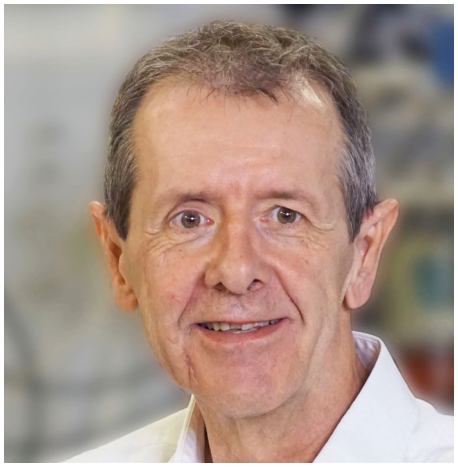
University of Basel

Swiss Nanoscience Institute

SNI SWISS NANOSCIENCE INSTITUTE
EINE INITIATIVE DER UNIVERSITÄT BASEL UND DES KANTONS AARGAU

SNI update September 2017



Dear colleagues,

A few weeks ago, the SNI community came together for its annual academic exchange in Lenzerheide. It was wonderful to see how project leaders, professors and our two honorary members Christoph Gerber and Andreas Engel interacted with junior researchers from the SNI's PhD School, and how lively the discussions were during the poster session and the breaks. With over 90 participants, this year's meeting broke our attendance record. For the first time, the event was also attended by a cohort of graduates of the PhD school, who recently completed their doctorates and are preparing to embark on professional life. The institute now offers graduates of the PhD School an Associate Membership, which enables them to remain a part of the SNI network and carry on attending events such as the Annual Meeting for another four years.

In late summer, the board of directors approved seven exciting new projects for our PhD School. We are now awaiting applications for the various projects from motivated young researchers. Please spread the word among colleagues so that we can once again look forward to an outstanding pool of candidates to choose from at the end of the year.

In this issue of SNI update we introduce the new head of the SNI's PhD School, Dr. Andreas Baumgartner. A key feature of his plans for the School's future is a focus on interdisciplinarity. This does not mean that each individual project must be rooted in different disciplines; rather, Andreas Baumgartner's aim is to ensure diversity among projects, and to stimulate interest in activities beyond each researcher's field of study.

This issue also includes a report on a successful project by a nanoscience master's student that led to a publication in "Nature Communications". For his first project, Julius Winter worked in Professor Marek Basler's laboratory at the Biozentrum, researching the structure of a nano speargun used by bacteria to inject toxins into other cells.

I hope you enjoy our newsletter – and please remember to submit your best photos of the nanoworld for this year's Nano Image Award.

