

UQ-DTU Quantum Technology Workshop

Webinar

Tuesday 7 - Wednesday 8 September 2021

AEST 16.00 - 18.00 | DNK 08.00 - 10.00

Workshop Objectives

To support the development of strategic partnership activities identified in the UQ-DTU Strategic Partnership Plan and continue to grow high impact research, UQ and DTU are holding a virtual workshop focused on Quantum Technology.

Key objectives of workshop include:

- Develop strategic partnership between UQ and DTU;
- Support and grow high impact Quantum research collaboration between UQ and DTU;
- Expand research outputs through co-publications, researcher and PhD student mobility and joint projects;
- Explore external funding opportunities through Australian Research Council, Novo Nordisk Foundation, and the Innovation Fund Denmark.

Zoom access links:

[Session 1: Tuesday 7 September, 4-6pm AEST, 8-10am DNK](#)

[Session 2: Wednesday 8 September, 4-6pm AEST, 8-10am DNK](#)



THE UNIVERSITY
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CREATE CHANGE



Program

Tuesday 7 September, 4-6pm AEST | 8-10am DNK; zoom access link: <https://uqz.zoom.us/j/87353041924>

Time	Details
4 - 4:10pm AEST 8 - 8:10am DNK	Welcome: Professor Deborah Terry AO , President and Vice-Chancellor, UQ Professor Anders O. Bjarklev , President, DTU
4:10 - 4:15pm AEST 8:10 - 8:15am DNK	Introduce session and presentation: Professor Andrew White , Chair
4:15 - 4:45pm AEST 8:15 - 8:45am DNK	Senior researchers' presentation (15 mins each) Optical Quantum Computing and the Quantum Internet Professor Timothy Ralph , Faculty of Science, UQ Clusters and kittens in fibre Professor Jonas Neergaard-Nielsen , Department of Physics, DTU
4:45 - 5:30pm AEST 8:45 - 9:30am DNK	PhD students' presentation (15 mins each) Squeezed light quantum metrology: Beating the NOON state Jens Arnbak Holbøll Nielsen , DTU Overcoming the repeaterless bound in continuous-variable quantum communication without quantum memories Matthew Winnel , UQ Fiber transmission and detection of squeezed states of light with a phase-locked local local oscillator Iyad Suleiman , DTU
5:30 - 5:50pm AEST 9:30 - 9:50am DNK	Discussion
5:50 - 6:00pm AEST 9:50 - 10:00am DNK	Closing: Professor Andrew White , Chair



Wednesday 8 September, 4-6pm AEST | 8-10am DNK; zoom access link: <https://uqz.zoom.us/j/83423375700>

Time	Details
4 - 4:10pm AEST 8 - 8:10am DNK	Introduce session and presentation: Professor Jonas Neergaard-Nielsen , Chair
4:10 - 4:40pm AEST 8:10 - 8:40am DNK	Senior researchers' presentation (15 mins each) Quantum sensors for applications in life science Professor Ulrik Lund Andersen , Department of Physics, Center for Macroscopic Quantum States, DTU Quantum sensing: nanomechanical devices and biological measurements Professor Warwick Bowen , Director, The University of Queensland Precision Technologies Translation Hub
4:40 - 5:10pm AEST 8:40 - 9:10am DNK	PhD students' presentation (15 mins each) Feedback cooling of mechanical oscillators from room temperature Angelo Manetta , DTU Optical-to-mechanical state transfer through feedback Amy van der Hel , UQ
5:10 - 5:40pm AEST 9:10 - 9:40am DNK	Funding presentation (5 mins each) Innovation Fund Denmark opportunities Jens Peter Vittrup , Senior International Advisor, Innovation Fund Denmark ARC funding opportunities Dr Robert Mun , Executive Director, Engineering and Information Sciences, Australian Research Council Novo Nordisk Foundation funding opportunities Kasper Nørgaard , Novo Nordisk Foundation UQ Research Office support for research applications and partnerships Dr Lucy Buzacott , Research Office (Flagships and International Grants), UQ EU funding opportunities (Horizon Europe) Barbara Spano , Office for Research, Advice and Innovation, DTU Danish national quantum network Ulrik Busk Hoff , Department of Physics, DTU
5:40 - 5:55pm AEST 9:40 - 9:55am DNK	Discussion
5:55 - 6:00pm AEST 9:55 - 10:00am DNK	Closing: Professor Jonas Neergaard-Nielsen , Chair Dr Jessica Gallagher , Pro-Vice-Chancellor, UQ



Biographies



Professor Deborah Terry AO
President and Vice-Chancellor
The University of Queensland

BA (Hons) ANU, PhD ANU, FASSA, FAPS

Professor Deborah Terry AO is Vice-Chancellor and President of The University of Queensland (UQ). Prior to commencing this role in August 2020, she served as Vice-Chancellor of Curtin University, in Western Australia (from February 2014 to July 2020).

