each other via a 'quantum mediator'. The two electrons are each trapped in a semiconductor nanostructure (quantum dot). The two spins interact, and this interaction is mediated by a third, empty quantum dot in the middle. In the future, coupling over larger distances can be achieved using other objects in between to mediate the interaction. This will allow researchers to create two-dimensional networks of coupled spins, that act as quantum bits in a future quantum computer.
Image credit: Researchgroup Lieven Vandersypen. Copyright: Tremani/TU Delft

UPCOMING KAVLI COLLOQUIUM

Alain Aspect

June 29, 2017

Institut d'Optique Graduate School

KAVLI DAY

Robbert Dijkgraaf

September, 7, 2017

Princeton University

UPCOMING KAVLI COLLOQUIUM

Amir Yacoby

Date to be determined

Harvard University

COLOFON

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