Department of Physics and Astronomy
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CHRISTOPHER EDWARD ING

Education

Ph.D., Biochemistry. University of Toronto. 2012 – 2017.
Advisor: Dr. Régis Pomès

M.Sc., Physics. University of Waterloo. 2009 – 2011.
Advisor: Dr. Wing-Ki Liu and Dr. Pierre-Nicholas Roy
Thesis: Path integral Langevin dynamics of complex molecular systems: from low-temperature quantum clusters to biomolecules

Hon.B.Sc., Computational Science. Co-Op. University of Waterloo. 2004 – 2009.
Specialization: Physics, Advisor: Dr. Jeffrey X.Y. Chen
Thesis: Mathematical Analysis of the Adhesion of Cylindrical Colloids in the Helfrich Model.

Teaching

University of Waterloo
2011 – Lab Assistant and Marker, Scientific Computer Programming (PHYS139).
2011 – Marker, Statistical Mechanics (PHYS359)
2010 – Marker, Graduate Solid State Physics (PHYS731).
2009 – Lab Instructor, Physics Lab II (PHYS112L).
2009 – Tutorial Instructor, Calculus I for Scientists (MATH127).

Notable Courses Taken
2011 – Graduate – Computer methods for studying protein structure and function – 99%
2010 – Graduate – Molecular Biophysics – 89%
2010 – Graduate – Theoretical Chemistry Topics: Molecular Dynamics – 92%

Contributions

Journal Articles

2012 - N. Blinov, H. Li, **C. Ing**, P.-N. Roy, "Superfluidity and dynamics of helium clusters doped with N_2O and CO_2: critical importance of rotational degrees of freedom" (**in preparation**)
2012 – **C. Ing**, T. Zeng, H. Li, P.-N. Roy, "A study of the dynamical properties of doped helium clusters using ring-polymer molecular dynamics" (**in preparation**).
2012 – **C. Ing**, K. Hinsen, J. Yang, T. Zeng, H. Li, P.-N. Roy, "A path-integral Langevin equation treatment of low-temperature doped helium clusters" (**submitted**).
2010 – S. Mkrtchyan, **C. Ing**, and J.Z.Y. Chen, "Adhesion of cylindrical colloids on the surface of a membrane", Physical Review E, **81**, 1.

Posters/Presentations

2011 – **Understanding Doped Helium Clusters with Path Integral Molecular Dynamics**. 27th Annual Symposium on Chemical Physics. Waterloo, ON, Canada. (poster).

2011 – **Efficient Sampling of Quantum Systems Using Path Integral Molecular Dynamics: Applications to Weakly Bound Systems and Biomolecules.** 66th International Symposium on Molecular Spectroscopy. Columbus, OH, USA (oral), 11th CERMM Symposium. Montreal, QC, Canada. (oral).

2011 – **Applications of Ring-Polymer Molecular Dynamics and Path Integral Ground State Methods to He-CO2 and Biomolecules**. 94th Canadian Chemistry Conference. Montreal, QC, Canada (oral). Matrix 2011, Vancouver, BC, Canada (oral).

2011 – **Sampling of Quantum Systems with Path Integral Langevin Dynamics: Applications to Weakly Bound Clusters and Biomolecules**. 10th Chemical Biophysics Symposium. Toronto, ON, Canada. (oral).

2010 – **Implementation of Feynman Path Integral Methods in the Molecular Modelling Toolkit**. 17th Canadian Symposium on Theoretical Chemistry. Edmonton, AB, Canada. (poster).

2010 – **Path Integral Implementation in MMTK**. Sharcnet Research Day 2010, Toronto, ON, Canada. 10th CERMM Symposium. Montreal, QC, Canada. (oral).

2009 – **Extending the Molecular Modeling Toolkit for Quantum Simulation**. 25th Annual Symposium on Chemical Physics. Waterloo, ON, Canada. (poster).

2008 – **The Counterintuitive Intermolecular Interactions of Hydroxyl Radical In Silico**. The Canadian Undergraduate Physics Conference 2008. Toronto, ON, Canada. (oral).

Awards

2011 – MITACS Travel Scholarship, to give oral presentation at Matrix 2011
2010 – French Consulate Scholarship, to collaborate at Synchrotron Soleil

Work Experience

Synchrotron Soleil, France
2010 – Scientific Programmer. Supervisor: Dr. Konrad Hinsen.
Project: Implemented normal mode path integral molecular dynamics in MMTK, an open-source molecular dynamics software package. Ported documentation to Sphinx and wrote python unit tests. Written in Cython/C/Python (3 months)

Google / KDE
2009 – Google Summer of Code Developer. Supervisor: Vladimir Kuznetsov.
Project: Implemented a real-time smoothed particle hydrodynamics algorithm in Step, an open-source physics sandbox in the KDE education packages. Written in C++/Qt. (4 months)

Radiation Laboratory, University of Notre Dame
2008 – Computational Chemist. Supervisor: Dr. Daniel Chipman, Dr. Paulo R.C Couto.
Project: Analyzed the many-body effects of hydroxyl-water clusters using a many-body decomposition scheme with Gaussian/Fortran workflow. Compared many-body effects of pure water clusters to those containing hydroxyl radicals (4 months)

Cardiac Imaging Group, Sunnybrook Hospital
2007 – Medical Imaging Developer. Supervisor Dr. Bonny Biswas, Dr. Graham Wright.
Project: Contributed to a C++ project for real-time MR imaging by adding multi-slice multi-FOV catheter tracking. (4 months)

Bioinformatics Group, Microarray Centre
2007 – Research Intern. Supervisor: Carl Virtanen.
Project: Developed a statistical research tool in C# for visualizing gene ontology in expression data sets. Wrote Perl scripts for sequence alignment, annotation of genes, and MySQL database integration. (8 months)

National Lab for Environmental Testing, Canadian Centre for Inland Waters
2006 – Database Developer. Supervisor: Ed Sverko.
Project: Full project cycle development of an Access database and data entry system for scientists to eliminate paper records and track stocks of chemicals. Used Microsoft Access and VBScript. (4 months)

Volunteering

2011 – **TEDxWaterloo**, Social Media Representative
2011 – **Graduate Student Research Conference**, Chemistry Session Chair
2011 – **SOUSCC**, Polymer and Material Chemistry Session Chair
2010 – **Science Rendezvous Waterloo**, Physics Demonstrator

Print and Web Design

2012 – Custom Theme for Fergus Dog Daycare (http://www.fergusdogdaycare.com/)
2011 – Custom Theme for the Pomés Lab website (http://www.pomeslab.com/)
2011 – Illustrator, University of Waterloo Chemistry Club T-shirt (http://bit.ly/mOQWgP)
2010 – Illustrator, local tennis camp T-shirt (http://imgur.com/a/hulFY)
2009 – Illustrator, Waterloo Tennis Club Logo (http://imgur.com/s0Hgm)