Professor Terry was made an Officer in the General Division of the Order of Australia (AO) in June 2015, in recognition of her distinguished service to education in the tertiary sector.

She is also Chair of the Board of Universities Australia; a Fellow and past President of the Academy of Social Sciences in Australia; an appointed member of the Australian Research Council Advisory Council; and serves on the Australia and New Zealand School of Government Board and Australia's Academic and Research Network Board.

Having grown up in Perth and Canberra, Professor Terry completed her PhD in Social Psychology at the Australian National University in Canberra. From there, she commenced her distinguished career at UQ in 1990, initially as an internationally recognised scholar in psychology. During her 24 years at UQ, Professor Terry progressed through a number of senior leadership roles to become Senior Deputy Vice-Chancellor, before leaving for her role as Vice-Chancellor of Curtin University in early 2014.



Professor Anders O. Bjarklev
President
Technical University of Denmark

Professor Anders O. Bjarklev is the 15th President of Technical University of Denmark. Before becoming the President of DTU in 2011, he was Provost and Executive Vice President at DTU, following a position as Head of Department at DTU's Department of Photonics.

Professor Bjarklev is also the head of the Danish Rectors' Conference and the Danish Academy of Technical Sciences. He has received numerous awards and accolades—including the Order of the Dannebrog in 2013, Fellow of the Optical Society of America in 2005, and recipient of the Villum Kann Rasmussen Annual Award for Technical and Scientific Research in 2004.

Professor Bjarklev achieved his MSc degree in Electrical Engineering from DTU in 1985. He gained his PhD in 1988, his Doctor Technicus in 1995 (dr. techn.), and his professorship in 1999. His scientific production is extensive, including more than 150 scientific articles in international publications. Professor Bjarklev has served as a referee for several scientific journals, including Science and Nature. He has extensive teaching experience, and his research has resulted in 20 patents / patent applications and led to the establishment of two companies and an extensive network in the ICT industry.



Dr Jessica Gallagher

Pro-Vice-Chancellor (Global Engagement and Entrepreneurship)
The University of Queensland

Dr Jessica Gallagher is the Pro-Vice-Chancellor, Global Engagement and Entrepreneurship, at The University of Queensland (UQ) where she is responsible for the continued development and implementation of the University's Global Strategy and Partner Engagement Framework.

She leads a number of key institutional partnership activities, strategic engagement events, business development opportunities and a wide range of programs designed to create change in global communities and to extend the University's reputation and reach.

Dr Gallagher also leads the ongoing development of UQ's Entrepreneurship Strategy. Encompassing high-level oversight of UQ Ventures – the umbrella brand for the University's suite of entrepreneurial activities and programs – her leadership is expanding links with local, national and international entrepreneurship ecosystems.

Jessica is an Adjunct Senior Lecturer in UQ's School of Languages and Cultures. She holds a PhD in Comparative Cultural Studies from UQ and is a graduate of the Australian Institute of Company Directors.

Dr Gallagher is also a Director on the board of the Kokoda Track Foundation (KTF) where she provides expertise and support KTF to improving the lives and futures of Papua New Guineans.



Professor Andrew White
School of Mathematics and Physics
The University of Queensland

Professor Andrew White was raised in a Queensland dairy town, before heading south to the big smoke of Brisbane to study chemistry, maths, physics and, during the World Expo, the effects of alcohol on uni students from around the world. Deciding he wanted to know what the cold felt like, he first moved to Canberra, then Germany—completing his PhD in quantum physics—before moving on to Los Alamos National Labs in New Mexico. Over the years he has conducted research on various topics including shrimp eyes, nuclear physics, optical vortices, and quantum computers. He likes quantum weirdness for its own sake, but his current research aims to explore and exploit the full range of quantum behaviours—notably entanglement—with an eye to engineering new technologies and scientific applications. He is currently Director of the Centre of Engineered Quantum Systems, an Australia-wide, 14-year long, research effort by 260 scientists to build quantum machines that harness the quantum world for practical applications.



