



QuantumWorks NEWSLETTER

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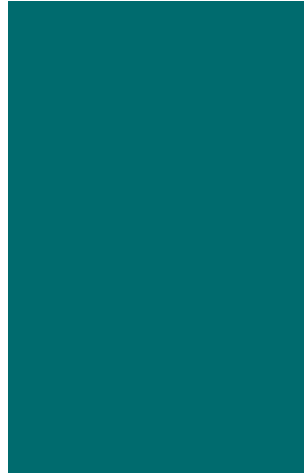
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sored by QuantumWorks

Write To Us....

We want to hear from you!
Do you have a new publi-
cation you'd like to share?
An event to advertise? A
postdoc position to fill?

The semiannual Quan-
tumWorks newsletter is
always looking for infor-
mation from members
and our partners.

To contribute, or for any
questions, comments or
general feedback about
the newsletter, con-
tact Research Network
Manager Sean Collins at
collins@iqc.ca



Third Annual General Meeting & Technical Conference

QuantumWorks is holding its Third Annual General Meeting & Technical Conference June 5 & 6 at the Hôtel Gouverneur Place Dupuis in Montréal, Québec.

The event brings together industry, institutional and government partners to interact with QuantumWorks members, emerging scientists and other quantum information researchers to discuss research at the cutting edge of quantum information processing.

The keynote speaker for the event is **Dr. Suzanne Fortier**, president of the Natural Sciences and Engineering Research Council of Canada (NSERC). Other speakers at the event include **Thomas Chapuran**, Senior Scientist, Network Management Research, Telcordia Technologies; **Ned Allen**, Senior Fellow & Chief Scientist, Lockheed Martin Advanced Development (The Skunk Works); and **Eric Holdrinet**, Consul and Trade Commissioner – Science and Technology Partnerships from the Consulate General of Los Angeles.

The Third meeting being in early June is in contrast to the late September timeframe of the previous two events. Our previous Annual General Meeting & Technical Conference was held in Calgary, Alberta in September 2007 and was a great success, with approximately 100 participants. The highlight for QuantumWorks was the vote by members to induct six new researchers into the organization, expanding our total to 30. Our six new members are profiled in this newsletter.

Visit quantumworks.ca for highlights and footage of our previous events. The talks from this year's event will be available for download soon.

The location of the 2009 Annual General Meeting & Technical Conference will be discussed at this year's event in Montréal.

Meet Our Newest Members...



Norbert Lütkenhaus

Norbert Lütkenhaus studied at the RWTH Aachen and the LMU Munich, from which he graduated with a thesis in general relativity. He studied quantum optics and quantum cryptography under the supervision of Stephen M. Barnett at the University of Strathclyde, Scotland, UK. In 1996 he obtained his PhD. After postdoc positions in Innsbruck (Peter Zoller and Ignacio Cirac) and the Helsinki Institute of Physics (Kalle-Antti Suominen) he worked for MagiQ Technologies (New York) to initiate the project of commercial realisation of quantum key distribution. Returning to academia in 2001, he built up and led an Emmy-Noether Research Group at the University of Erlangen-Nürnberg, during which time he did his habilitation (2004). Currently he is an Associate Professor in the Physics Department of the University of Waterloo and a member of the Institute of Quantum Computing.

His research interests lie in quantum communication and its quantum optical implementations. They include: the theory of practical QKD systems, methods and tools for entanglement verification, linear optic quantum logic operation and measurement implementation and quantum state detection and estimation theory.

In addition to the known effective decoy state protocol, two other schemes are in the current focus of attention: continuous-variable quantum key distribution and differential phase-shift QKD. It is the goal of Norbert's research to provide a thorough security analysis for both schemes.