Kind regards,

Christian Schönenberger

Prof. Christian Schönenberger
SNI Director

Growth at the tip

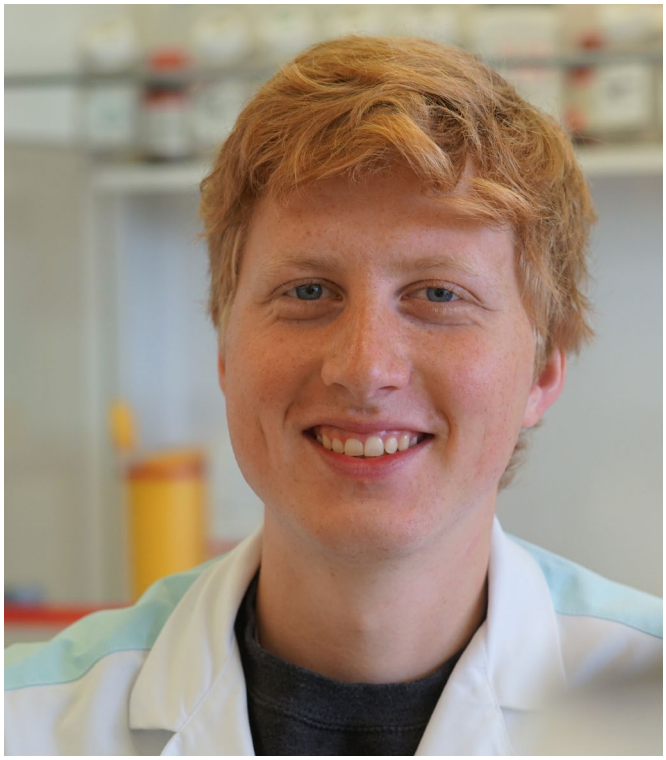
A successful project at the Biozentrum

Students enrolled on a master's program in nanosciences at the University of Basel complete two projects in two different subjects before going on to write a final master's thesis. Julius Winter, who is currently completing his master's degree in nanosciences, completed one of his projects in the group led by Professor Marek Basler at the Biozentrum. And it was a huge success. Working alongside his supervisor, Andrea Vettiger, he studied the assembly of a nano-harpoon used by bacteria to inject toxins into other cells. The results of the project were published in Nature Communications in July.

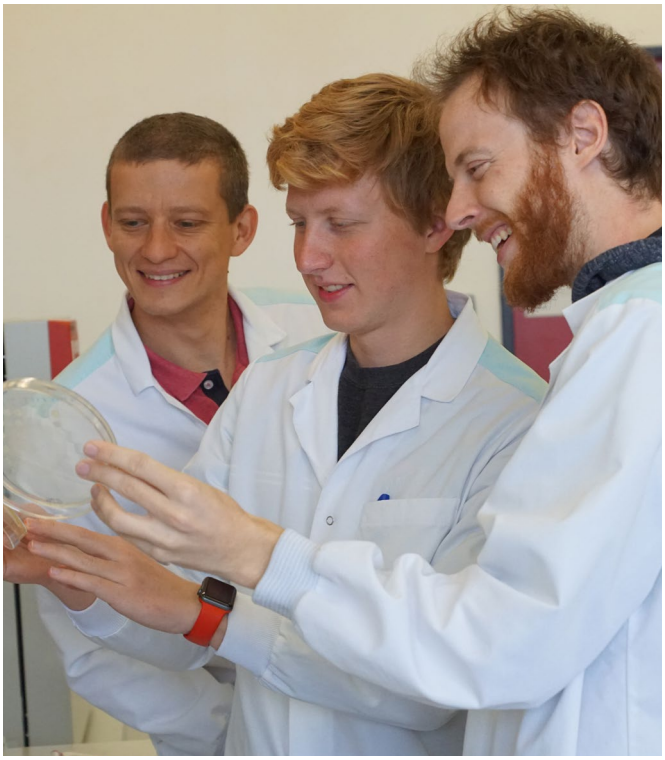
Armed with nano-harpoons

Bacteria use a variety of "weapons" to establish themselves in their natural environment. One such weapon is a tiny harpoon that they can use to quite literally shoot other bacteria and cells and to inject toxins directly into them. Various species of bacteria use this nano-harpoon to gain an advantage over competitors or to protect themselves against host's immune cells. The group led by infection biologist Professor Marek Basler from the Biozentrum studies the assembly and mode of action of this type of secretion system, known as the Type VI Secretion System (T6SS), in various bacterial species. Through their work, the scientists hope to identify new approaches to the treatment of bacterial infections, as the harpoons often play a crucial role in the infection process.

The scientists in Marek Basler's group have already been able to establish that the harpoon consists of an inner dart with a sharp tip, as well as a spring-like outer sheath. The outer sheath can contract within milliseconds, firing the central dart out of the bacterium in order to puncture the cell membrane of adjacent cells. This process allows toxic substances to be injected into target cells directly using physical force. After the harpoon is fired, the entire injection apparatus is broken down into its individual parts and rebuilt. Until now, the researchers had not obtained clear proof of whether during T6SS assembly the sheath extends from its base or whether the growth takes place at the sheath tip.



During his project thesis, master student Julius Winter studied the assembly of a nano-harpoon.



He has worked together with Andrea Vettiger (right) in the group of Professor Marek Basler (left) at the Biozentrum.

Experimenting with giant cells

This is where Julius Winter stepped in with his project. For his experiments, he worked with cells of the cholera pathogen, *Vibrio cholerae*. By adding the antibiotic ampicillin, which prevents synthesis of the cell wall, he first produced cells that grow without a cell wall, meaning they are no longer able to divide and instead keep on growing continuously. When treated with antibiotics, the bacteria lose their typical rod-like shape and swell up like a balloon. These cells, also known as spheroplasts, reach a size of several micrometers, making microscopic analysis easier.

