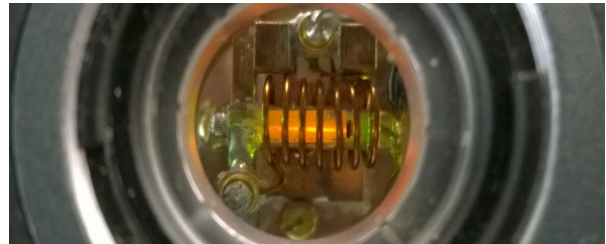


1. Scientific News

Nicolas Gisin's / Nicolas Brunner's group, Geneva

Simultaneous coherence enhancement of optical and microwave transitions in solid-state electronic spins:

Future quantum networks will need nodes that can store quantum states. But to do this we need materials that are able to preserve quantum coherence. A team led by Mikael Afzelius recently discovered a new material that holds great promise as quantum nodes, as it provides long coherence time while also featuring large bandwidth. It therefore holds great promise for future generations of quantum nodes.



- Antonio Ortu, Alexey Tiranov, Sacha Welinski, Florian Fröwis, Nicolas Gisin, Alban Ferrier, Philippe Goldner & Mikael Afzelius, *Nature Materials* **17**, 671-675 (2018) [link](#)

Nicolas Gisin's / Nicolas Brunner's group, Geneva and Philipp Treutlein's group, Basel

Does a large quantum Fisher information imply Bell correlations?: A quantum system with large Fisher information offers an advantage over classical resources for metrology. Here we ask whether this form of non-classicality is connected to Bell nonlocality. That is, we investigate whether two a priori completely different notions of non-classicality could in fact be related to each other.

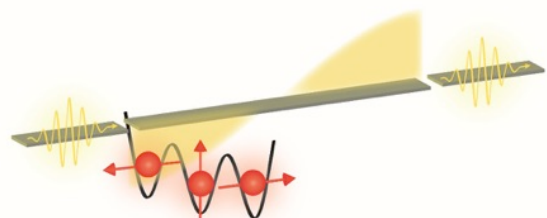
While we do not provide a fully general answer to this intriguing question, we discuss two examples that hint at affirmative answers.

- Florian Fröwis, Matteo Fadel, Philipp Treutlein, Nicolas Gisin, and Nicolas Brunner, *Phys. Rev. A*, 2019, in press

Klaus Ensslin's, Thomas Ihn's, Andreas Wallraff's and Werner Wegscheider's groups, Zurich

Coherent spin-qubit photon coupling: Electron spins hold great promise for quantum computation because of their long coherence times. Long-distance coherent coupling of spins is a crucial step towards quantum information processing with spin qubits. One approach to realizing interactions between distant spin qubits is to use photons as carriers of quantum information. Here we demonstrate strong coupling between single microwave photons in a niobium titanium nitride high-impedance resonator and a three-electron spin qubit (also known as a resonant exchange qubit) in a gallium arsenide device consisting of three quantum dots. We observe the vacuum Rabi mode splitting of the resonance of the resonator, which is a signature of strong coupling; specifically, we observe a coherent coupling strength of about 31 megahertz and a qubit decoherence rate of about 20 megahertz. We can tune the decoherence electrostatically to obtain a minimal decoherence rate of around 10 megahertz for a coupling strength of around 23 megahertz. We directly measure the dependence of the qubit-photon coupling strength on the tunable electric dipole moment of the qubit using the 'AC Stark'

effect. Our demonstration of strong qubit-photon coupling for a three-electron spin qubit is an important step towards coherent long-distance coupling of spin qubits.



- A. J. Landig, J. V. Koski, P. Scarlino, U. C. Mendes, A. Blais, C. Reichl, W. Wegscheider, A. Wallraff, K. Ensslin, and T. Ihn, *Nature* **560**, 179 (2018) [link](#)
- in the news: [ETH News](#), [Computerworld](#)

Tilman Esslinger's group, Zurich

Breakdown of the Wiedemann–Franz law in a unitary Fermi gas: Heat and matter currents are required to relax an out-of-equilibrium system with temperature and chemical potential gradients to thermodynamic equilibrium. The ratio of heat to particle conductance characterizes this response and takes a universal value for typical electronic materials, known as the Wiedemann–Franz law, originating in the quasi-particle nature of the excitations contributing to transport. Investigating the transport dynamics between two reservoirs of ultracold and strongly interacting

Fermi gases, connected by a quantum point contact, we observe a nonequilibrium steady state, strongly violating the Wiedemann–Franz law. This cold atom version of the fountain effect, previously observed in superfluid helium superleaks, is characterized by a weak coupling between heat and particle currents that results in a nonvanishing Seebeck coefficient.

- D. Husmann, M. Lebrat, S. Häusler, J. - P. Brantut, L. Corman, and T. Esslinger, *Proceedings of the National Academy of Sciences* **115**, 8563-8568 (2018) [link](#)

Jonathan Home's group, Zurich

Repeated multi-qubit readout and feedback with a mixed-species trapped-ion register: Nowadays, quantum systems can be manipulated with extremely high, but not perfect precision. The physics group of Jonathan Home reports how errors that occur during such operations can be monitored and corrected on the fly.