Wolfgang Tittel

Wolfgang Tittel studied Physics at the University of Frankfurt in Germany, was a Ph.D. student at the University of Geneva in Switzerland with Nicolas Gisin, and did post doctoral work at the University of Århus, Denmark and again in Geneva. He joined the Department of Physics and Astronomy and the Institute for Quantum Information Science at the University of Calgary as Associate Professor and iCORE Industrial Research Chair in July 2006, and is also affiliated to the Centre for Information Security and Cryptography.

He engaged in ground-breaking experiments in the field of quantum communication from the early stages on. The investigations were seminal in bringing quantum cryptography out of the laboratory and into the real world using a standard telecommunication fibre network, thereby raising both scientific and public awareness and appreciation that quantum technology is not restricted to contrived laboratory settings. Wolfgang's current interests include practical quantum cryptography, quantum relays, and quantum memory.

Wolfgang's research group will supplement QuantumWorks efforts to develop Canadian quantum cryptographic prototypes plus various building blocks required to overcome the distance barrier.



Frank Wilhelm

Frank Wilhelm studied physics at the University of Karlsruhe in Germany, where he obtained his Vordiplom (B.S.) in 1993, Diplom (M.S.) in 1996, and Doctorate in 1999. His thesis research was in condensed matter theory in the group of G. Schoen, studying superconducting nanodevices. He started working on quantum computing in 1999, when he joined the experimental physics group of J.E. Mooij in what is now known as the Kavli institute for Nanoscience at the TU Delft in the Netherlands. Still being a theorist, he moved to the LMU Munich in 2001, where he obtained the Habilitation and was appointed lecturer in 2004. He joined the University of Waterloo and the Institute for Quantum Computing in 2006.

In particular, Frank investigates quantum computing with superconducting nanocircuits, decoherence theory, circuit QED, control theory, quantum noise, mesoscopic physics and nanodevices, and nonequilibrium quantum statistics.

His research connects the description of matter – primarily condensed matter, but also optical systems and spins – by the tools of condensed matter physics and nonequilibrium quantum statistical physics to the challenges of quantum information. Through this, Frank is able to connect to the experimentalists and the physics-oriented theorists on the one hand, and the quantum information researchers on the other.



Li Qian

Li Qian is an Assistant Professor in the Department of Electrical & Computer Engineering (Photonics Group), at the University of Toronto. Her group currently conducts research in experimental Quantum Key Distribution, nonlinear fibre optics, and fiber optic sensing/metrology.

She received her B.A.Sc., M.A.Sc. and Ph.D. degrees in 1993, 1996 and 2000, respectively, all from the University of Toronto. She was a Senior Scientist in Corning Incorporated from 2000 to 2003, where she and her colleagues developed the extended L-band erbium-doped fiber amplifiers (EDFA), extending the commercial EDFA amplification bandwidth to 1620 nm for the first time. She joined the University of Toronto faculty in 2003, and received the Premier's Research Excellence Award in Ontario in the same year. In 2006, Li was elected Senior Member of the IEEE. She currently holds the Canada Research Chair in Photonic Technologies and Applications (2006-2011).

Li's group proposes to develop a compact, robust, fiber-based entangled photon source, a fiber-based QKD system running continuous-variable protocols and study its feasibility for practical deployment.

In collaboration with fellow QuantumWorks member Hoi-Kwong Lo a comprehensive experimental QKD test facility has been established.



Jan Kycia

Jan Kycia received a B.Sc. in Physics from McGill University in 1989. In 1991 he completed a M.Sc. Physics at the University of Pennsylvania. In 1997, he graduated from Northwestern University with a Ph.D. in Physics.

Jan was awarded the NSERC Postdoctoral Fellowship in 1998, the Research Corporation's Research Innovation Award (for Novel TES detector) in 2001 and the Ontario Early Research Award, (Applied superconducting devices) in 2007.

