

# Vlad Gheorghiu – Curriculum Vitae

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## Education and Work Experience

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- 2013 – currently, Postdoctoral Researcher, **Institute for Quantum Computing at the University of Waterloo**, Waterloo ON, Canada.
- 2011 – 2013, Postdoctoral Researcher, **Institute for Quantum Information Science**, Faculty member, **Department of Mathematics and Statistics**, **University of Calgary**, Calgary AB, Canada.
- 2010 – 2011, Postdoctoral Research Associate, **Carnegie Mellon University**, Pittsburgh, PA 15213, USA, working with Prof. Robert B. Griffiths.
- 2004 – 2010, PhD in Physics, Quantum Information Theory, **Carnegie Mellon University**, Pittsburgh, PA 15213, USA. Dissertation Title: “Separable Operations, Graph Codes and the Location of Quantum Information”. Thesis advisor: Prof. Robert B. Griffiths.
- 1999 – 2003, B.S. in Theoretical Physics, **University of Bucharest**, Romania. Graduated with a GPA of 9.81 on a scale from 1 to 10. Diploma Thesis Title: “Adiabatic Perturbation Theory in Quantum Mechanics”. Thesis advisor: Prof. Gheorghe Nenciu.

## Honors and Awards

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- 2011–2013, \$40,000 (CAD) Pacific Institute for the Mathematical Sciences Postdoctoral Fellowship Award under the Collaborative Research Group in Mathematics of Quantum Information. Application success rate  $\sim 15\%$ .
- 2012 Postdoctoral Fellow Departmental Competition, Department of Mathematics and Statistics, University of Calgary, Canada. 3 nominations out of 10 candidates.
- 2004–2010, University Tuition Scholarship, Carnegie Mellon University, USA.
- 1994, 1997, 1998, Romanian National Physics Olympiad Laureate.

## Publications

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2014

- *Vlad Gheorghiu*, “**Quantum++ - A C++11 Quantum Computing Library**”, arXiv:1412.4704 [quant-ph] (2014).
- *Vlad Gheorghiu* and Barry C. Sanders, “**Nonzero Classical Discord**”, arXiv:1407.5507 [quant-ph] (2014).
- *Vlad Gheorghiu*, “**Standard Form of Qudit Stabilizer Groups**”, arXiv:1101.1519 [quant-ph], *Physics Letters A* **378**, 505–509 (2014).
- German Luna, Samuel Reid, Bianca de Sanctis and *Vlad Gheorghiu*, “**A Combinatorial Approach to Quantum Error Correcting Codes**”, arXiv:1304.6743 [math], *Discrete Mathematics, Algorithms and Applications*, vol. **6**, 1450054 (2014).

## 2013

- *Vlad Gheorghiu* and Barry C. Sanders, “**Accessing Quantum Secrets via Local Operations and Classical Communication**”, *Physical Review A* **88**, 022340 (2013).
- Shmuel Friedland, *Vlad Gheorghiu* and Gilad Gour, “**Universal Uncertainty Relations**”, arXiv:1304.6351 [quant-ph], *Physical Review Letters* **111**, 230401 (2013).

## 2012

- Patrick J. Coles, *Vlad Gheorghiu* and Robert B. Griffiths, “**Collisional Decoherence of Tunneling Molecules: a Consistent Histories Treatment**”, arXiv:1205.6188 [quant-ph] (2012), *Physical Review A* **86**, 042111 (2012).
- *Vlad Gheorghiu* and Gilad Gour, “**Multipartite Entanglement Evolution Under Separable Operations**”, arXiv:1205.2667 [quant-ph] (2012), *Physical Review A* **86**, 050302 (Rapid Communication) (2012).
- *Vlad Gheorghiu*, “**Generalized Semiquantum Secret-Sharing Schemes**”, arXiv:1204.1072 [quant-ph], *Physical Review A* **85**, 052309 (2012).

## 2011

- Patrick J. Coles, Li Yu, *Vlad Gheorghiu* and Robert B. Griffiths, “**Information Theoretic Treatment of Tripartite Systems and Quantum Channels**”, arXiv:1006.4859 [quant-ph], *Physical Review A* **83**, 062338 (2011).

## 2010

- *Vlad Gheorghiu*, “**Separable Operations, Graph Codes and the Location of Quantum Information**”, Carnegie Mellon University PhD thesis, arXiv:1006.4888 [quant-ph], also available at ProQuest Dissertation & Theses under Publication No. AAT 3470169, ISBN 9781124122816 (2010).
- *Vlad Gheorghiu*, Li Yu and Scott M. Cohen, “**Local Cloning of Entangled States**”, *Physical Review A* **82**, 022313 (2010).
- *Vlad Gheorghiu* and Shiang Yong Looi, “**Construction of Equally Entangled Bases in Arbitrary Dimensions via Quadratic Gauss Sums and Graph States**”, *Physical Review A* **81**, 062341 (2010).
- *Vlad Gheorghiu*, Shiang Yong Looi and Robert B. Griffiths, “**Location of Quantum Information in Additive Graph Codes**”, *Physical Review A* **81**, 032326 (2010).

## 2008

- *Vlad Gheorghiu* and Robert B. Griffiths, “**Separable Operations on Pure States**”, *Physical Review A* **78**, 020304 (Rapid Communication) (2008).
- Shiang Yong Looi, Li Yu, *Vlad Gheorghiu* and Robert B. Griffiths, “**Quantum Error Correcting Codes Using Qudit Graph States**”, *Physical Review A* **78**, 042303 (2008).

## 2007

- *Vlad Gheorghiu* and Robert B. Griffiths, “**Entanglement Transformations Using Separable Operations**”, *Physical Review A* **76**, 032310 (2007).