- V. Negnevitsky, M. Marinelli, K. K. Mehta, H.-Y. Lo, C. Flühmann and J. P. Home, *Nature* **563**, 527 (2018) [link](#)

- In the news: [D-PHYS News](#)

Encoding a qubit in a trapped-ion mechanical oscillator: Christa Flühmann and colleagues have used trapped calcium ions to demonstrate a new method for making quantum computers immune to errors. To do so, they created a periodic oscillatory state of an ion that circumvents the usual limits to measurement accuracy.

- C. Flühmann, T. L. Nguyen, M. Marinelli, V. Negnevitsky, K. Mehta and J. P. Home, *Nature* **566**, 513 (2019) [link](#)

- in the news: [ETH News](#)

Ataç İmamoğlu's group, Zurich

Towards polariton blockade of confined exciton-polaritons: Polaritons in two dimensional systems have emerged as a promising platform for investigation of nonequilibrium many-body systems. Weak polariton-polariton interactions however, have so far hindered the exploration of the interplay between strong correlations and dissipation. Our observation of quantum

correlations between individual polaritons demonstrate that realization of strongly interacting photonic systems is within reach.

- A. Delteil, T. Fink, A. Schade, S. Höfling, C. Schneider, A. Imamoğlu, *Nature Materials* **18**, 219–222 (2019) [link](#)

- in the news: [ETH News](#)

Tobias Kippenberg's group, Lausanne

Electrically pumped photonic integrated soliton microcomb: Researchers in the group of Tobias Kippenberg have built the smallest frequency comb ever with small optical losses.

- Arslan S. Raja, Andrey S. Voloshin, Hairun Guo, Sofya E. Agafonova, Junqiu Liu, Alexander S. Gorodnitskiy, Maxim Karpov, Nikolay G. Pavlov, Erwan Lucas, Ramzil R. Galiev, Artem E. Shitikov, John D. Jost, Michael L. Gorodetsky & Tobias J. Kippenberg, *Nature Communications*, **10**, 680 (2019) [link](#)

- in the news: [EPFL News](#)

Spatial multiplexing of soliton microcombs: A way has been found to implement an optical sensing system by using spatial multiplexing, a technique originally developed in optical-fiber communication. The method is far simpler than existing technologies. It produces three independent streams of ultrashort optical pulses using a single continuous-wave laser and a single optical microresonator.

- E. Lucas, G. Lihachev, R. Bouchand, N. G. Pavlov, A. S. Raja, M. Karpov, M. L. Gorodetsky & T. J. Kippenberg, *Nature Photonics* **12**, 699–705 (2018) [link](#)

- in the news: [EPFL News](#)

Lukas Novotny's group, Zurich

GHz Rotation of an Optically Trapped Nanoparticle in Vacuum: ETH physicists from Lukas Novotny's group have made a nanoparticle turn around its own axis a billion times per second. From such measurements of rotating particles, the scientists hope to obtain new insights into the behavior of materials under extreme

stress.

- René Reimann, Michael Doderer, Erik Hebestreit, Rozenn Diehl, Martin Frimmer, Dominik Windey, Felix Tebbenjohanns, and Lukas Novotny, *Phys. Rev. Lett.* **121**, 033602 (2018) [link](#)

- in the news: [ETH News](#), [phys.org](#), [Physics](#)

Sensing Static Forces with Free-Falling Nanoparticles: Erik Hebestreit, his PhD adviser Lukas Novotny, and their colleagues at ETH Zürich have shrunk the apple drop to the nanoscale regime. By levitating a silica nanoparticle in an optical trap, and briefly releasing it, they can measure the effect of

gravity or any other static force that acts on the particle.
- Erik Hebestreit, Martin Frimmer, René Reimann, and Lukas Novotny, *Phys. Rev. Lett.* **121**, 063602 (2018) [link](#)
- in the news: [Physics Today](#)

Martino Poggio's group and Stefan Willitsch's group, Basel

Classical and quantum dynamics of a trapped ion coupled to a charged nanowire: New Journal of Physics published our theoretical study of the coupling between a trapped ultracold ion and a charged nanowire. The manuscript considers the perturbation of the trapping potential for the ion by the nanowire and discusses the parameters determining the dynamics of the ion under the action of the nano oscillator. We explore the classical dynamics as well as motional quantum states of the ion which can be generated and manipulated with the resonant drive of the nanowire and the effects of anharmonicities of the ion-trap potential on the system. Our modelling indicates that unusual quantum states of the ion motion can be generated with this approach and that sympathetic cooling and quantum entanglement can be realized when both subsystems operate in the quantum regime. This ion-mechanical hybrid system might prove interesting as a new quantum device, for quantum sensing experiments, for spectroscopy and for mass spectrometry. The work was led and carried out by Ph.D. student Panagiotis Fountas, who is a shared SNI Ph.D. student based in the lab of Prof. Stefan Willitsch in the Chemistry Department. The project also benefited from a QSIT Director's Reserve Grant. The paper represents the first results of an ongoing collaboration between the Poggio group and the Willitsch group and is a prelude to future experimental work in this direction.
- P. N. Fountas, M. Poggio and S. Willitsch, *New Journal of Physics* **21**, (2019) 013030 [link](#)

