Submittee: Theresa Liao
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Title: (final) Workshop on Quantum Algorithms, Computational Models, and Foundation of Quantum Mechanics
Event Type: Conference-Workshop

Location:
Department of Physics & Astronomy, University of British Columbia

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Dates:
July 23-25, 2010

Topic:
Mathematical aspects of quantum information: algorithms, computational models and foundations of quantum mechanics.

Methodology:
9 invited presentation, 12 contributed talks, and 8 poster presentations; workshop banquet dinner; poster session; D-Wave tours. The Workshop on Quantum Algorithms, Computations Models, and Foundation of Quantum Mechanics is a satellite event for the 10th Canadian Summer School on Quantum Information. Please note that due to the nature of the QI10 Summer School and QAMF workshop all funding agencies funded both events simultaneously (see sponsorship section). A separate report is submitted for the QI10 Summer School.

Objectives Achieved:
The research workshop was a satellite event to the 10th Canadian Summer School on Quantum Information. We aimed to bring experts working on the summer school topics to Vancouver and have them interact with each other and workshop participants. The workshop also served as an opportunity to see real-world research, given they had learned some knowledge from the school. Their feedback was positive.

Scientific Highlights:
-"Whether Adiabatic quantum computation/optimization will be hindered by first-order quantum phase transitions." There were an invited talk by Boris Altshuler (a famous condensed-matter physicist) and an contributed talk by Vicky Choi (a computer scientist). They provided different viewpoints on this issue. Both engaged in intense and friendly discussions, as well as from the workshop participants - Another highlight of the workshop was the talk "Quantum metropolis sampling," which reported progress on the use of quantum computers as simulators for physical systems. - A notable contributed talk was "Fast decoders for topological quantum codes" which presented an important development in quantum coding theory - Additionally, the poster session provided yet another platform for technical discussions and interaction of the participants at an informal level.

Organizers:
Raussendorf, Robert. Physics & Astronomy, University of British Columbia; Liao, Theresa. Physics & Astronomy, University of British Columbia; Amin, Mohammad. D-Wave Systems Inc.; Lisonek, Petr. Mathematics, Simon Fraser University; Sanders, Barry. Physics & Astronomy, University of Calgary; Sarvepalli, Pradeep Kiran. Physics & Astronomy, University of British Columbia; Wei, Tzu-Chieh. Physics & Astronomy, University of British Columbia.

Speakers:
Invited Presentations - Boris Altshuler, Columbia University, New York, NY, USA (Adiabatic quantum optimization and Anderson localization) - Daniel E. Browne, University College London, UK (Correlations in Measurement-Based Quantum Computing and Bell Inequalities) - Gemma De las Cuevas, Universität Innsbruck, Innsbruck, Austria (Unifying Classical Spin Models Using A Quantum Formalism) - Steve Flammia, Perimeter Institute, Waterloo, ON, Canada (Adiabatic Quantum Transistors) - Daniel Lidar, University of Southern California, Los Angeles, CA, USA (Combining dynamical decoupling with fault-tolerant quantum computation) - David Poulin, Université de Sherbrooke, Sherbrooke, QC, Canada (Quantum Metropolis Sampling: An algorithm to simulate thermal systems with a quantum computer) - Rob Spekkens, Perimeter Institute, Waterloo, ON, Canada (Why the quantum? Insights from classical theories with a statistical restriction) - Maarten van den Nest, Max-Planck-Institut für Quantenoptik, Garching, Germany (Simulating quantum computers with probabilistic methods) - Pawel Wocjan, University of Central Florida, Orlando, Florida, USA (Quantum Algorithm for Preparing Thermal Gibbs States) *Contributed Talks* - Gorjan Alagic (post-doc), Institute for Quantum Computing, University of Waterloo (Quantum Algorithms from Topological Quantum Field Theories) - Hector Bombin (post-doc), Perimeter Institute (Twists in topological codes) - Vicky Choi (professor), Virginia Tech (Adiabatic Quantum Algorithms for the NP-Complete Maximum-Weight Independent Set, Exact Cover and 3SAT Problems) - Guillaume Duclos-Cianci (graduate student), Université de Sherbrooke (Fast Decoders for Topological Quantum Codes) - Chris Ferrie (graduate student), Institute for Quantum Computing University of Waterloo (On the relevance of quasi-probability representations to quantum foundations and quantum information theory) - Ernesto F. Galvão (professor), Instituto de Física, Univ. Federal Fluminense, Brazil (Closed time-like curves in measurement-based quantum computation) - Viv Kendon (post-doc), University of Leeds (Fractional scaling of quantum walks on percolation lattices) - Akimasa Miyake (post-doc), Perimeter Institute for Theoretical Physics (Quantum computation on the edge of a symmetry-protected topological order) - Eduardo R. Mucciolo (professor), University of Central Florida, USA (For How Long Is It Possible To Quantum Compute?) - Osama Moussa (post-doc), Institute for Quantum Computing and Department of Physics and Astronomy, University of Waterloo (Testing Contextuality on Quantum Ensembles with One Clean Qubit) - Michael Mullan (graduate student), University of Colorado at Boulder, USA (A Numerical Quantum and Classical Adversary) - Vincenzo Tamma (graduate student), Department of Physics, University of Maryland, Baltimore, Maryland (Factoring numbers with periodic interferograms) *Poster Presentations* - Toshihico Arimitsu (professor), Graduate School of Pure and Applied Sciences, University of Tsukuba (Non-equilibrium Thermo Field Dynamics and Its Application to Quantum Information) - Colin Benjamin (post-doc), Center for Simulational Physics, Dept. of Physics & Astronomy, Univ. of Georgia, Athens (Detecting Majorana bound states) - Vicky Choi (professor), Virginia Tech (Minor-Embedding in Adiabatic Quantum Optimization) - Neil G. Dickson (industrial scientist), D-Wave Systems, Inc. (Algorithmic Approach to Adiabatic Quantum Optimization) - Toru Kawakubo (graduate student), Kyoto University (Homodyne detection in view of joint probability and quantum state of laser) - Olivier Landon-Cardinal (graduate student), D épartement de Physique, Universit é de Sherbrooke, Sherbrooke, Qu ébec, Canada (Efficient Direct Tomography for Matrix Product States) - Tzyh Haur YANG (graduate student), Centre for Quantum Technologies, National University of Singapore, Singapore (Inequalities for the quantum set)

Links:

http://qi10.ca