To track the assembly of the harpoons, Julius Winter and his supervisor, Andrea Vettiger, selectively marked the sheaths with green fluorescent protein (GFP). This makes it possible to observe the sheath assembly in real time in living cells using fluorescence microscopy. The scientists were first able to show that the spheroplasts without a cell wall could still form working harpoons. Then, to find out how the harpoon is formed and from which end it extends, they fired a fine, high-energy laser beam at the cells for a fraction of a second, with the beam illuminating a specific part of the assembeling sheath. “The laser doesn’t damage the sheath but reduces the emission of the fluorescent protein, leaving a bleached spot that appears dark under the fluorescence microscope,” Julius Winter explains. The researchers then examined whether, during the sheath’s growth, the dark area of the sheath is displaced or the area at the top of the sheath becomes longer. This analysis provided the first experimental evidence that the harpoon sheath does not assemble by adding subunits at the fixed base, but rather at the distal end.

The results, published in Nature Communications in July, also clearly showed that the longer sheath structures assembled in the spheroplasts without a cell wall are ideal for investigating processes of dynamics and the mode of action of the bacterial harpoon. For Julius Winter, it was a pleasant surprise to become coauthor of a paper in such a renowned journal as a result of his project work.

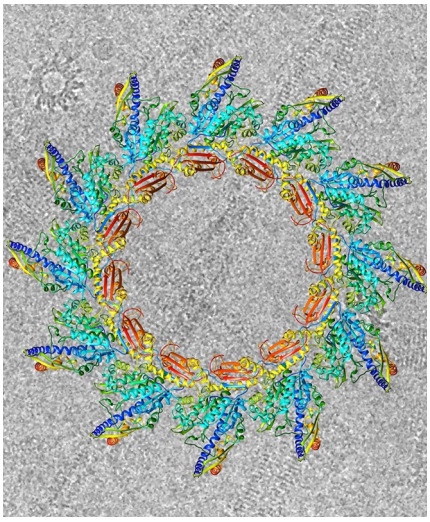
Valuable experience at UC Berkeley

In the meantime, Julius Winter has completed another project at the University of California, Berkeley (UC Berkeley). “I took the completely unbureaucratic step of emailing Dr. Jeff Urban’s group to ask about the possibility of a research stay, and I received an offer immediately,” he says. Equipped with a travel grant from the SNI, he spent four months working on the desalination of seawater using nanoparticles. He particularly enjoyed the unique atmosphere at UC Berkeley and its proximity to San Francisco.

Now unable to let go of working in a biological laboratory and especially with fluorescence microscopy, he returned to Marek Basler’s lab for his master’s thesis. There, he continued to study the bacterial harpoon. This time, he developed a microfluidic system that allows rapid replacement of the culture medium, so that it is possible to study the influence of various components of the nutrient medium on the assembly of the bacterial harpoon. “During his short stay in our lab, Julius made fantastic contributions to our understanding of T6SS assembly. It was obvious to me that Julius has a great talent for perfoming even complicated experiments. In addition, he is very curious and keen to find answers to biological questions. I was therefore very happy that Julius decided to come back to our lab and help us to develop a new technology to study bacterial behaviours,” comments Marek Basler.

First physics and chemistry, then biology

Julius has now almost completed his studies in nanosciences. When he chose this field in 2012, it was above all the combination of physics and chemistry that interested him. Over the course of the various lectures and practical work, he has also developed a fascination with biological questions. The 23-year-old German wants to continue working in research, although he doesn’t necessarily want to start a doctoral dissertation straight away, and above all he’d like to gain more experience outside of Basel. We wish him the best of luck and enthusiasm for the future as he takes the next step in his career.



Structure of the contracted outer sheaths of the Type VI Secretion System of Vibrio cholerae (Image: Biozentrum).

Interdisciplinary network for the future

Andreas Baumgartner has ideas for the SNI PhD School

Dr. Andreas Baumgartner has been head of the SNI PhD School since January 2017. His long-term goal is to improve and optimize the exchange of knowledge between the different disciplines in the SNI PhD School in order to make it a source of new, sometimes unconventional ideas. He himself knows very well what interdisciplinarity means, having studied interdisciplinary sciences at ETH Zurich before completing his doctorate in nanophysics in the research group led by Professor Klaus Ensslin (ETH Zurich). The SNI PhD School is to be seen not only as a source of financing but also as a network that continues to be used after the training or the end of a project.