Magnetic Force Sensing Using a Self-Assembled Nanowire: In the study, we present a scanning magnetic force sensor based on an individual magnet-tipped GaAs nanowire (NW) grown by molecular beam epitaxy. Its magnetic tip consists of a final segment of single-crystal MnAs formed by sequential crystallization of the liquid Ga catalyst droplet. We characterize the mechanical and magnetic properties of such NWs by measuring their flexural mechanical response in an applied magnetic field. Comparison with numerical simulations allows the identification of their equilibrium magnetization configurations, which in some cases include magnetic vortices. To determine a NW's performance as a magnetic scanning probe, we measure its response to the field profile of a lithographically patterned current-carrying wire. The NWs' tiny tips and their high force sensitivity make them promising for imaging weak magnetic field patterns on the nanometer-scale, as required for mapping mesoscopic transport and spin textures or in nanometer-scale magnetic resonance. Ph.D. student Nicola Rossi led the research and carried out the experiments. Dr. Boris Groß developed and ran the micromagnetic simulations. Ph.D. student Florian Dirnberger and Prof. Dominique Bougeard from the Universität Regensburg grew the magnet-tipped NWs used in the experiments.
- N. Rossi, B. Gross, F. Dirnberger, D. Bougeard and M. Poggio, *Nano Letters* **19**, 2, 930-936 (2019) [link](#)

Renato Renner's group, Zurich

Quantum theory cannot consistently describe the use of itself: Searching for errors in the quantum world: The theory of quantum mechanics is well supported by experiments. Now, however, a thought experiment by ETH physicists Renato Renner and his former doctoral student Daniela Frauchiger yields unexpected

contradictions. These findings raise some fundamental questions – and they're polarizing experts.
- Daniele Frauchiger and Renato Renner, *Nature Communications* **9**, 3711 (2018) [link](#)
- in the news: [ETH News](#), [NZZ](#), [Scientific American](#), [Forbes](#), [Tagesanzeiger](#)

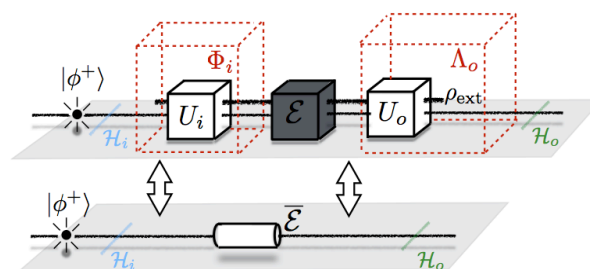
Gian Salis' group, Rüşchlikon and Werner Wegscheider's group, Zurich

Controlling nuclear noise in semiconductor quantum dots: Electron spins confined in semiconductor quantum dots interact with the nuclear spins of the semiconductor lattice atoms. Fluctuation of the nuclear background polarization leads to dephasing of the electron spin. It has been found that periodic laser pulses can lock the precession of single electron spins to the laser repetition rate, but the exact reason for this has remained unclear. We have found that the effect is much more universal than previously thought and that it is

driven by the optical Stark effect. With this technique, the dephasing time of the spin can be substantially prolonged beyond the limit given by the fluctuating nuclear spins also in dots that contain many electron spins and that are lithographically defined.
- Sergej Markmann, Christian Reichl, Werner Wegscheider and Gian Salis, *Nature Communications* **10**, 1097 (2019) [link](#)
- in the news: [IBM research blog](#)

Nicolas Sangouard's group, Basel

Certifying the building blocks of quantum computers from Bell's theorem: Bell's theorem has been proposed to certify, in a device-independent and robust way, blocks either producing or measuring quantum states. The Sangouard group recently provided a method based on Bell's theorem to certify coherent operations for the storage, processing, and transfer of quantum information. This completes the set of tools needed to certify all building blocks of a quantum computer. Our method distinguishes itself by its robustness to experimental imperfections, and so could be used to certify that today's quantum devices are qualified for usage in future quantum computers. These results have been highlighted by the [SNSF](#).



- P. Sekatski, J.-D. Bancal, S. Wagner, and Nicolas Sangouard, *Phys. Rev. Lett.* **121**, 180505 (2018) [link](#)

Vincenzo Savona's group, Lausanne

Quantum Critical Regime in a Quadratically Driven Nonlinear Photonic Lattice: Writing in *Physical Review Letters*, the group of Vincenzo Savona (EPFL), with colleagues from MPQlab and Riken, predict that an appropriately driven lattice of coupled optical resonators

can emulate the quantum transverse Ising model at finite temperatures.

- Riccardo Rota, Fabrizio Minganti, Cristiano Ciuti, and Vincenzo Savona, *Phys. Rev. Lett.* **122**, 110405 (2019) [link](#)

- in the news: [EPFL News](#)

Christian Schöenberger's group, Basel

New Generation of Moiré Superlattices in Doubly Aligned hBN/Graphene/hBN Heterostructures: Combining an atomically thin graphene and a boron nitride layer at a slightly rotated angle changes their electrical properties. Physicists at the University of Basel have now shown for the first time the combination with a third layer can result in new material properties also in a three-layer sandwich of carbon and boron

nitride. This significantly increases the number of potential synthetic materials, report the researchers in the scientific journal *Nano Letters*.

