Quantum Photonics – Speaker

Thursday, 28.10.2021, Basel

Dr. Christian Bosshard

Managing director, Swissphotonics, 4415 Lausen BL
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Dr. Christian Bosshard received his degree in Physics (1986) and his doctorate (1991, Silver medal award) from ETH. From 2001-2021 he was working at CSEM, first as Section Head and then as Vice President and Head Photonics. Since 2013 he is Managing Director of Swissphotonics. Christian is a Fellow of the Optical Society of America Optica, Board Member of EPIC, and Member of the Board of the University of Basel.

Moderation

Prof. Dr. Philipp Treutlein

Head of Department Physics, Uni Basel, 4056 Basel
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Philipp Treutlein studied physics at the universities of Konstanz, Germany and Stanford, California, followed by a PhD in the laboratory of Theodor Hänsch at LMU Munich. Since 2010 Philipp is a professor of physics at the University of Basel in Switzerland. With his team he is exploring the quantum physics of atoms and light and their applications in quantum technology.

Moderation

Dr. Christoph Harder

President, Swissphotonics, 8832 Wollerau SZ
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Dr. Christoph S. Harder received the ETH Diploma in 1979 and the Master and PhD in EE in 1980 and 1983 from Caltech, Pasadena, USA. He is cofounder of the IBM Zurich Laser Diode Enterprise which pioneered the first 980nm high power pump laser for telecom optical amplifiers and laser diodes for industrial and consumer applications with ultrahigh reliability. He is the recipient of a Fulbright scholarship and the Optica Fellow recognition. Christoph is now heading a consulting company and is cofounder of Swissphotonics and has been its president for the last few years. He has published more than 100 papers and 20 patents and has held a variety of staff and management positions at ETH, Caltech, IBM, Uniphase, JDS Uniphase, Nortel and Bookham and has volunteered on society boards and committees.

Overview on the OIDA Quantum Photonics Roadmap
The OIDA Quantum Photonics Roadmap will be presented.
https://www.swissphotonics.net/home?news_id=4076

Dr. Serge Grop

R&D Manager, Orolia Switzerland SA, 2000 Neuchâtel
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Serge Grop received his PhD degree in engineering science in 2010 from the Université de Franche-Comté for his dissertation *Elisa, une référence de fréquence ultrastable pour l'Agence Spatiale Européenne*. During his PhD, he developed a cryocooled sapphire oscillator (CSO) to complete the frequency reference set of DSA3 in Malargüe, Argentina. He was granted of two best student awards for this work. From 2011 to 2015, he was hired as technical manager on the project ULISS by the FEMTO-ST Institut in France. He worked on the improvement of the design of the CSO developed during his study to reduce power consumption and cost. In 2015, he worked for the company Alemnis AG as project leader. He managed the CTI project FastObs and he developed a dynamic module to upgrade a nano-mechanical testing platform for high-speed measurement. In 2017, he has joined Orolia Switzerland SA. He is the head of the R&D department. He led the mRO-50 industrialisation and he is responsible for the development of the defence and space model of this product. He is also the product owner of the hydrogen maser product line.

Atomic clock developments at Orolia Switzerland
Orolia Switzerland is part of the group Orolia, world leader in resilient Positioning Navigation and Timing PNT. In today's world, a large number of applications rely on GNSS signals but those signals are not always accurate or available. The job of Orolia is to make them virtually fail-safe for critical applications in defence and commercial industries worldwide by proposing a large portfolio of components, instruments and simulator. Atomic clocks are the first pilar to resilent PNT however nowadays low Size, Weight and Power SwaP are required for application as timecards for example. Other applications as defence require operating in harsh environment with the lowest environmental sensitivity. Orolia Switzerland developed clocks based on mercury and rubidium atoms to access those previous markets. The presentation will report on the miniature Rubidium Oscillator mRO-50™ and Mercury Ion Clock and the company internal optical component needs.

Dr. Steve Lecomte

Section Head, CSEM SA, 2002 Neuchâtel
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Dr. Steve Lecomte holds a diploma in Physics from the University of Neuchâtel and a PhD degree in Laser Physics from ETH Zürich. From 2005 to 2007 he worked on a cesium beam clock for space applications at the Observatoire Cantonal de Neuchâtel. In 2007 he joined the Swiss Center for Electronics and Microtechnology CSEM where he acts as Section Head of the Laser and Quantum Tech group.

Atomic clocks and lasers: from timing to gravitational waves detection
Atomic clocks and lasers are key instruments that are fundamentally based on quantum physics and photonics. In addition, they also serve as instruments for exquisitely sensitive measurements of physical quantities. CSEM developments around miniature atomic clocks, compact atomic clocks and laser sources and metrology for the LISA mission will be presented.

Martin Felle

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Martin is a Product Manager in Quantum Sensing at IDQ. With a background in photonics and quantum light sources, he engages with researchers in academia and industry to help solve their single-photon detection challenges, and drives some of the future improvements for the photonic sensing offerings needed in the emerging quantum technology ecosystem.

From Lab to Fab: Industrialized QKD Platform for Real-World Networks and Applications
In this talk, Martin explores the development of high-performance single-photon counting techniques and technology needed to realise practicable quantum communication channels, from today's off-the-shelf Quantum Key Distribution QKD systems, to the infrastructure of tomorrow's Quantum Internet.

Dr. Rob Thew

Senior Researcher, Uni Genf, 1211 Genève 4
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Rob Thew is a senior researcher at the University of Geneva and an expert in quantum photonics and communication, spanning fundamental to applied topics and more recently working in quantum sensing in bio and molecular systems. He has worked on the development of the Quantum Flagship programme for over 10 years is chair of the Strategic Research Agenda Work Group.