Community for interdisciplinary exchange

At the beginning of 2017, Dr. Andreas Baumgartner took over the headship of the SNI PhD School from his predecessor Dr. Michel Calame, who now heads a research group for nanoscale transport phenomena at Empa in Dübendorf. During the last few months, Andreas has been busy calling for proposals and promoting the seven new doctoral projects, for which applications can be submitted until the end of the year. In the coming weeks, he would like to create clearer structures for the PhD School so that all doctoral students know right from the start what is expected of them at the PhD School.

His long-term vision for the SNI PhD School is to set up an interdisciplinary community, though the individual projects themselves do not necessarily have to be interdisciplinary. The aim would be to boost the doctoral students' interest in and understanding of topics outside their field of work. "I could imagine, for example, holding workshops where physicists tackle problems originating in molecular biology, or molecular biologists address a chemical issue. Together with existing activities this would enable us to create a community whose members maintain their contacts and continue to exchange know-how even after completing their doctoral dissertations," he explains. He is not only thinking of the doctoral students themselves here, though. For the participating project leaders, too, the SNI PhD School should not just be a source of funding but also a community fostering the interdisciplinary exchange of information and views.

Curiosity across boundaries

When it comes to interdisciplinarity, Andreas knows what he is talking about. He himself studied interdisciplinary sciences at ETH Zurich from 1995 to 2000, getting to know the entire range of the sciences, from molecular biology, through chemistry to physics. With up to 50 hours of lectures per week, he was able to indulge his curiosity during his years of study, although it was probably not always easy to keep everything in focus with such a wide variety of subjects. Towards the end of his degree course, it was solid-state physics and in particular superconductivity that interested Andreas most, and this was the field he dealt with more intensively in his diploma thesis. For his doctoral studies he then switched to the research group led by Professor Klaus Ensslin (ETH). That was where he first came into contact with the nanosciences and the NCCR Nano. "One of my first conferences was a meeting of the NCCR Nano in Pontresina," Andreas recalls. Back then he probably did

Andreas Baumgartner has been head of the SNI PhD School since January 2017.

not think that he would be working for the successor organization of the NCCR Nano today.

Fascinating nanophysics

He remained true to nanophysics when he moved to the University of Nottingham (UK) to take up a post-doctoral position, where he conducted optical experiments with quantum dots in semi-conductors. After spending three years as a postdoc in England, in 2009 he decided to return to Switzerland as his wife had been offered an interesting job here. Christian Schönenberger was looking for a postdoc at that time, and that is how Andreas found his way to the Department of Physics at the University of Basel. His research focus switched to carbon nanotubes and semi-conducting nanowires in electric circuits with superconductors.

This year, he began to set up his own research group. The first step has been taken. Thanks to the decision made by the selection committee for PhD projects at the SNI, he is now supervising a doctoral dissertation project for the first time. For this, the future PhD student is to examine two-dimensional semi-conductors. “I hope to obtain further funding in the near future so that I can give my research a new direction,” he explains.

Enthusiasm for research

When talking about research, the 42-year-old physicist’s eyes light up. “Discovering new things time after time, experiencing eureka moments when you’ve really understood something – those are the things that motivate me personally,” he tells us. It is moments like that which have kept him at the university and in academic research. In addition, he values the flexibility he has in Christian Schönenberger’s group. “That enables me to reconcile my life as a researcher with my family life.”

So when Andreas is not sitting at his computer, discussing something with other researchers or working in the lab, he spends as much time as possible with his wife and two children. He goes hiking with them, pursues his interests in history and philosophy or reads stories with his children. But even in his leisure time he cannot get physics out of his mind, as there is a lot to listen to and explain when, despite the lack of time early in the morning, his five-year-old son observes the eddies that form when he stirs his cocoa, or his eight-year-old daughter describes the principles of thermodynamics to him using her own, not particularly scientific words.