- Lujun Wang, Simon Zihlmann, Ming-Hao Liu, Peter Makk, Kenji Watanabe, Takashi Taniguchi, Andreas Baumgartner, and Christian Schöenberger, *Nano Letters*. 2019, **19** (4), pp 2371–2376 [link](#)

- in the news: [Uni Basel News](#)

Hugo Zbinden's group, Geneva

Pushing the limits of long-distance quantum cryptography: The group of Hugo Zbinden continues to push the limits of quantum key distribution (QKD) with a recent demonstration of a secret key exchange over a record distance of 421 km of optical fibre. This new world record for distance and rates require rethinking and optimising all parts of the QKD system. Firstly, this has been made possible by increasing the generation rate of the quantum states to reach 2.5 GHz. New generation optical fibers transmitting the light more efficiently are used. Moreover, in-house-made single-photon detectors detect the received photons very efficiently and with very low noise. Finally, a new

encoding method of the quantum signals has been developed in order to simplify the experimental setup while keeping it very efficient. Reaching such transmission distances is an important step towards establishing quantum communication networks between cities, in view for instance of building a Pan-European network.

- Alberto Boaron, Gianluca Boso, Davide Rusca, Cédric Vulliez, Claire Autebert, Misael Caloz, Matthieu Perrenoud, Gaëtan Gras, Félix Bussièrès, Ming-Jun Li, Daniel Nolan, Anthony Martin, and Hugo Zbinden, *Phys. Rev. Lett.* **121**, 190502 (2018) [link](#)

Oded Zilberberg's group, Zurich

Quantum interference of topological states of light: The demonstration of quantum interference between topological states of light, by an international team of researchers including ETH physicist Oded Zilberberg, signals a way to exploiting the quantum properties of

light in photonic devices with unique robustness against disorder.

- Jean-Luc Tambasco, Giacomo Corrielli, Robert J. Chapman, Andrea Crespi, Oded Zilberberg, Roberto

Osellame and Alberto Peruzzo, *Science Advances* **4**, aat3187 (2018) [link](#)
 - in the news: D-PHYS [News](#)

A look into the fourth dimension: The ETH highlight in January was the theoretical basis, provided by Oded Zilberberg, for the experiments giving us a glimpse of a fourth dimension.
 -in the news: [ETH News](#)

Dominik Zumbühl's group and Daniel Loss' group, Basel

Hyperfine-phonon spin relaxation in a single-electron GaAs quantum dot: Physicists from the groups of Dominik Zumbühl and Daniel Loss at the University of Basel, in collaboration with researchers from Japan, Slovakia and the US, have observed new mechanism of electron spin relaxation.

- Leon C. Camenzind, Liuqi Yu, Peter Stano, Jeremy D. Zimmerman, Arthur C. Gossard, Daniel Loss & Dominik M. Zumbühl, *Nature Communications* **9**, 3454 (2018) [link](#)
 - In the news: [Uni Basel News](#)

Dominik Zumbühl's group, Basel

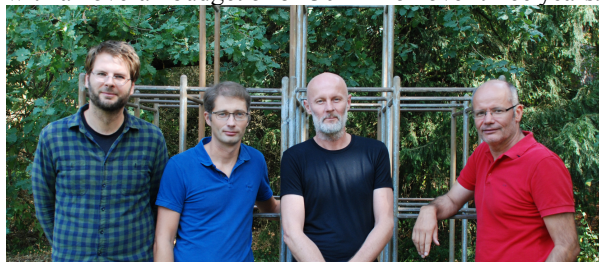
Evolution of the quantum Hall bulk spectrum into chiral edge states: A new technique makes it possible to obtain an individual fingerprint of the current-carrying edge states occurring in novel materials such as topological insulators or 2D materials. Physicists from Dominik Zumbühl's group present the new method together with American scientists in "Nature

Communications."
 - T. Patlatiuk, C. P. Scheller, D. Hill, Y. Tserkovnyak, G. Barak, A. Yacoby, L. N. Pfeiffer, K. W. West & D. M. Zumbühl; *Nature Communications* **9**, 3692 (2018) [link](#)
 - In the news: [Uni Basel News](#)

Quantum Flagship - Several PIs and collaborators of QSIT research groups

The *Quantum Flagship* projects have been announced and launched in October 2018. With a budget of € 1 billion for ten years of research in quantum physics, the goal is to build synergies between academic research, applied research and industry.

During the first three year ramp-up stage, three UNIGE projects will be backed among the 20 selected by the EC, with an overall budget of € 130 million over three years.



Hugo Zbinden will coordinate the [QRANGE](#) (Quantum Random Number Generation) project in partnership with **Nicolas Brunner** and **Rob Thew**. The aim of QRANGE is to advance the academic and industrial aspects of quantum random number generation for applications in the Internet of Things (IoT), quantum cryptography and high-performance computing.

Mikael Afzelius is a partner in The Quantum Internet Alliance ([QIA](#)) project and will focus on developing quantum memories and repeaters to provide the technologies needed for long distance quantum communication. This is part of a larger ambition to lay the foundations for the development of a future quantum Internet.

Rob Thew is a partner in the Quantum Flagship Coordination and Support Action ([QFlag](#)). The goal is to facilitate the coordination of all stakeholders – the EC, member states, academic researchers and industry players – and to reach out to the public and end-users of quantum technologies. A key objective will be the development of the Strategic Research Agenda for the Quantum Flagship.

