

MATTHEW SCHMIDT

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519-573-3979

PROFESSIONAL PROFILE

Project Manager of the Atmospheric Chemistry Experiment (ACE) at the University of Waterloo.
PhD Graduate in Chemistry from the University of Waterloo and a Vanier Scholar.
Passionate about science, business administration, and education.

EDUCATION

University of Waterloo

Waterloo, ON

Ph.D., Theoretical Chemistry, GPA: 100%

Conferred: 2019

- Thesis: Path integral ground state approaches for the study of weakly bound clusters and confined molecules
- Supervisor: Dr. Pierre-Nicholas Roy
- Advisory Committee: Dr. Roger Melko, Dr. Scott Hopkins, Dr. Marcel Nooijen (University of Waterloo), Dr. Gilles Peslherbe (Concordia University)
- Notable Awards/Funding: Vanier Scholar (NSERC)

MSc, Theoretical Chemistry, GPA: 94%

Conferred: 2014

- Thesis: Developing a Method to Study Ground State Properties of Hydrogen Clusters
- Supervisor: Dr. Pierre-Nicholas Roy
- Advisory Committee: Dr. Roger Melko, Dr. Scott Hopkins, Dr. Marcel Nooijen
- Notable Awards: Outstanding Achievement in Graduate Studies Award (University of Waterloo)
- Notable Funding: Canadian Graduate Scholarship recipient (NSERC)

Hon. B.Sc., Honours Science, GPA: 92%

Conferred: 2011

Chemistry Minor, Physics Minor, Economics Minor

- Honours Project: Protocol for the calculation of vibrationally-averaged dispersion coefficients between two arbitrary molecules
- Supervisor: Dr. Marcel Nooijen
- Notable Funding: Undergrad Student Research Award recipient (NSERC)

TEACHING EXPERIENCE

University of Waterloo

Waterloo, ON

Lecturer

Winter 2023

- Designed lesson plans and administered content for NE 452: Special Topics in Quantum Simulations

Quantum Boot Camp 2020, Creative Destruction Lab

Toronto, ON

Teaching Assistant

Summer 2020

- Designed a quantum chemistry project for computer scientists, chemists, physicists, & business students to provide educational and practical knowledge of quantum chemistry with business applications
- Topic: Calculating Franck-Condon Factors using traditional & Boson Sampling techniques
- Collaborated with Dr. Nicolas Quesada (Xanadu) and Dr. Pierre-Nicholas Roy (University of Waterloo)
- Implemented and documented the project on GitHub
- Programmed and documented code using a variety of programming languages
- Evaluated the submissions and chose a “winner”
- Assisted students through Slack during the project
- Held a tutorial, after the project, to discuss solutions and answer questions

Victus Academy

Supply Teacher

Kitchener, ON

2016-2021

- Administered course content to elementary and high school students
- Supported students and aided with course content
- Developed lessons in conjunction with the regular teacher using the Ontario Curriculum
- Supervised students and ensured work completion

High School Tutor

Kitchener, ON

2013, 2015, 2018-2019, 2023

- Provided support to high school students to aid in understanding course material
- Subjects Tutored: Grade 11 Functions, Grade 12 Calculus
- Prepared lesson plans and practice problems of varying difficulty to gauge student understanding
- Communicated overall and specific learning goals of each lesson
- Provided strategies for success including memory aids and identifying keywords in questions
- Constructed with the student a “Summary Sheet” of key lesson points and equations during each session

University of Waterloo

Teaching Assistant

Waterloo, ON

Sept. 2012 – April 2014

<u>Term</u>	<u>Course</u>	<u>Description</u>	<u>Instructor</u>
Winter 2014	CHEM 212	Structure & Bonding	Dr. Laura Deakin
	CHEM 350	Chemical Kinetics	Dr. Marcel Nooijen
Fall 2013	CHEM 209	Introduction to Spectroscopy	Dr. Scott Hopkins
Winter 2013	CHEM 212	Structure & Bonding	Dr. Laura Deakin
	CHEM 123L	Chemical Reaction Laboratory 2	Sue Stathopoulos
Fall 2012	CHEM 209	Introduction to Spectroscopy	Dr. Scott Hopkins

- Guest-lectured in Winter 2013
- Prepared and presented bi-weekly tutorial sessions for students
- Graded assignments, tests, and exams in a professional and timely manner giving clear descriptive feedback
- Assisted students through discussion forums, email, office hours, and during lectures
- Recipient of “Outstanding Teaching Assistant Award” in Winter Term 2013
- Proficient with UW Learn and other educational platforms