Andreas Baumgartner would like to define what is expected of the PhD students. His long-term goal is to optimize the exchange of knowledge between the different disciplines in the SNI PhD School.

Applications for new PhD projects

Interested junior researchers can apply for the SNI PhD School’s seven new projects at www.phd.nanoscience.ch.

Any questions should be addressed to andreas.baumgartner@unibas.ch.

New projects at the SNI PhD School

The first doctoral students at the SNI's PhD School have successfully completed their PhDs. As a result, applications for seven new projects have been open to junior researchers since mid-September.

Professors Patrick Maletinsky and Philipp Treutlein of the Department of Physics are offering a project on quantum sensing in nanomechanical systems. Physics professors Richard Warburton and Ilaria Zardo are looking for candidates to research nano-photonics with van der Waals heterostructures. Van der Waals 2D semiconductors with superconducting contacts are the topic of a PhD to be supervised by Dr. Andreas Baumgartner and Professor Christian Schönenberger. Argovia Professor Martino Poggio and Dr. Floris Braakman will supervise a doctoral dissertation on ultrasensitive force microscopy using nanowire cantilevers.

Professors Sven Panke and Petra Dittrich of the Department of Biosystems Science and Engineering at ETH Zurich (D-BSSE) in Basel are offering a project on genetic selection of nanocatalysts alongside Professor Thomas Ward of the Department of Chemistry. Professor Michael Nash (Department of Chemistry) and Professor Sai Reddy (D-BSSE) will supervise a PhD involving the creation of and research into new protease enzymes. Dr. Yasin Ekinci, Dr. Xiao-Dan Li (both of the Paul Scherrer Institute), Professor Henning Stahlberg and Dr. Thomas Braun are offering a PhD project whose aim is to develop a method to quantify the number and size of mitochondria.

Applications for the various projects can be submitted until December 31, 2017 at www.phd.nanoscience.ch.

Any questions should be addressed to andreas.baumgartner@unibas.ch.

Get on track, stay on track

The University of Basel's funding programs get on track (for PhD students with family responsibilities) and stay on track (for postdocs in the early stages of motherhood) are once again available to provide relief to eligible candidates in the 2018 spring semester.

The application deadline for funding under both programs in the 2018 spring semester is October 1, 2017.

For more information please contact getontrack@unibas.ch and stayontrack@unibas.ch.

Nano Image Award

We are looking for the best nano photos

Every year in fall, it is time to submit images for the Nano Image Award. We are looking forward to lots of beautiful images of the nanoworld, which we can use for our annual reports, brochures and on our website.

The SNI management team will choose the three best photos, which will each be awarded CHF 300 in vouchers. We will announce the winners on our webpage and in SNI update.

Please submit your photos with a title, a short description, and scale of the image by November 15, 2017 to c.moeller@unibas.ch.

New Argovia projects

We already presented the first four Argovia projects, launched in spring 2017, in the July issue of SNI Update. We now provide a brief overview of the projects PlasmoRetarder and 3D Cellophil® membranes.

PlasmoRetarder – electrically controlled colors

In the Nano Argovia project PlasmoRetarder, researchers at CSEM in Muttenz and the Paul Scherrer Institute in Villigen are working with industrial partner Rolic Technologies Ltd (Allschwil) to develop a plasmonic phase retarder which can be used for displays in sensor technology and imaging applications. The project is led by Dr. Benjamin Gallinet of CSEM Muttenz.

In the project PlasmoRetarder, researchers plan to develop a plasmonic phase retarder and to electrically control the emitted color.

On the surface of nanostructured metals, electrons can be excited to collective oscillations known as surface plasmons. These plasmonic nanostructures are able to focus light at the nanoscale and to influence its color, phase and polarization. As a result, they can be used, for example, as color filters with outstanding resolution and a wide range of applications.

The researchers working on the PlasmoRetarder project aim to develop, characterize and optimize a controllable phase retarder. To achieve this, they are producing nanostructures measuring up to 100 nanometers and working on an optimal coating process using metals. With the help of liquid crystals, the team hopes to be able to electrically control the color emitted by the phase retarder. In a second step, the phase retarder will be incorporated into a device intended to demonstrate the technology's future potential in optoelectronic equipment.