## Conferences/Workshops/Summer Schools/Talks

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- Invited, **North South Dialogue in Mathematics**, Edmonton AB, Canada, 4 May 2012: Vlad Gheorghiu, "Quantum entanglement: properties and evolution".
- Contributed Talk, **Southwest Quantum Information and Technology (SQUINT 2012), 14th Annual Meeting**, Albuquerque NM, USA, 16-19 February 2012: Vlad Gheorghiu, "Optimal hybrid quantum secret sharing schemes via stabilizer codes and twirling of symplectic structures".
- Contributed poster, **Conceptual Foundations and Foils for Quantum Information Processing**, Perimeter Institute, Canada, 9-13 May 2011: Vlad Gheorghiu, "Information-theoretical study of collisional decoherence of chiral molecules in a gas".
- Invited Talk, **University of Bristol**, Bristol, UK, 13 January 2010: Vlad Gheorghiu, "Location of Quantum Information in Additive Graph Codes", hosted by Prof. Richard Jozsa.
- Invited Talk, **Max-Planck-Institut für Quantenoptik**, Garching, Germany, 12 January 2010: Vlad Gheorghiu, "Location of Quantum Information in Additive Graph Codes", hosted by Prof. Ignacio Cirac.
- Poster presentation, **The Thirteen Workshop on Quantum Information Processing (QIP 2010)**, 18-22 January 2010, Zürich, Switzerland: Vlad Gheorghiu, Scott M. Cohen and Robert B. Griffiths, "Most Entangled States Cannot be Locally Cloned".
- Poster presentation, **The Twelfth Workshop on Quantum Information Processing (QIP 2009)**, 12-16 January 2009, Santa Fe NM, USA: Vlad Gheorghiu, Shiang Yong Looi and Robert B. Griffiths, "Location of Quantum Information in Additive Quantum Codes".
- Poster presentation, **3-rd International Conference on Quantum Information (ICQI 2008)**, 13-16 July 2008, Boston MA, USA: Vlad Gheorghiu and Robert B. Griffiths, "Separable Operations on Pure States".
- Participant, **2-nd International Conference on Quantum Information (ICQI 2007)**, 13-15 June, 2007, Rochester NY, USA.
- Presented around 50 seminars/talks at the **CMU Quantum Information Seminar**, during 2005 – 2011. Titles/summaries/talks available at <http://quantum.phys.cmu.edu/QIP/index.html>.

## Teaching Experience

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- Fall 2012, Instructor for Calculus I (MATH 251) in the Mathematics and Statistics Department at the University of Calgary. Students enrolled: 121. Duties: course preparation, homework preparation, exam preparation and grading. Student evaluations overall score 5.88/7, detailed report available on request.
- Summer 2012, Instructional Skills Workshop teaching certificate, available on request.
- Fall 2011, Instructor for Calculus I (MATH 251) in the Mathematics and Statistics Department at the University of Calgary. Students enrolled: 118. Duties: course preparation, homework preparation, exam preparation and grading. Student evaluations overall score 5.22/7, detailed report available on request.
- Spring 2011, Supervised PhD student Ananth Tenneti. Duties: meeting the student weekly and guide him on his research track.
- Spring 2009, Supervised PhD student Chang-You Lin. Duties: taught the student introductory quantum information theory and get him started on a research project, that finally became a refereed published paper, *Physical Review A* **81**, 032326 (2010).
- Spring 2008, Spring 2010, homework grading and guest lecturer for Quantum Information and Computation Theory Course (PHYS 33-658) taught by my PhD advisor Robert B. Griffiths.

- Fall 2004, Spring 2005, Fall 2005, Spring 2006, Carnegie Mellon University, Teaching Assistant for Physics for Engineering Students I (PHYS 33-106). Duties: lab/recitation material preparation, homework and exam grading.

## Research Interests

The following areas in Quantum Information

- Quantum memories.
- Uncertainty relations.
- LOCC, separable operations and the role of entanglement as a physical resource.
- Graph states and graph codes, applications to quantum error correction.
- Additivity problems for quantum channel capacity.
- Location of quantum information in multipartite quantum systems, relations between quantum channels and their complement.

## Professional Activity

Referee for:

- Physical Review Letters
- Physical Review A
- Physics Letters A
- Quantum Information and Computation
- Quantum Information Processing
- Optics Communications
- International Journal of Quantum Information

## Computer Skills

- C/C++, Java, MATLAB, Mathematica (extensive knowledge).
- UNIX/Linux, Windows (extensive knowledge).
- Ruby, Python, HTML, Perl, PHP (fair knowledge).

## Foreign Languages

- English: Excellent reading/writing/speaking.
- French: Good reading/writing, fair speaking.
- Romanian (native language).

## Other Interests

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- Computer Science, C++ programming, Mathematics, Quantitative Finance, Guitar playing, Reading, Hiking, Pool (8 ball), Soccer, Tennis.

## References (research)

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- **Prof. Michele Mosca**, Institute for Quantum Computing  
University of Waterloo, Canada  
Email: mmosca@uwaterloo.ca  
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- **Prof. Robert B. Griffiths**, Carnegie Mellon University, USA  
Email: rgrif@andrew.cmu.edu  
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- **Prof. Barry C. Sanders**, IQST and University of Calgary, Canada  
Email: sandersb@ucalgary.ca  
Phone: +1-(403) 220-3939
- **Prof. Gilad Gour**, IQST and University of Calgary, Canada  
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- **Prof. Scott M. Cohen**, Duquesne University, USA  
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- **Prof. Edward Gerjuoy**, University of Pittsburgh, USA  
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## References (teaching)

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- **Prof. Claude Laflamme**, University of Calgary, Canada  
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- **Prof. James Russ, USA**, Carnegie Mellon University  
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