



QuantumWorks NEWSLETTER

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Write To Us....

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

The semiannual Quantum-
Works newsletter is always
looking for information from
members and our partners.

To contribute, or for any
questions, comments or
general feedback about the
newsletter, contact Research



QuantumWorks Member Patrick Hayden Receives Research Chair

Patrick Hayden is one of the recipients of the new Perimeter Institute Distinguished Research Chair, where he will spend extended research periods at Perimeter each year while retaining permanent positions at his home institution, McGill University, in Montreal.

Patrick holds the Canada Research Chair in the Physics of Information at McGill. His research is devoted to quantum information theory which is one of the foundation topics of quantum information science. This includes the development of methods for reliably sending quantum states through 'noisy' media and for protecting quantum information from unauthorized manipulation. He also has a keen interest in exploring what lessons quantum information might have for black hole physics and cosmology.

This Chair will provide him with the opportunity to make extended visits to PI and he plans on spending at least three months of his sabbatical there in 2010-2011 and will enable him to 'get involved' in and even initiate PI activities. In addition next summer he plans on organizing a workshop along with Benoit Collins and Ion Nechita, to bring together random matrix theorists

and quantum information enthusiasts to talk about the many recently discovered connections linking our subjects.

For more information on Mr. Hayden's appointment and the other new distinguished research chairs please visit the Perimeter Institute website at: www.perimeterinstitute.ca/News/In_The_Media/Ten_New_Distinguished_Research_Chairs_Join_Perimeter/



Canadian Wins Nobel Prize in Physics

On October 6, the Royal Swedish Academy of Sciences announced that it had awarded a portion of the Nobel Prize in Physics to Willard S. Boyle.

Dr. Boyle is the retired Executive Director of Research at the Communications Sciences Division of Bell Laboratories in Murray Hill, N.J., and shares the prize with his Bell Laboratories collaborator George E. Smith, along with Charles K. Kao of the Standard Telecommunications Laboratory in Harlow, England and the Chinese University of Hong Kong.

Dr.'s Boyle and Smith were recognized for their invention of the charged-couple device (CCD) in 1969. CCDs use the photoelectric effect to transform light into electric signals. This technology is now used in a wide variety of applications, including digital photography.



Photo: Alcatel-Lucent/Bell Labs, 1974

QuantumWorks Associate Member Recipient of CFI Funding

Adrian Lupascu, an Associate Member at the Institute for Quantum Computing and University of Waterloo, is one of the newest recipients of funding through the Canada Foundation for Innovation. His research will be on *Fabrication Facility for Superconducting Quantum Devices* with funding running at \$164,000.



The CFI-funded infrastructure consists of an electron-beam evaporation system, custom-built to meet the stringent requirements for micro-fabrication of superconducting quantum devices. The equipment will complement infrastructure for

micro-fabrication at Waterloo and will be located in a clean room in the Quantum-Nano Centre, now under construction.

The EBE system will play a key role in research on superconducting quantum computing and devices. The tool will also spur research in other directions. For example, superconducting quantum devices will be used to explore quantum optics in a new domain: microwave frequencies and ultra-strong coupling between light and atoms.

“Quantum information science has the potential to revolutionize the processing and transmission of information,” says Lupascu. “It addresses the challenges of miniaturization through an emphasis on quantum effects, which are detrimental to the functioning of conventional computers. In this new framework, the subtle properties of evolution and measurement of quantum systems are used to enable applications that are not possible using present-day tools.”



QuantumWorks AGM Highlights

The Fourth **Annual General Meeting** took place at the Sutton Hotel in Toronto this year and was a great success. Key speakers included Jean-Claude Gavrel, Associate Vice-President of the Networks of Centres of Excellence of Canada (NCE) and George Ross, Assistant Deputy Minister of Ontario's Ministry of Research and Innovation. Mr. Gavrel spoke about the NCE program and Deputy Ross acknowledged the value of quantum information to Ontario and the world at large.

Technical talks included those from University of Waterloo, University of Toronto, ETSI, University of Calgary, Universite de Montreal and the Austrian Research Centre. Members highlighted their individual research areas and including their progress and goals. Some of the fascinating topics included *Space-Quest: Quantum Entanglement in Space Experiences*, *On the Power of 2-Party Quantum Cryptography*, *The Cost of Simulating Entanglement* and *A Survey of Quantum State*.

To view the lectures on-line, click on <http://www.quantumworks.ca/section/view/?fnode=130>

Save the Date!