Integrated Photonics, Entanglement and Quantum Networks
I will present some of the photonic technologies we are developing for quantum communication and sensing applications. I will discuss the state of the art and future perspectives.

Dr. Felipe Favaro

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Dr. Felipe Favaro de Oliveira is an expert in Materials Science with extensive hands-on experience. During his PhD at the University of Stuttgart, he developed innovative processes to improve the quality of quantum sensors in ultra-pure diamond. Since he co-founded Qnamib AG, Felipe has put his unique know-how into improving the quality and reproducibility of the company's sensor technology.

Advancing research and materials science with quantum metrology
In the past years, a new generation of quantum sensors is being pushed out of the labs in the form of products addressing problems across different areas from medical, to geo-localization, to failure analysis in the semiconductor industry. In this talk, we present the Qnami ProteusQ microscope and show how photonics plays a key role in the high level of precision achieved in failure analysis measurements.

Prof. Dr. Richard Warburton

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Richard Warburton is Professor of Experimental Condensed Matter Physics at the University of Basel, 2010-. Before that, he was Professor at Heriot-Watt University, Edinburgh (2000-2010), and Assistant Professor at the Ludwig-Maximilians-University, Munich. Richard Warburton studied (both MA and DPhil degrees) at the University of Oxford.

A fast and bright source of single photons
A single-photon source is presented. A single quantum dot is used to mimic a two-level atom; an open microcavity is used to funnel the photons into one optical mode. The source has an end-to-end efficiency above 50%; the coherence of the photons, as judged by the visibility of the two-photon interference, is very high.

Dr. Paul Seidler

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Paul Seidler received his B.S. from Caltech and his PhD from U.C. Berkeley. At IBM, he has held various positions both in New York and Switzerland, including leadership and management of a broad spectrum of research areas ranging from semiconductors to display and storage technology to optical communications. His current research involves quantum optics, optomechanics and the physics of light-matter interaction.

Microwave-optical transducers for quantum links
The ability to coherently interconvert microwave and optical signals at the level of individual photons is an outstanding scientific and technological challenge of particular relevance to quantum computing and future quantum networks. Numerous groups are pursuing device architectures involving either mechanical systems as intermediaries or direct electro-optic transduction via the Pockels effect. I will present an overview of IBM activities.

Prof. Dr. Martin Frimmer

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Martin Frimmer studies the fundamental limitations of precision measurements using light fields at the Photonics Laboratory of ETH Zurich since 2013. By training, Martin is a sub-wavelength microscopist who obtained his PhD from the University of Amsterdam in 2012. He obtained a diploma in physics at TU Munich in 2008 with a focus on solid-state physics.

Measurement-based quantum control of levitated nanosystems
We study the limitations of optical measurements using levitated nanoparticles. In vacuum, such particles can be isolated from their environment to an extreme degree and their motion can be probed with ultimate precision using light. This measurement can be exploited to exert quantum control over the particle motion. We discuss cooling a levitated nanoparticle's center-of-mass motion to its quantum ground state.

Dr. Clément Javerzac-Galy

Co-CEO, Miraex SA, 1015 Lausanne VD
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Clément is a co-founder of Miraex SA, developing photonic and quantum technologies for next-gen sensing, networking and computing. Prior to joining EPFL, he was a guest researcher at NIST, USA working with William D. Phillips, and held a position at Thales Group. Clément is an engineer from Institut d'Optique, Paris and studied physics at Université Paris XI and EPFL.

Towards a quantum internet
Miraex industrial photonic sensing solutions prevent asset failure before it happens in the most demanding environments, where standard electronic sensors do not work. At Miraex we also build quantum integrated circuits for high sensitivity measurements and distributed quantum computing infrastructures.

Prof. Dr. Stefan Willitsch

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Stefan Willitsch received his PhD from ETH Zurich in 2004. From 2004-07, he was Junior Research Fellow at the University of Oxford. He was appointed lecturer at University College London in 2007 and joined the University of Basel in 2008. His research focuses on cold molecules and their applications in chemistry, spectroscopy and quantum technologies.

Quantum-logic-assisted precision spectroscopy of single molecules using a fibre network for the distribution of the Swiss primary frequency standard
The development of quantum technologies for molecules has remained a long-standing challenge due to the complexity of molecular systems. We have developed a quantum-non-demolition technique for high-precision spectroscopic measurements on single isolated molecules using a fibre network for the precise transfer of frequencies within Switzerland and their comparison to the Swiss primary standard at METAS.

Dr. Andreas Gut

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Responsibilities

- Development of strategy and project related initiatives of Switzerland and Innosuisse in the domain of international innovation cooperation
- Swiss participation in EUREKA, Eurostars, Active and Assisted Living, ECSEL, and engagement of Innosuisse in bilateral cooperation
- deputy head of Innosuisse Division Knowledge Transfer & International Collaborations

Past professional positions

2017 – 2018:	Head of Research and Innovation Programmes, State Secretariat for Education, Research and Innovation SERI
2014 – 2015:	EUREKA Project Coordinator Chairman during the Swiss EUREKA Chairmanship
2008 – 2017:	Swiss EUREKA Project Coordinator, SERI
2001 – 2008:	Scientific Collaborator for Energy Research at Swiss Federal Office of Energy, Bern

Education

1994 – 1998:	PhD ETH Zürich / Institute for Environmental Protection and Agriculture, Liebefeld
1987 – 1993:	Studies of Environmental Sciences, ETH Zürich

Horizon Europe: what are the implications in the domain of innovation
Switzerland is a third country to Horizon Europe until Switzerland and the European Commission have negotiated and decided about the association of Switzerland to Horizon Europe. The consequences of this status in the area of innovation and the planning of transitional measures of Innosuisse to manage the particiation of Swiss businesses and research will be presented.

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