Professor Jonas S. Neergaard-Nielsen
Department of Physics
Technical University of Denmark

Professor Jonas S. Neergaard-Nielsen is a Senior Researcher at DTU Physics, focusing on experimental continuous-variable quantum optics and quantum information with particular interest in non-Gaussian states. He obtained his MSc and PhD from the Niels Bohr Institute, University of Copenhagen, on generation of single photons and “kitten” states of light. After three years at NICT in Tokyo working on entanglement distillation and teleportation, he returned to Denmark for a postdoc and later a senior researcher position at DTU Physics. Recent and ongoing work from his team includes distributed phase sensing with entangled light, large-scale continuous-variable cluster states, quantum receivers beyond the standard quantum limit, and quantum communication using non-Gaussian states of light. He still can’t keep away from turning some mirrors when going to the lab, and he is apparently still not senior enough to break everything when he does.



Professor Timothy Ralph
Faculty of Science
The University of Queensland

Professor Timothy Ralph obtained a BSc Hons from Macquarie University and PhD in Physics from The Australian National University. Professor Ralph has extensive experience in quantum technology, quantum optics and optical implementations of quantum information techniques. He has more than 350 publications in international journals including Nature and Science. He is a Fellow of the Australian Academy of Science and a recipient of the AIP Alan Walsh Medal for industry engagement. Tim is a founding member of the Governing Executive of the Centre of Excellence for Quantum Computation and Communication Technology. He collaborates with a large number of national and international university research groups and with industry partners such as Quintessence Labs and Northrop Grumman. He has been a consultant for Xanadu, Canada, the Defence Science and Technology Group and the Australian Strategic Policy Institute.



Professor Ulrik Lund Andersen
Department of Physics, Center for Macroscopic Quantum States
Technical University of Denmark

Professor Ulrik L. Andersen is heading the section for Quantum Physics and Information Technology at DTU Physics and the DNRF Center of Excellence on Macroscopic Quantum States (bigQ). He conducts research in quantum information science and explores its applications in life science and security. For example, his lab has recently demonstrated a new scalable platform for quantum computing and novel quantum sensors for monitoring magnetic signal from mammalian tissue. His group also dedicates large efforts in translating quantum technology into industry.



Professor Warwick Bowen

Director, The University of Queensland Precision Technologies Translation Hub
The University of Queensland

Professor Warwick Bowen's research focuses on the implications of quantum science on precision measurement, and applications of quantum measurement in areas ranging from quantum condensed matter physics to the biosciences. He is a Fellow of the Australian Institute of Physics, Director of the University of Queensland Precision Technologies Translation Hub, and a Theme Leader of the Australian Centre for Engineered Quantum Systems. His lab has significant efforts in using quantum light and quantum-limited technologies to improve biological microscopy. They also have active research efforts on integrated photonics, quantum control of macroscopic mechanical devices, and superfluid helium physics. Professor Bowen's research is supported by the Australian Research Council, the US Air Force Office of Scientific Research, Lockheed Martin, the US Army Research Office and the Australian Defence Science and Technology Group.



Jens Arnbak Holbøll Nielsen

PhD student, Department of Physics
Technical University of Denmark

Jens Arnbak Holbøll Nielsen is a PhD student at DTU Physics, where he works in squeezed light generation with a focus on applications in quantum sensing and computing. A part of Jens' work revolves around optical phase sensing using squeezed states of light and how to optimize these types of protocols for various quantum channels. Jens has a background in atomic physics from Copenhagen University, where he wrote his Master's thesis in bio-magnetic field sensing using atomic vapor magnetometers under the supervision of Eugene Polzik.



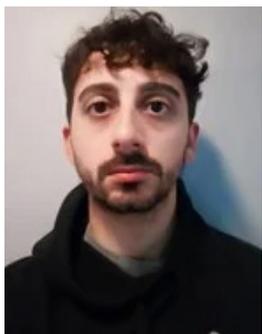
Matthew Winnel
PhD student
The University of Queensland

Matthew Winnel is a current PhD student in quantum optics and quantum error correction at the University of Queensland working with Timothy Ralph. He is also collaborating with Iyad Suleiman, Jonas Neergaard-Nielsen, and Ulrik Andersen at the Technical University of Denmark. Matt's main research interest is about how to protect fragile quantum states from noise which is vital for long-distance quantum communication and fault-tolerant quantum computing. He has written several research papers in the field of quantum key distribution, quantum repeaters, and noiseless linear amplification. Matt was awarded First Class Honours in Physics from the University of Sydney where he gained research experience in quantum physics and astronomy.