3D Cellophil® membrane – patient-specific and tailored to conditions in the mouth

The Nano Argovia project 3D Cellophil® membrane aims to develop innovative nanostructured implants that support the regeneration of bone and soft tissue in the jaw and mouth area, and can be custom-built for each patient using 3D printing techniques. Professor Uwe Pieles of the FHNW School of Life Sciences is the project leader in charge of the team, which includes researchers from the FHNW, the Hightech Research Center of Cranio-Maxillofacial Surgery at University Hospital Basel and Bubendorf-based company CIS Pharma AG.

In the project, the researchers develop a triple-layered polymer membrane based on the Cellophil® technology developed by CIS Pharma. Cellophil® is a combination of various natural amino acids linked by an acrylic backbone and characterized by a high degree of biocompatibility. The polymers are mixed with cross-linking substances. After exposure to UV light, this gives rise to membranes with varying degrees of porosity depending on the amount added.

The researchers make use of this phenomenon and give the three layers of the implant different properties. The two outer layers are porous, supporting the attachment of bone-building osteoblasts to the surface facing the bone, and of fibroblasts on the side in contact with the soft tissue. The membrane's middle layer contains a higher proportion of cross-linking substances, making it less permeable to cells. This is intended to prevent the fast-growing fibroblasts from overrunning the osteoblasts, which propagate at a slower rate, and impairing bone formation. Furthermore, the two outer layers contain different concentrations of active substances specifically selected to support the growth and differentiation of osteoblasts or fibroblasts, respectively. Despite the different composition of the three layers, they can be individually tailored to the patient and printed in a single step.

Events

Another year, another meeting – the SNI convenes for its Annual Event

On September 7 and 8, over 90 SNI members came together at Hotel Schweizerhof in Lenzerheide for the Institute's annual scientific exchange. After the welcome address by SNI Director Christian Schönenberger, Professor Wolfgang Meier of the University of Basel's Department of Chemistry gave the audience an insight into his research on polymer membranes. This was followed by a series of presentations by doctoral candidates from the SNI PhD School and project leaders from the Nano Argovia program, before the evening's poster session with over 40 posters.

During dinner, Christian Schönenberger bestowed honorary SNI membership on Professor Christoph Gerber in recognition of his work on scanning probe microscopy and his long-standing commitment as an ambassador for the SNI and the nanosciences. After the meal, while the doctoral students were busy team-building at the "farmer olympics", the remaining guests assembled once again in the lecture hall, where Dr. Martin Bopp treated the audience to an engaging overview of the diverse activities of the Hightech Zentrum Aargau.

The morning of the second day began with the keynote lecture by Professor Andreas Engel, honorary member of the SNI and founder of the nanoscience degree course, on the fascinating possibilities of microscopy for imaging of membranes and proteins.

To conclude the event, Christian Schönenberger had the pleasant task of awarding numerous prizes. The award for the best master›s thesis in nanoscience in 2016 went to Elise Aeby. Luc Driencourt won the prize for the best poster, and Jan Overbeck for the best presentation. Tomaž Einfalt, Stefan Arnold, Michael Gerspach, Clevin Handschin and Matthias Schulzendorf, having successfully defended their doctoral dissertations, formally graduated from the SNI PhD School. They now have the option of remaining a part of the SNI network as Associate Members. Finally, Christian Schönenberger thanked the meeting's organizers Kerstin Beyer-Hans, Sandra Hüni and Claudia Wirth for once again ensuring the smooth running of the event, paving the way for outstanding discussions and exchange between SNI members.

Busy schedule for visitors from China

In July 2017, the SNI hosted 75 pupils from Beijing. Dr. Kerstin Beyer-Hans had prepared a varied program in which the 13 to 16-year-olds and their chaperones were first of all given a theoretical introduction to nano research at the SNI, followed by two lab tours showcasing the practical work carried out by the nano researchers.

Students from Beijing got a taste of life and work in the heart of Europe and an insight into the nanoworld.