At Uni Basel **Philipp Treutlein's** group will develop quantum sensing devices based on miniaturized atomic vapour cells within the project Miniature Atomic vapor-Cells Quantum devices for Sensing and Metrology AppLications ([MACQSIMAL](#)). The project is coordinated by the research and technology organisation CSEM in Neuchatel and brings together 13 European partners from academia and industry.

Nicolas Sangouard is partner in the The Quantum Internet Alliance ([QIA](#)) project and **Patrick Maletinsky** in the Advancing Science and TEchnology thRough dIamond Quantum Sensing ([ASTERIOS](#)) project. With the purpose to bring solutions to societal and economical needs, it will exploit quantum sensing based on nitrogen-vacancy centres in ultrapure diamond.

At ETH four groups are partners in four different projects. **Jonathan Home** is partner in the Advanced quantum computing with trapped ions ([AQTION](#)) project, which will work towards realizing a scalable quantum computer based on the manipulation of single-charged atoms. **Andreas Wallraff** is partner in the An

Open Superconducting Quantum Computer ([OpenSuperQ](#)) project, which aims at developing a quantum computing system of up to 100 qubits and at one site make it accessible for external users. **Jerome Faist** in the Quantum simulation and entanglement engineering in quantum cascade laser frequency combs ([Qombs](#)) project. The project aims at creating a quantum simulator platform made of ultracold atoms in optical lattices, which will allow to develop a new generation of quantum cascade laser frequency combs. **Christian Degen** is partner in the Advancing Science and

TEchnology thRough dIamond Quantum Sensing ([ASTERIOS](#)) project.

[Quantum Flagship](#)
[ETH News](#)
[Uni Basel News](#)
[University of Geneva Press Release](#)
[NZZ](#)
[RTS Info](#)
[Blick](#)
[Corriere del Ticino](#)

2. Technology Transfer

Quantum Industry Day in Switzerland: The Quantum Industry Day in Switzerland ([QIDiS](#)) is now a key event in the quantum technology landscape. The first dedicated event of its kind to push the industrial R&D to exchange and accelerate the development of new quantum products gathered 270 participants.

QSIT triggered the Quantum Industry Day in Switzerland (QIDiS) to enforce this traction. IBM, ID Quantique, Zurich Instruments, EURESEARCH, Innosuisse, Enterprise Europe Network and QSIT joint forces for QIDiS - in October 2019 in Technopark Zurich.

The goal to bring quantum companies, financial stakeholders and our ventures to share and connect will ultimately support the development coming along from the QSIT research in the final phase.

The exhibitions, face-to-face meetings, technology marketplace, the business presentations will be again the home match for our companies in the quantum business.

Don't miss the **Quantum Industry Day** in Switzerland ([QIDiS](#)) event on the 04.10.19 in Zurich!



qstarter awards 2019: The sixth qstarter awards event will take place in summer 2019 (date to be communicated), at the Villa Hatt in Zurich. Followed by the traditional pitch talks of the new projects and start-up ideas, the inventors will discuss intensely their projects with representatives of QSIT's industry

partners (Nanosurf, Sensirion, Zurich Instruments, ABB, Nanonis SPECS) during a buffet lunch. Please stay tuned.

Webpage: [qstarter](#)

ID Quantique SA (IDQ) announced a strategic investment plan with Deutsche Telekom Innovation Pool (TIP), a strategic investment fund advised by Deutsche Telekom Capital Partners (DTCP).

BT announced that the UK celebrates a milestone in the development of ultra-secure quantum networks with the opening of the world's first commercial-grade quantum test network link based on IDQ technology.

The investment will strengthen ID Quantique's position as the global leader in quantum safe cryptography and quantum sensing solutions.

[ID Quantique press release](#)
 BT

News from the start-ups: QSIT welcomes the newest company **Basel Precisions Instruments (BASPI)** founded in Basel from the group of Dominik Zumbühl on the base of 6 qstarter projects.

[IRsweep](#) (start-up emerging from the Faist group) pitched as a finalist of the top 8 start-ups at the Swiss Nanoconvention Award 2018.

[LiGenTec](#), [QZabre](#), [IRsweep](#) and [QNAMI](#), offering unique scanning probes to perform NV magnetometry experiments are growing their teams rapidly.

Exhibitions and fairs: [QZabre](#), and [BASPI](#), have successfully attended the Hannover Industry Fair in April 2019 with the support of NCCR QSIT and the SNSF.

[Hannover Messe](#)

Together with QSIT [IRsweep](#), [QNAMI](#), [QZabre](#) and [MicroSystems](#), [BASPI](#), attended the [Swiss Nanoconvention 2018](#) exhibition and will attend the [Swiss Nanoconvention](#) at EPFL in 2019 in our QSIT booth.

3. Equal Opportunity

INSPIRE Potentials – QSIT Master Internship Award: A QSIT initiative to enhance the place for women in science. The INSPIRE Potentials Master internship award aims at attracting excellent female students who will conduct their Master thesis in a laboratory belonging to the NCCR QSIT network.