RESEARCH EXPERIENCE

University of Waterloo

Postdoctoral Fellow

Waterloo, ON

Oct. 2021 – Sept. 2022

- Project: To publish work on previous Ph.D. research and new water-hydrogen simulations
- Supervisor: Dr. Pierre-Nicholas Roy

Perimeter Institute Quantum Intelligence Lab (PIQuIL), Perimeter Institute/UWaterloo

Research Assistant

Waterloo, ON

Jan. 2020-Aug, 2020

- Project: Using machine learning to calculate the partition function of a vibronic Hamiltonian
- Supervisor: Dr. Roger Melko
- Collaborators: Dr. Pierre-Nicholas Roy (University of Waterloo) & Dr. Marcel Nooijen (University of Waterloo)

University of Waterloo

Research Assistant

Waterloo, ON

July 2010 – Sept. 2018

- Project: Investigated quantum chemistry of water and hydrogen clusters using quantum simulation techniques
- Supervisors: Dr. Pierre-Nicholas Roy, Dr. Robert J. LeRoy, Dr. Marcel Nooijen (University of Waterloo)
- Collaborated effectively with group members and research groups from around the world
- Trained and supervised 7 undergraduate students; many continuing in the field post-graduation
- Organized and coordinated group meetings for the Roy Group from 2012-2017
- Presented at 27 scientific conferences in Canada, USA, and France (posters and oral presentations)

NON-ACADEMIC WORK EXPERIENCE

Atmospheric Chemistry Experiment (ACE), University of Waterloo *Waterloo, ON*
Project Manager 2022 – Present

- Create and maintain budgets; handle all purchasing for the group
- Work within a Canadian Space Agency (CSA) contract and complete regular reports
- Manage the document and data archive
- Take minutes for staff meetings and bi-annual Science Team meetings
- Coordinate any hiring that our team may require

Founder & President *Kitchener, ON*
Victus Academy 2016 – Present

- Founded and operate a private school and hockey academy, the first of its kind in the Waterloo Region
- Developed a proposal and pitched it to educational and athletic leaders
- Oversee the athletic and academic programs to ensure the school vision is being implemented
- Work with Principal and Ministry of Education to ensure high academic standards and curriculum is followed
- Organize and lead board meetings and staff meetings
- Negotiate lease agreements with the City of Kitchener
- Create and maintain budgets; understand accounting practices
- Hire and negotiate contracts with directors and staff members
- Responsible for press interviews, marketing, recruiting, and website maintenance

AWARDS & SCHOLARSHIPS

<u>Name of Award</u>	<u>Level</u>	<u>Total Value</u>	<u>Period Held</u>
President's Scholarship	Institutional	\$5000	May 2017 – April 2018
Ontario Graduate Scholarship	Provincial	\$15 000	May 2017 – April 2018
NSERC – Vanier Scholarship	National	\$150 000	May 2014 – April 2017
University of Waterloo – Graduate Studies Research Travel Assistantship	Institutional	\$500	June 2016
University of Waterloo – Graduate Studies Research Travel Assistantship	Institutional	\$300	June 2015
Quantum Fluid Clusters 2015 Committee – PhD Fellowship	Institutional	450 €	June 2015
University of Waterloo – Outstanding Achievement in Graduate Studies	Institutional	None	October 2014
NSERC – Alexander Graham Bell CGS-D3	National	\$105 000	Declined (May 2014)
University of Waterloo Graduate President's Scholarship	Institutional	\$10 000	May 2013 – April 2014
NSERC – Alexander Graham Bell Master's Canada Graduate Scholarship	National	\$17 500	May 2013 – April 2014
Student Graduate Experience Award	Institutional	\$5782	2012-2014
University of Waterloo – Chemistry Teaching Assistant Award	Institutional	\$100	June 2013
Graduate MSc Seminar Prize	Institutional	\$100	May 2013
Ontario Graduate Scholarship	Provincial	\$15 000	Declined (May 2013)
Ontario Graduate Entrance Scholarship	Institutional	\$2000	2012
Ontario Graduate Scholarship	Provincial	\$15 000	Declined (May 2012)
NSERC – Alexander Graham Bell Master's Canada Graduate Scholarship	National	\$17 500	Declined (May 2012)
NSERC – Undergraduate Student Research Award	National	\$4500	May 2011 – Aug 2011
Faculty of Science Upper-Year Scholarship (x2)	Institutional	\$500 (x2)	2009-2011
University of Waterloo – Waterloo County Entrance Scholarship (x4)	Institutional	\$1000 (x4)	2007- 2009
University of Waterloo President's Scholarship	Institutional	\$2000	2007

