

Key Emerging Technology Cooperation Opportunities

Quantum Technology & 5G NL-IL mini-symposium

1st December 2020 16:00-17:30 IL time 15:00-16:30 NL time

Webinar through zoom

Program

- 16:00-16:05 **Welcome note** and possible funding opportunities¹
Dr. [Racheli Kreisberg](#), Innovation Attaché, Netherlands Embassy in Israel and Israeli Dutch Innovation Center ([IDIC](#))
- 16:05-16:20 **The Quantum Delta Netherlands initiative**
Prof. [Kareljan Schoutens](#), Faculty of Science UvA and co-director QuSoft
- 16:20-16:35 **Topological quantum registers**
Prof. [Eytan Grosfeld](#), Department of Physics, Ben Gurion University, BGU-QST
- 16:35-16:40 **Eindhoven quantum key distribution testbed**
Prof. [Idelfonso Tafur Monroy](#), Center for Quantum Materials and Technology Eindhoven, TU Eindhoven
- 16:40-16:55 **Quantum Key Distribution (QKD) – augmented the security framework of an optical 6G fronthaul**
Prof. [Shlomi Arnon](#), Department of Electrical and Computer Engineering and director of the Center for Quantum Science and Technology (BGU-QST)
- 16:55-17:10 **Key recycling protocols, and quantum readout of Physical Unclonable Functions**
Dr. [Boris Škorić](#), QT/e, Dept. of Mathematics and Computer Science, Eindhoven University of Technology
- 17:10-17:25 **Quantum technology with atoms at BGU**
Prof. [Ron Folman](#), Department of Physics, Ben Gurion University, Head of the atom chip laboratory at BGU, Founder of the BGU nano-fabrication facility and Founder of the BGU center for quantum science and technology
- 17:25-17:30 Wrap-up

Registration: <https://www.eventbrite.com/e/dutch-israeli-quantum-technology-5g-mini-symposium-tickets-127832124325>

¹ [NWO Money Follows Cooperation](#), EuroTech, [EU QCI](#), New Horizon program call: DIGITAL-EMERGING-11-2022 (draft RIA call), MCSA ITN (Nov 2021)



Background

In a rapidly changing world, technology is increasingly defining how we live. In the future, technology and innovation will have a major impact on societal challenges. Innovation processes are going faster than ever. Responding to this requires a lot of knowledge and ability to act. As a small country, NL is scientifically among the top in many key technologies and can also build on companies with a strong technology position. But without a focus on key technologies such as artificial intelligence, photonics, quantum technology and nanotechnology, NL will not be able to create sufficient mass. This is necessary to remain internationally competitive in further development, diffusion, and upscaling phases.

Both NL and IL aim at being at the forefront of the KETs and the most effective way to achieve technological leadership and to compete with the giants in the field is through innovation cooperation.

5G

5G offers a lot of chances for international cooperation. NL has an excellent communication network and is currently changing from 4G to 5G. COVID-19 proves how important it is to work digitally, making 5G even more crucial, while taking the wellbeing of the population and the acceptance of this technology into consideration. In NL, several 5G pilots are currently in progress. IL launched its 5G communication technology at the end of September 2020 and will upgrade its communication network to 5G too.

Quantum technologies (QT)

Dutch universities and knowledge institutes (QuTech and QuSoft) are leaders in the field of qubits, quantum internet, quantum algorithms and post-quantum cryptography, attracting global business investments and talent. NL established Quantum Delta NL and developed its national agenda on quantum technology. IL aims to financially invest in a national \$360 million five-year Science and Quantum Technology program for 2020-2025. IL will invest the funding, not in building a quantum computer, but rather in advanced encryption, code-breaking capability, complex simulations, and quantum sensors.

5G and QT convergence

By 2026 it is expected that more than 43 billion IoT devices will be connected. Global autonomous vehicles market is expected to reach \$615.02 billion USD by 2026 with a forecasted fleet 54 million self-driving cars in use globally by 2035. These two emerging technologies will make use of 5G systems and the edge mobile computing segment of the telecommunication infrastructure. These are only two examples to highlight the challenges and opportunities in the area of providing quantum, unbackable cybersecurity for the masses.

This mini symposium will bring leading scientists in the field of 5G and quantum technology together to showcase the cutting-edge technology developments in both countries. The symposium is open to scientists and students, startups and companies, policy makers.