We proud to announce the following awardees:

- 15.07.18 Dina Abdelhadi (Renner)
 Anne Nguyen (Novotny)
 Stefanie Miller (Home)
 Sandra Buob (Esslinger)
 Jarla Thiesbrummel (Kippenberg)
- 15.10.18 Anna Morales-Melgares (Fontcuberta)
 Chenglian Zhu (Kippenberg)
 Giulia Zheng (Ensslin)
 Maria Luisa Mattana (Faist)
 Melissa Osterwalder (Schönenberger)
- 15.01.19 Natasha Kiper (Imamoglu)
 Jingwen Li (Degen)

The next deadline for applications is June 15, 2019. Please find all details for the application procedure on the [QSIT webpage](#).

NEW - QSIT INSPIRE Postdoc Award: In phase 3 we launch the QSIT INSPIRE Postdoc Award targeting female PhD students and future postdocs about to start their postdoc. The next deadline for applications is June 15, 2019. Please find all details for the application procedure on the [QSIT webpage](#).

Ladies Lunch Meeting: Once per semester QSIT offers a get together for female MSc/PhD students and postdocs in order to discuss challenges and advantages of the next career steps.



On January 15, 2019, **Géraldine Haack**, Collaboratrice scientifique and NSF Prima fellow at University of Geneva, discussed different aspects of her career, starting with a short talk entitled: *How equal opportunity initiatives do help young women scientists? Some personal insights for 2019 and later*. 15 women joined the sandwich lunch and participated in a lively discussion. [Link](#)

4. Promotions and Awards

01.04.2019 - **Tobias Kippenberg** received an ERC Research Advanced Grant for his project "Extremely Coherent Mechanical Oscillators and circuit Cavity Electro-Optics" (ExCOM-cCEO) — his 2nd ERC Adv. Grant, and 4th ERC grant in total.

[EPFL News](#)
[ERC Communication](#)

04.04.2019 – **Tobias Kippenberg** is one of the two winners of the Zeiss Research Award for 2018.

[EPFL News](#)

04.04.2019 - **Erwan Lucas** in Tobias Kippenberg's group received the Emil Wolf Outstanding Student Paper Award.

[EPFL News](#)

12.02.2019 – **Jerome Faist** received the Julius Springer Prize 2019 for Applied Physics. He is honored for his work on quantum cascade lasers.

[Springer Press release](#)
[pro-physik.de](#)

14.12.2018 – **Vanessa Wood** was promoted to Full professor of Materials and Device Engineering at ETH.

[ETH News](#)

09.12.2018 – **Tobias Kippenberg** is recognized as highly cited researcher in 2018.

[EPFL News](#)

29.11.2018 – Both **Christian Degen** and **Jonathan Home** were awarded an ERC Consolidator Grant. Their projects are entitled "Non-Invasive Imaging of Nanoscale Electronic Transport" and "Trapped-ion quantum information in 2-dimensional Penning trap arrays", respectively.

[ETH News](#)
[ERC Communication](#)

17.11.2018 - **Jonathan Home** receives the golden owl at the 2018 ETH Day. The Golden Owl honors lecturers who have provided exceptional teaching and motivates them to continue with their excellent teaching. The Owl is awarded by the VSETH, ETH Zurich's students association, who are also the initiators of the award.

[ETH News](#)
[Awards and prizes at ETH Day 2018](#)
[Golden Owl of the VSETH](#)

17.11.2018 - **Sebastian Krinner** from the Wallraff group received the Lopez-Loreta Prize for his project with the aim of constructing quantum bits (Qubits) for future quantum computers based on superconducting circuits in order to reduce the susceptibility of quantum states to errors.

Donated by the Fondation Jean-Jacques et Felicia Lopez-Loreta, the prize honors outstanding ETH graduates and enables them to carry out their groundbreaking research or innovation projects.

[ETH News](#)

[phys.org](#)

[Photonics Online](#)

05.11.2018 - Members of the **Sangouard** and **Treutlein** groups have received the Paul Ehrenfest Award for Quantum Foundations for their work on Bell correlations in a Bose-Einstein condensate. [link](#)

25.10.2018 - **Jelena Klinovaja** was promoted to Associate Professor in Physics at the University of Basel.

[Uni Basel News](#)

24.10.2018 - **Jonathan Home** receives the 2019 Rolf Landauer and Charles H. Bennett Award in Quantum Computing "For the development and demonstration of trapped-ion quantum computing protocols, including Bell state stabilization by feedback control in mixed-ion chains, and the encoding of logical quantum states in the ion motion."

This award recognizes recent outstanding contributions in quantum information science, especially using quantum effects to perform computational and

information-management tasks that would be impossible or infeasible by purely classical means.

[APS communication](#)

August 2018 - **Géraldine Haack** receives a PRIMA grant (a funding scheme of the Swiss National Science Foundation) for her project "Mesoscopic quantum thermal machines". She will explore the thermodynamical properties & fundamental limits of thermal machines in the quantum regime & for non-conventional dynamics. [link](#)

August 2018 – **Philipp Treutlein** was promoted to full professor in the Department of Physics at the University of Basel.

17.08.2018 - **Daniel Kienzler** from Jonathan's Home group at ETH wins a SNSF Ambizione grant. His project is entitled "High-level control and spectroscopy of single trapped molecular ions".

[Ambizione](#)

[List of awardees](#)

08.06.2018 - **Amir H. Ghadimi** in Tobias Kippenberg's group won the Swiss Nanotechnology PhD award.

[EPFL News](#)

27.04.2018 - **Amir H. Ghadimi** in Tobias Kippenberg's group received the best student paper award at the European Frequency and Time Forum (EFTF) 2018.