Jan's group works on the experimental investigation of quantum mechanical properties of sub-micron and micron scaled superconducting devices. In particular, superconducting single electron transistors (sSETs), SQUIDs (superconducting quantum interference devices), and TESs (transition edge sensors). The group is studying the 1/f noise in Josephson junctions. This 1/f noise may be an intrinsic limitation to the coherence time of superconductor-based qubits. The group is also working to improve the cryogenic electronics for reading electron spin based qubits and detecting single photons.

SQUIDs are the most sensitive sensors of magnetic fields. For example, a SQUID can detect a change in magnetic field as little as 100 billion times weaker than the earth's magnetic field, which is responsible for moving compass needles. Jan leads a research team that will improve the devices by studying their intrinsic noise, an obstacle for use in quantum computing. The work will produce new measurement techniques that could be used in everything from medical scans to mineral exploration.



Louis Salvail

Louis Salvail studied computer science at the university of Montreal where he obtained his Ph.D. in 1998 under the supervision of Gilles Brassard and Claude Crépeau. His main research interest is quantum cryptography.

In 1998, he came to the department of computer science at the University of Århus to work primarily on the development of a prototype for quantum key distribution. A center, called CKI, was established to support the experiment developed by a joint effort between the department of physics and computer science at the University of Århus.

Louis Salvail is involved in the European project SECOQC as a research leader for the SECURITY subproject. The project aims at implementing a global network for secure communication based on quantum key distribution. He is also involved in a project called QUSEP funded by the Danish Agency for Science, Technology and Innovation. QUSEP aims at demonstrating the possibility of using quantum cryptography in practical 2-party settings with security proven in the bounded quantum-storage model.

In June 2008, Louis will return to Canada and join the team at the Université de Montréal. He will collaborate with Gilles Brassard on Merkle Puzzles and he will study the bounded quantum memory model.

We've Moved...

QuantumWorks offices have made a short move from their previous premises to a new building in Waterloo's Research and Technology Park. The QuantumWorks mailing address remains 200 University Ave. W., Waterloo, ON N2L 3G1. Our phone numbers also remain the same, while our fax number is now +1 519 888 7214.



Upcoming Sponsored Events

QuantumWorks is proud to support ...

Ninth International Conference on Quantum Communication, Measurement and Computing (QCMC), which will be held at the University of Calgary 19-24 August 2008. The conference will be attended by the world's best quantum information scientists, providing an opportunity for exchange of ideas, networking, and collaboration between Canadian and international researchers, as well as exposure of Canadian achievements in the field.

<http://www.qcmc2008.org>

In June 2008, the **Eighth Canadian Summer School on Quantum Information** will be held at the Université de Montréal. Over five days, students will be introduced to the exciting field of quantum information science by participating in seminars led by experts in the field. This year, students will have opportunity to learn about ground-breaking research in quantum cryptography, communication complexity, pseudo-telepathy and fault-tolerant computation. <http://qischool.cs.mcgill.ca/>

The **5th Canadian Quantum Information Students' Conference (CQISC)** will be held in Montréal in June. This conference is run by and for graduate students in Quantum Information Processing (QIP). The conference is free of charge and students from across Canada, as well as from all over the world, are invited to attend. The conference consists of presentations given by students having a background in areas such as computer science, physics, mathematics, engineering and chemistry. The diversity of the audience reflects the highly multidisciplinary aspect of the field. <http://www.iro.umontreal.ca/labs/theorique/cqisc08/>

The summer school **Information Security in a Quantum World** is focused on quantum cryptography and is planned for August 7-11th 2008 at the IQC in Waterloo. The summer school is aimed at graduate students and industry researchers who know the basic ideas of quantum information and cryptography and who want to deepen their understanding of the cryptographic context, the theoretical underpinning and the experimental realisations and difficulties. <http://www.iqc.ca/qkdss>



RÉSEAU DE L'INFORMATION QUANTIQUE CANADA QUANTUM INFORMATION NETWORK CANADA

200 University Ave. W., Waterloo, Ontario, Canada N2L 3G1
p. 519-888-4567 x.38152 f. 519-888-7214