PUBLICATION LIST

11. Schmidt, M., Bernath, P., Boone, C., Lecours, M., and Steffen, J. Trends in atmospheric composition between 2004 – 2023 using version 5 ACE-FTS data. *J. Quant. Spectrosc. Radiat. Transfer*. Submitted (2023)
10. Schmidt, M. and Roy P.-N. On the accuracy and efficiency of different methods to calculate Raman vibrational shifts of hydrogen clusters. *J. Chem. Phys.* **156**, 084102 (2022)
9. Schmidt, M., Millar, J., and Roy P.-N. Quantum molecular dynamics simulations of confined parahydrogen molecules within clathrate hydrates: merging low temperature dynamics with the zero-temperature limit. *J. Chem. Phys.* **156**, 014303 (2022)
8. Schmidt, M. and Roy P.-N. Ground state chemical potential of parahydrogen clusters of size N=21-40. *J. Chem. Phys.* **156**, 016101 (2022)
7. Schmidt, M. Path integral ground state approaches for the study of weakly bound clusters and confined molecules. Ph.D. Thesis, Department of Chemistry, University of Waterloo (2018)
6. Schmidt M. and Roy P.-N. Path integral molecular dynamic simulation of flexible molecular systems in their ground state: application to the water dimer. *J. Chem. Phys.* **148**, 124116 (2018)
5. Schmidt M., Fernández J.-M., Faruk N., Nooijen M., Le Roy, R.J., Morilla J.H., Tejada G, Montero S., and Roy P.-N. Raman Vibrational Shifts of Small Clusters of Hydrogen Isotopologues. *J. Phys. Chem. A.* **119**, 12551 (2015)
4. Faruk N., Schmidt M., Li H., Le Roy, R.J., and Roy P.-N. First Principle Prediction of the Raman shifts of parahydrogen clusters. *J. Chem. Phys.* **141**, 014310 (2014)
3. Schmidt M., Constable S., Ing C., and Roy, P.-N. Inclusion of trial functions in the Langevin equation Path Integral Ground State method: application to parahydrogen clusters and isotopologues. *J. Chem. Phys.* **140**, 234101 (2014)
2. Schmidt, M. Developing a Method to Study Ground State Properties of Hydrogen Clusters. M.Sc. Thesis, Department of Chemistry, University of Waterloo (2014)
1. Constable S., Schmidt M., Ing C., Zeng T., and Roy, P.-N. Langevin Equation Path Integral Ground State. *J. Phys. Chem. A.* **117**, 7461 (2013)

POSTERS & PRESENTATIONS

*Underlined are presenting authors

29. M. Schmidt and P.-N. Roy
A Path Integral Molecular Dynamics Investigation into Hydrogen Clathrates: From Rigid to Flexible Cages
36th Annual Symposium on Chemical Physics
University of Waterloo, Waterloo, ON Canada. November 2022
(poster)
28. M. Schmidt and P.-N. Roy
A Path Integral Molecular Dynamics Investigation into Hydrogen Clathrates: From Rigid to Flexible Cages
WATOC 2020: 12th Triennial Congress of the World Association of Theoretical and Computational Chemists
Vancouver, BC Canada. July 2022
(poster)