[EPFL News](#)

5. Recent Events

<http://www.nccr-qsit.ethz.ch/news/conferences-events.html>

Winter school on Quantum Communications

February 18 – 24, 2019, Sochi, Russia

QSIT and ETH researchers Nuriya Nurgalieva and Lidia del Rio collaborated with the Russian Quantum Centre in the organization of a [winter school on quantum communications](#).

First they organized a [quantum computing competition](#) for ETH students, where students had to implement the quantum pigeon hole paradox, and a mathematics problem where they had to find efficient ways to compute the transversal of a symmetry group and prepare an appropriate quantum state.

The winning team was awarded a fully funded participation in the winter school, sponsored by the RQC. At the winter school they organized a full day of quantum hackathon, in which students had to program a quantum thermodynamics protocol to convert information into work. The winning team is awarded participation at the next conferences from the RQC.

QSIT General Meeting

February 6 – 8, 2019, Waldhotel, Arosa

With more than 200 attendees the 9th QSIT General Meeting took place as every year in Arosa.



The program included three invited talks: On Wednesday afternoon Ilario Zardo gave a talk on "Nanophonics with nanowires". In our traditional technology transfer session Geopraevent AG CEO Lorenz Meier talked about "Quantum Geology? A physicist's journey into snow, rocks, dirt und money". And on Friday morning Yiwen Chu featured "Connecting quantum systems with acoustic resonators".

This year a special session was dedicated to leadership. On Wednesday evening pitch talks on *What leadership do we want in science?* were given by Lidia del Rio, Martin Frimmer, Tilman Esslinger, Christian Schönerberger and Anna Fontcuberta i Morral. Furthermore, the program covered 20 talks by young scientist from all across the network. The participants took the chance to discuss with their colleagues during plenty of time in two poster sessions. 63 posters were presented giving an overview of the research covered in the NCCR QSIT. In addition, there were many opportunities to make new contacts in the evening and during social events.

[Link](#)

QSIT Winter School

February 4 - 6, 2019, Waldhotel, Arosa

The 8th QSIT Winter School featured six lectures:

- **Quantum Information**, Lidia del Rio
- **Topological Quantum States**, Jelena Klinovaja
- **The Spin Qubit**, Christoph Klöffel
- **Quantum Error Correction**, James Wootton

6. Outreach

January 2019 – **Philipp Treutlein** gave two public lectures on “Ultrakalte Atome - die kälteste Materie der Welt” at the Volkshochschule beider Basel (a study program for the general public), which were attended by about 100 interested participants from the Basel area.

01.02.2019 – **Dominik Zumbühl** was interviewed for the "Wissenschaftsmagazin" in radio SRF 2 on the topic of the agreement between the EU and Switzerland with regards to the Swiss association to the EU research programs.

[SRF](#)

QSIT on Twitter: Since mid-February 2018 the NCCR QSIT is present on Twitter: [@NCCR_QSIT](#). This information channel is managed by Dr. Andreas Trabesinger (trabi@ethz.ch), an experienced science communicator.

In order to get your QSIT-relevant news to be tweeted, please send your information to Andreas (and to Klara Berg, for the webpage news!!).

Hearing the Quantum - a podcast about latest research in quantum physics, made by and for quantum physicists.

Hearing the Quantum is a new podcast made for researchers by Maciej Malinowski (Jonathan Home's group). Each episode features an hour-long discussion

- **Quantum Metrology**, Philipp Treutlein
- **Quantum Technology**, Hugo Zbinden

At the poster session on Monday evening 20 posters were presented by the young scientists, giving ample time to the students for discussion. The Winter School was very well attended with over 70 participants.

[Link](#)

Nanoskyrmionics Workshop

November 22 - 23, 2018, Basel

The Poggio group held a “Nanoskyrmionics Workshop” for students and post-docs in the Nanoskyrmionics Sinergia Network. The program included talks by researchers from amongst others the Poggio and Maletinsky labs, lab tours, networking events, and two talks by leading experts in nanometer-scale magnetic imaging and sensing. The workshop was organized by PhD student Simon Philipp, who deserves all the credit for a well-organized, stimulating, and successful event.

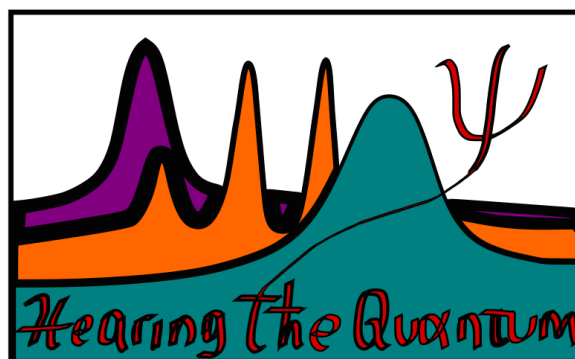
[Nanoskyrmionics Sinergia Network Program](#)

with authors of recent papers. We find out not just about their results, but also about the background necessary to understand the work, and how many times the laser broke while taking data.

To listen, search for *Hearing the Quantum* on your podcast app (Apple Podcasts/Google Podcast/Spotify), or visit <https://www.hearingthequantum.com/>

We also have a Facebook page, so please do follow <https://www.facebook.com/HearingTheQuantum/> and spread the word.