Iyad Suleiman
PhD student, Department of Physics
Technical University of Denmark

Iyad Suleiman is a PhD student at DTU Physics, developing long-distance quantum communications with non-classical states of light and continuous variables quantum repeaters. He has worked with continuous variables quantum key distribution using squeezed states of light, in close collaboration with Tobias Gehring, Jonas Neergaard-Nielsen, Matt Winnel and Tim Ralph, and developed a real-time local oscillator for homodyne detection of squeezed states of light over long distance. He graduated with a MSc in Telecommunications Engineering at Università degli Studi di Padova, with a specialization in photonics and optical communications, which he deepened at École polytechnique fédérale de Lausanne during a year-long exchange program.



Angelo Manetta
PhD student, Department of Physics
Technical University of Denmark

Angelo Manetta received a master's degree in condensed matter physics from Sapienza University of Rome. Focusing on semiconductor nanophotonics, he carried out part of his studies at the Université Grenoble Alpes, France where he completed a master thesis project at the CEA-Inac. He is currently a PhD student at DTU Physics where he is working on cavity optomechanics. His goal is to induce non-classical states in macroscopic mechanical resonators, thus paving the way to important applications for both quantum computation and sensing.



Amy van der Hel
PhD student
The University of Queensland

Amy van der Hel received her MSc at the University of Amsterdam. Her graduation project was on sliced photonic crystal nanobeams as quantum transducers at AMOLF with Ewold Verhagen. That project inspired her to apply for the research project at UQ in the Quantum Optics Lab with Professor Warwick Bowen.



Jens Peter Vittrup
Senior International Advisor
Innovation Fund Denmark

Jens Peter Vittrup is a Senior International Advisor at Innovation Fund Denmark. He works with international relations, industrial R&D policy, the Eurostars and EUREKA programmes and has frequent interaction with universities. Innovation Fund Denmark is a Danish Fund for industrial oriented R&D funding with an annual budget of 300 mio. Euros. The annual budget for international projects is 30 mio. Euros.



Dr Robert Mun
Executive Director, Engineering and Information Sciences
Australian Research Council

Dr Robert Mun joined the ARC in May 2018 as Executive Director for Engineering and Information Sciences. Dr Mun has a strong technical background as a researcher, and has had an extensive career in the Australian Government. Prior to joining the ARC, Dr Mun was Branch Head at the Defence Science and Technology Group with the Australian Department of Defence, and previously was Scientific Advisor to Navy and to the Defence Material Organisation, and Senior Scientist leading systems engineering research, also with the Department of Defence. With research expertise commencing in the area of fluid mechanics, through his subsequent Australian Government roles, his experience has extended to complex systems integration, focusing on the integration and networking of multiple Defence systems. His research team's speciality was including the human element within the engineering solution.



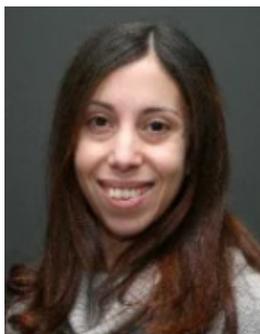
Dr Kasper Nørgaard
Senior Scientific Lead
Novo Nordisk Foundation

Dr Kasper Nørgaard is a Senior Scientific Lead at Novo Nordisk Foundation in Denmark. He works with the development and implementation of new strategic initiatives as well as open competition grants with natural and technical sciences.



Dr Lucy Buzacott
Senior Manager, Research
The University of Queensland

Dr Lucy Buzacott leads the Flagships and International portfolios in the University of Queensland Research Office as Senior Manager, Research. She was previously Research Manager at the University of Melbourne and has worked as a consultant in education, arts, and the creative industries sectors. She has a PhD in Literary Studies from the University of Queensland.



Barbara Spano

Chief Advisor, Office for Research, Consultancy, and Innovation
Technical University of Denmark

Barbara Spano works as Chief Advisor at the Office for Research, Consultancy, and Innovation at the Technical University of Denmark. She has over 15 years' experience working with International Relations and Research Management in the Government, Intergovernmental Partnerships, Universities, and International University Alliances in both Italy and Denmark.



Ulrich Busk Hoff

Senior Advisor, Department of Physics
Technical University of Denmark

Ulrich Busk Hoff is a Senior Adviser at DTU's Department of Physics, where he is connected to the Center for Macroscopic Quantum States. He has co-published with the University of Queensland.