The Fifth QuantumWorks Annual General Meeting will take place June 10 - 11, 2010 in Ottawa, Ontario!



Student Internships Available

Have you heard about QuantumWorks' Student Internship program? Similar to the NSERC IPS program, Partner Internships permits students to become more fully immersed in the transfer of their discoveries to partners by undertaking a year-long internship with a company relevant to their discovery.

As part of this internship, the student will be expected to spend at least 25% of the year at the company site, continuing work on the discovery and integrating it into the goals of the partner. The company will be expected to commit at least \$6,000 towards the internship, while QuantumWorks will contribute \$15,000.

For further information and how to apply, please contact Sean Collins at (519) 888-4567 x38152 or by email: collins@iqc.ca

QuantumWorks Participates in UW Science Day

Celebrate Science and Technology was the theme of the 2009 Science Open House which the University of Waterloo held on October 25th.

The annual open house is an opportunity for primary school children and their families to experience the wonders of modern science for the day. Hands-on experiments included turning copper into gold, making nylon and manipulating the atoms of aspirin on a computer screen.

The Open House has something for everyone, from the Chemistry Magic Show and making bottle rockets, to examining the human DNA. The IQC and QuantumWorks were on hand for guided tours of the labs and to answer questions about who we are and what we do.



Quantum to Cosmos

The Perimeter Institute hosted a highly successful week long festival in October which gave a fascinating look at the wonderful and mysterious world of quantum physics. A wide variety of subjects were presented that dealt with intriguing topics such as how quantum computers could revolutionize our security systems, virtually ensuring a hack-free environment.

Another compelling topic highlighted was **Seeing Science Through Fiction**. Everyone is familiar the speculation of time travel, warp speed and multiple universes through shows like *Star Trek*, *The Twilight Zone* and *Stargate*, but do they have any basis in fact? A compelling interview with a best-selling science fiction writer and a pioneer of virtual reality helps decipher science fact from science fiction.

Other topics of interest presented included *The Origin of the Universe and the Arrow of Time*, *Nine Billion People + 1 Planet, Are We Bound for Space?* and *Is Technology Dumbing Down Our Kids?* To view the full videos online, go to:

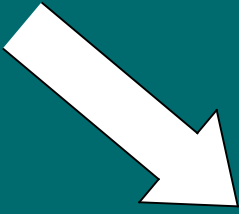
www.q2cfestival.com/program

Quantum Tamers

Speaking of Perimeter Institute, faculty and staff of IQC and QuantumWorks were invited to attend a free viewing of *The Quantum Tamers: Revealing our Weird & Wired Future*, which played at the Princess Twin Cinemas downtown Waterloo. This highly acclaimed

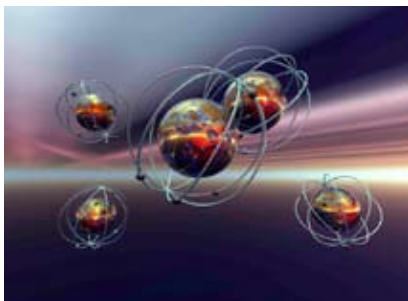
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Reminders



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documentary has already won the prestigious Prix Audace of the Pariscience International Science Film Festival award and featured some of the most brilliant minds of our time, including Raymond Laflamme, Director of IQC and Stephen Hawking who was appointed the Distinguished Research Chair at PI.



Qsearch Library

The Qsearch Library - your gateway to leading edge research is available online. The Qsearch Library catalogs technical publications from across the QuantumWorks network.

Visit <http://qsearch.quantumworks.ca> to find QuantumWorks researcher profiles, links to their homepages and a searchable database of our researchers' recent publications. Flexible search functions allow you to search by author, journal, title or keywords.

QuantumWorks members have access to update their profiles and add articles to the database.

The Qsearch Library raises the profile of quantum information research in Canada. Qsearch puts Canada's leading edge research in quantum information processing at your fingertips!



Membership has its privileges

Privileges of Associate Membership:

- Invited to attend QuantumWorks events, including closed sessions at Annual General Meetings
- eligible to request sponsorship of conferences, workshops, etc., subject to existing QuantumWorks regulations
- short-listed to become full Members of QuantumWorks, should another round of nominations arise

Induction of Associate Members

Existing QuantumWorks Members may nominate an individual at a university or research institution with whom they are or will be collaborating. Nominees may also be a representative of a private company or other organization with an interest in quantum information.

The nomination process remains open. Nomination forms are available at www.quantumworks.ca

Apply today!



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