If you have any feedback, or suggestions for future episodes, please get in touch via Facebook or email at maciejm@phys.ethz.ch.



7. Education

Mini-sabbaticals: Each PhD student and post-doc associated with the NCCR QSIT has the opportunity to work one week per year in another NCCR group of his/her choice. This step will promote collaboration and exchange between the younger researchers and will also serve the purpose of general education. These research stages will be centrally financed by the NCCR and are open for all young researchers working on NCCR-related projects in the participating research groups, even if NCCR resources do not directly provide the salary of these researchers.

Please contact your supervisor or the NCCR office for further information. [link](#)

COFUND proposal funded on EUCOR -- The European Campus, 9.1 Million Euro: The project "Quantum Science and Technologies at the European Campus" (QUSTEC) has been selected by the European Commission as a joint international and interdisciplinary doctoral program in quantum sciences and technologies. Led by Eucor – The European Campus, it will bring together the Universities of Basel, Freiburg and Strasbourg, Karlsruhe Institute of Technology and IBM Research Zurich.

[Uni Basel News](#)

Master of Science in Quantum Engineering: New Masters Program in Quantum Engineering at ETH Zurich, starting in Autumn 2019.

[Master Quantum Engineering Website](#)

8. For your agenda

<http://www.nccr-qsit.ethz.ch/news/conferences-events.html>

Summer, 2019 – date to be communicated

NCCR QSIT qstarter awards 2019

[Website](#)

Villa Hatt, Zurich

June 3-6, 2019

NCCR QSIT Junior Meeting

[Website](#)

Juhui Flumserberg, Switzerland

June 17-21, 2019

Summer school on quantum foundations

<https://foundations.ethz.ch>

Solstice of Foundations, ETH Zurich

Registration opens in April.

July 7 – 11, 2019

Hybrid Optomechanical Technologies HOT2019

[HOT2019](#)

Monte Verità, Ascona, Switzerland

- This conference brings together international groups from different fields to discuss the latest developments and future challenges in Quantum Science and Technology, including hybrid quantum systems, quantum measurements, quantum interfaces, atomic, microwave and optical approaches to opto- and electro-mechanics.

August 26-30, 2019

Joint Annual Meeting of the Swiss Physical Society and Austrian Physical Society

[Webpage](#)

University of Zurich, Irchel Campus

- The conference program includes several quantum related plenary lectures from Rainer Blatt (Innsbruck), Heike Riel (IBM), Patrick Maletinsky (Basel). There will be two pre-conference workshops on "machine learning for quantum physicists" and "machine learning for quantum computers"(see below).

Finally, an exciting industry session on jobs in AI and Quantum will take place with speakers from IBM, Google, Bosch, Siemens, Alpine Quantum Technologies, QZabre, HQS Quantum Simulations, Microsoft, Atos, Toptica, Daedean and Zurich Instruments. This is a great opportunity to learn about the job of physicists that work on quantum or AI in startups or industry.

August 30 – September 1, 2019

NCCR QSIT @ Scientifica 2019

[Scientifica](#)

ETH Zürich und Universität Zürich

September 1-6, 2019

Conference on Nanophotonics

[Website](#)

Monte Verità, Ascona, Switzerland

October 4, 2019

Quantum Industry Day in Switzerland

[QIDiS2020](#)

[Agenda](#)

Registration will open on May 15, 2019

Technopark Zurich, Switzerland



November, 2019

NCCR QSIT Site Visit

- No site visit in 2019

February 3 - 5, 2020

NCCR QSIT Winter School

Waldhotel, Arosa

February 5 - 7, 2020

NCCR QSIT General Meeting

Waldhotel, Arosa

9. New Collaborators



Francesco Ferri
postdoc in Tilman Esslinger's group, working on quantum gases in cavities.

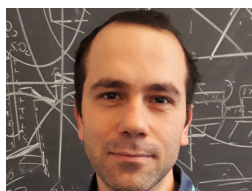
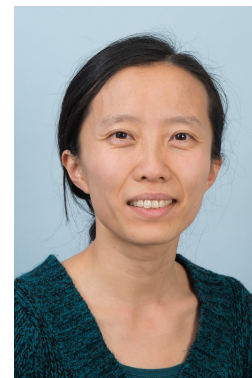


Miguel Carbadillo
PhD in Dominik Zumbühl's group, working on the Ge/Si nanowire project, developing these as a platform for spin qubits and exotic quantum matter such as Majorana fermions.

Lisa Gächter
PhD in Klaus Ensslin's group, working on 2D quantum systems connected to superconducting microwave resonators.



Yiwen Chu
New QSIT associate member: Yiwen Chu, Tenure Track Assistant Professor of Hybrid Quantum Systems at ETH Zurich.



Mohammad Samani
Postdoc in Dominik Zumbühl's group, working on opening the sub-mK temperature range for nanoelectronics / quantum transport experiments.



Alexey Soluyanov
New QSIT associate member: Alexey Soluyanov, SNSF Professor at the University of Zurich working on topics in the field of materials with non-trivial topology: topological insulators, topological semimetals, and topological superconductors.

Henok Weldeyesus
PhD student in Dominik Zumbühl's group, working on tunneling spectroscopy and helical states in quantum wires.