Sandro Sieber of the Department of Physics explained how zebrafish serve as model organisms for research into the use of nanoparticles to administer medicines. Dr. Binlu Huang of the Biozentrum explained how nuclear pore complexes work, while Dilek Yildiz of the Department of Physics talked about his research into friction at the atomic scale. Dr. Markus Dürrenberger, head of the Nano Imaging Lab, captivated the young visitors with his electron microscopy images of the nanoworld, after which Yves Aeschi of the Department of Chemistry discussed his research into molecular muscles. Finally, Marco Martina left the guests in awe with a demonstration involving liquid nitrogen and a visit to the helium liquefaction plant.

The trip to Switzerland and Germany for pupils from Beijing is a yearly event organized by the association Science and Technology e.V., and has repeatedly enjoyed the support of the SNI. The idea is to give the youngsters a taste of life and work in the heart of Europe over the course of a one-week stay.

SNI supports summer camps

Several groups from the SNI network supported the one-week UniKidsCamp held in the summer holidays by the University of Basel. Michael Steinacher of the Department of Physics and his team led an activity in which the children tried their hand at designing and soldering a dexterity game. Under the guidance of the group led by Argovia Professor Roderick Lim of the Biozentrum, the young scientists isolated banana DNA and made ice cream using liquid nitrogen. Dr. Kerstin Beyer-Hans of the SNI showed the children how to generate electricity from everyday objects. Together, they built batteries from copper coins and acids, experimenting with acid obtained from a range of fruits and vegetables.

The proud researchers present the DNA they had isolated from bananas.

These and other activities gave the 40 children attending the camp a glimpse into the fascinating world of research and technology at the University of Basel's Faculty of Philosophy and Natural Sciences, with plenty of excursions, games and fun into the bargain.

The Rodersdorf summer camp was another opportunity for children to spend an afternoon devoted to creative research, putting everyday objects to scientific use in a playful setting. Fully kitted out by the SNI, the children assembled funny hats decorated with flashing LEDs with the help of nanoscience master's student Till Ryser. The electricity to power the lights came from batteries made by the children themselves.

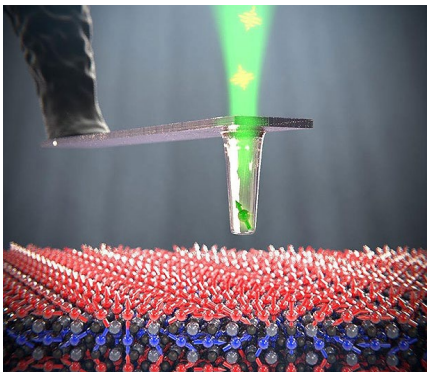
Media releases and Uni News from SNI members

University of Basel, September 19, 2017. Nanocapsules Enable Cell-Inspired Metabolic Reactions

Researchers at the University of Basel succeeded in developing capsules capable of producing the bio-molecule glucose-6-phosphate that plays an important role in metabolic processes. The researchers were able to produce the metabolite in conditions very similar to the biochemical reaction inside natural cells. The results have been published in the scientific journal Chemical Communications.

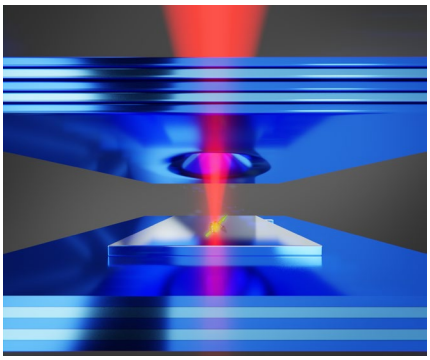
University of Basel, September 14, 2017. Quantum Sensors Decipher Magnetic Ordering in a New Semiconducting Material

For the first time, physicists have successfully imaged spiral magnetic ordering in a multiferroic material. These materials are considered highly promising candidates for future data storage media. The researchers were able to prove their findings using unique quantum sensors that were developed at Basel University and that can analyze electromagnetic fields on the nanometer scale. The results – obtained by scientists from the University of Basel's Department of Physics, the Swiss Nanoscience Institute, the University of Montpellier and several laboratories from University Paris-Saclay – were recently published in the journal Nature.