Biosketches

Prof. Shlomi Arnon



Prof. Shlomi Arnon is a Professor in the Department of Electrical and Computer Engineering. He is also the director of the Center for Quantum Science and Technology (BGU-QST) at Ben Gurion University of the Negev (BGU), Israel, and the director of the Satellite and Wireless Communication Laboratory at the university. Professor Arnon is a Fellow of the International Society for Optics and Photonics (SPIE). He was a postdoctoral associate (Fulbright Fellow) at Massachusetts Institute of Technology (MIT), Cambridge, USA. He has held visiting positions at TU/e Eindhoven, Philips Lab, Nederland, TU Delft, and Cornell University. He has served several times as associate editor for special issues on optical wireless communication for OSA and IEEE. He is co-author of the book Applied Aspects of Optical Communication and LIDAR, Taylor & Francis/CRC, 2010; co-editor of the book Advanced Optical Wireless Communication Systems, Cambridge University Press, 2012; and editor of the book Visible Light Communication, Cambridge University Press, 2015. Recently he has initiated a new project in area of medical and quantum technology funded by the prestigious European Union FET Open program. The main subjects of his research include wireless and satellite communication, optical wireless communication, free space optics, quantum key distribution system, optical technologies for environmental monitoring, and quantum technology for medical applications. Keywords: Quantum Key Distribution (QKD), free space optics, communication

Prof. Ron Folman



PhD – Weizmann and CERN. Post Doc – Innsbruck. Researcher at Heidelberg. Head of the atom chip laboratory at BGU. Founder of the BGU nano-fabrication facility. Founder of the BGU center for quantum science and technology.

Key words: Ultra-cold atoms, Atom chip, quantum technology, atom interferometry.

Prof Eytan Grosfeld



Eytan Grosfeld obtained his PhD from the Weizmann Institute of Science (2008) and was a postdoctoral fellow at the Institute for Condensed Matter Theory at the University of Urbana-Champaign (2008-2011). He is currently an Associate Professor in the Department of Physics at Ben-Gurion University and serves as the Associate Dean for Undergraduate Teaching at the Faculty of Natural Sciences.

Eytan Grosfeld specializes in condensed matter theory, including the study of topological phases of matter, light-matter interaction and fault-tolerant qubits. He is involved in several European projects related to quantum technology including the [FET Open HiTIME project](#) and the [Quantera project InterPol](#).

Prof. Idelfonso Tafur Monroy



Idelfonso Tafur Monroy is Professor at the Department of Electrical Engineering of the Eindhoven University of Technology and director of the Photonic Integration Technology Center BV (PITC). He is PI in the Center for Quantum Materials and Technology Eindhoven (QT/e) and the Institute for Photonics Integration (IPI) and the Center for Wireless Technology (CWTe).

He coordinates the 5G PPP BLUESPACE project on technologies for 5G wireless systems and the ITN CELTA project with 15 PhD students working convergence of electronics and photonics technologies for applications such as THz communications, sensing and imaging.

His research interests are in the area Terahertz systems-on-chip, 5G and beyond systems, converged electronic-photonic integrated circuits for applications in quantum, secure communications, sensing and computing. He is co-author of over 500 journal and conference papers and has graduated 22 PhD students. He is co-founder of the start-up Bifrost Communications on optical fiber access solutions.

Idelfonso Tafur started his academic career in the Kharkov Polytechnic Institute in Ukraine, he received a M.Sc degree from the Bonch-Bruевич Institute of Communications, St. Petersburg, Russia, holds a Technology Licentiate degree in telecommunications theory from the Royal Institute of Technology, Stockholm, Sweden, and a PhD degree from the Eindhoven University of Technology.

He has been Professor in photonics communication technologies at Technical University of Denmark, guest Professor at the Beijing University of Post and Telecommunications, visiting scientist at the University of California at Berkeley and Fellowship Professor at the ITMO University in St Petersburg Russia, and is a senior member of IEEE and OSA.

Prof. Kareljan Schoutens



Kareljan Schoutens obtained his PhD from Utrecht University (1989), held postdoctoral positions in Stony Brook and Princeton, and was assistant professor at Princeton University. At the University of Amsterdam he became a full professor of Theoretical Physics in 1999. He was head of the Institute for Theoretical Physics, became the first director of the Institute of Physics in 2011, and served as dean of the Faculty of Science from October 2012 till 2014. In December 2015 he co-founded QuSoft and he acts as its co-director.

He also co-founded the Quantum Delta Netherlands foundation and is a member of its supervisory board.

As a theoretical physicist, Schoutens, specializes in quantum condensed matter theory. He has a special interest in topological phases of matter and investigates how such phases can be employed for fault tolerant quantum information processing. Recent interests are the quantum control of multi-qubit quantum registers and the quantum simulation of quantum many body systems.

Prof. Boris Škorić

Dr. Racheli Kreisberg



Dr. Racheli Kreisberg serves since January 2016 as the Innovation Attaché of the Holland Innovation Network, Ministry of Economic Affairs, at the Netherlands Embassy in Israel. She is responsible for developing R&D and business collaborations between Dutch and Israeli companies, Universities and research institutions. Her work is focused on the High-Tech Systems and Materials (HTSM) top-sector, i.e., photonics, robotics, cyber, agro-tech as well as the Life Science and Agro&Food top sectors. Prior to this position she managed her own consultancy company that specialized in the initiation and management of collaborative EU research projects and she serves as an evaluator of the EU. Dr. Kreisberg was the Head of the Bioinformatics Unit of Tel Aviv University between 1998-2005. Dr. Kreisberg holds a PhD in Biotechnology and Molecular Microbiology from Tel Aviv University (TAU), an Executive MBA from TAU, an MSc in Chemistry (summa cum laude) from the Technion Israel Institute of Technology.