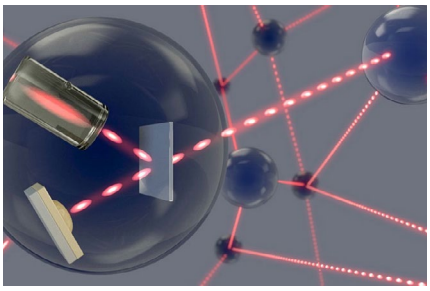
University of Basel, September 11, 2017. Using Mirrors to Improve the Quality of Light Particles

Scientists from the University of Basel's Department of Physics and the Swiss Nanoscience Institute have succeeded in dramatically improving the quality of individual photons generated by a quantum system. The scientists have successfully put a 10-year-old theoretical prediction into practice. With their paper, published recently in Physical Review X, they have taken an important step towards future applications in quantum information technology.



University of Basel, September 10, 2017. High-speed Quantum Memory for Photons

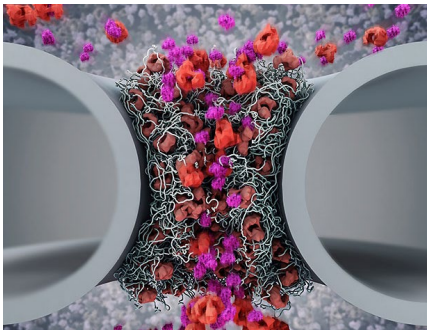
Physicists from the University of Basel have developed a memory that can store photons. These quantum particles travel at the speed of light and are thus suitable for high-speed data transfer. The researchers were able to store them in an atomic vapor and read them out again later without altering their quantum mechanical properties too much. This memory technology is simple and fast and it could find application in a future quantum Internet. The journal Physical Review Letters has published the results.



University of Basel, September 10, 2017. Two Basel Physicists Receive prestigious EU Grants

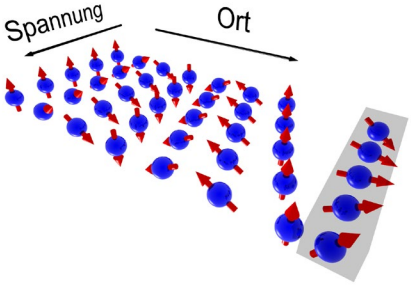
The European Research Council (ERC) has awarded both professors Jelena Klinovaja and Ilaria Zardo from the Department of Physics at the University of Basel an ERC Starting Grant. The two physicists will receive up to 1.5 million Euros over the course of the next five years for their ambitious research projects.

University of Basel, September 4, 2017. Like a Revolving Door: How Shuttling Proteins Operate Nuclear Pores



Nuclear pore complexes are tiny channels where the exchange of substances between the cell nucleus and the cytoplasm takes place. Scientists at the University of Basel report on startling new research that might overturn established models of nuclear transport regulation. Their study published in the Journal of Cell Biology reveals how shuttling proteins known as importins control the function of nuclear pores – as opposed to the view that nuclear pores control the shuttling of importins.

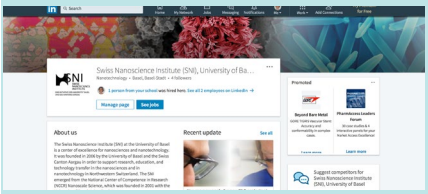
University of Basel, July 19, 2017. Manipulating Electron Spins Without Loss of Information



Physicists have developed a new technique that uses electrical voltages to control the electron spin on a chip. The newly-developed method provides protection from spin decay, meaning that the contained information can be maintained and transmitted over comparatively large distances, as has been demonstrated by a team from the University of Basel's Department of Physics and the Swiss Nanoscience Institute. The results have been published in Physical Review X.

All media releases can be found at:
https://nanoscience.ch/en/media-2/aktuelle-medienmitteilungen/.

SNI on LinkedIn



The SNI now has a LinkedIn company page. Here, we will regularly announce news and events.

If you are interested, follow the SNI at:
www.linkedin.com/company/18255301/.

SeminBar

On November 2, 2017, 6 pm, @ Sud (Basel), Prof. Bradley Hyman (Harvard Medical School) will talk about "Alzheimer's disease: snapshots from the journey towards a cure". Following the talk, Roli Frei will present some of his Pop, Rock, Soul and Blues songs. More information at: www.nccr-mse.ch/en/events/seminbar-public-lecture/

Please provide feedback

Please send information for SNI update and feedback to: c.moeller@unibas.ch.