27. M. Schmidt
“Quantum” Science and Statistics
Victus Academy Seminar Series
Victus Academy, Kitchener, ON Canada. April 2018
(presentation)
26. M. Schmidt and P.-N. Roy
Quantum molecular dynamics simulations of the water monomer and dimer in the ground state
33rd Annual Symposium on Chemical Physics
University of Waterloo, Waterloo, ON Canada. November 2017
(poster)
25. M. Schmidt, D. Iouchtchenko, K. Bishop, and P.-N. Roy
A Path Integral Hybrid Molecular Dynamics Approach to Investigate Rotations and Bosonic Exchange at Low Temperature
Applied Mathematics, Modeling and Computational Science (AMMCS) Conference – 2017
Wilfrid Laurier University. Waterloo, ON, Canada. August 2017
(presentation)
24. M. Schmidt, D. Iouchtchenko, N. Faruk, K. Bishop, and P.-N. Roy
Methodological Advances in Low (and Zero) Temperature Path Integral Molecular Dynamics
32nd Annual Symposium on Chemical Physics
University of Waterloo, Waterloo, ON Canada. November 2016
(poster)
23. M. Schmidt, D. Iouchtchenko, N. Faruk, K. Bishop, and P.-N. Roy
Methodological Advances in Low (and Zero) Temperature Path Integral Molecular Dynamics
International Summer School on Computational Quantum Materials
Sherbrooke, QC Canada. June 2016
(poster)
22. K. Bishop, M. Schmidt, and P.-N. Roy
Quantum Free Energy Calculations of the Water Dimer
International Summer School on Computational Quantum Materials
Sherbrooke, QC Canada. June 2016
(poster)
21. M. Schmidt, D. Iouchtchenko, N. Faruk, K. Bishop, and P.-N. Roy
Comparing Quantum Molecular Dynamics Calculations to Experimental Observations
31st Annual Symposium on Chemical Physics
University of Waterloo, Waterloo, ON Canada. November 2015
(poster)
20. D. Iouchtchenko, M. Schmidt, C. Herdman, and P.-N. Roy
Numerical Approaches for Entanglement and Semiclassical Dynamics
31st Annual Symposium on Chemical Physics
University of Waterloo, Waterloo, ON Canada. November 2015
(poster)
19. M. Schmidt, S. Constable, N. Faruk, and P.-N. Roy
Quantum molecular dynamics study of ground state properties of parahydrogen clusters and their bosonic isotopologues
Quantum Fluid Clusters 2015
University Paul Sabatier, Toulouse, France. June 2015
(presentation)

18. M. Schmidt, N. Faruk, K. Bishop, L. Orr, D. Iouchtchenko, S. Yim, L. Wang, and P.-N. Roy
Molecular Dynamics and the Role of Quantum Effects in Chemistry
Grad Student Poster Display – Waterloo Unlimited Grade 12 2014 Program
University of Waterloo, Waterloo, ON Canada. November 2014
(poster)
17. M. Schmidt, D. Iouchtchenko, N. Faruk, K. Bishop, S. Constable, and P.-N. Roy
A Molecular Dynamics Approach to Calculate Equilibrium and Dynamic Ground State Properties
30th Annual Symposium on Chemical Physics
University of Waterloo, Waterloo, ON Canada. November 2014
(poster)
16. N. Faruk, M. Schmidt, R. J. Le Roy, and P.-N. Roy
Quantum Effects in Sugar and para-H₂ cluster Systems
30th Annual Symposium on Chemical Physics
University of Waterloo, Waterloo, ON Canada. November 2014
(poster)
15. M. Schmidt, S. Constable, C. Ing, and P.-N. Roy
Inclusion of trial functions in the Langevin equation Path Integral Ground State method
26th Canadian Symposium on Theoretical and Computational Chemistry
Concordia University, Montreal, QC, Canada. July 2014
(poster)
14. D. Iouchtchenko, M. Schmidt, and P.-N. Roy
Particle entanglement in quantum clusters: Renyi entropy via the permutation operator
26th Canadian Symposium on Theoretical and Computational Chemistry
Concordia University, Montreal, QC, Canada. July 2014
(poster)
13. M. Schmidt, S. Constable, C. Ing, T. Zeng, and P.-N. Roy
Path integral methods to simulate the ground state and dynamics of weakly bound systems
29th Annual Symposium on Chemical Physics.
University of Waterloo, Waterloo, ON, Canada. November 2013.
(poster)
12. D. Iouchtchenko, M. Schmidt, and P.-N. Roy
Particle Entanglement in Quantum Clusters: Renyi Entropy via the SWAP Operator
29th Annual Symposium on Chemical Physics.
University of Waterloo, Waterloo, ON, Canada. November 2013.
(poster)
11. N. Faruk, M. Schmidt, H. Li, R.J. Le Roy, and P.-N. Roy
First-Principles Prediction of the Vibrational Raman Shifts in paraHydrogen Clusters
29th Annual Symposium on Chemical Physics.
University of Waterloo, Waterloo, ON, Canada. November 2013
(poster)
10. M. Schmidt, S. Constable, C. Ing, T. Zeng, and P.-N. Roy
Low temperature and ground state quantum molecular dynamics simulations of various weakly bound water-hydrogen systems
96th Canadian Chemistry Conference and Exhibition.
Quebec City Convention Centre, Quebec City, Quebec, Canada. May 2013.
(poster)

9. M. Schmidt, S. Constable, C. Ing, T. Zeng, and P.-N. Roy
Low temperature and ground state quantum molecular dynamics simulations of various weakly bound water-hydrogen systems
GWC² Graduate Poster Exhibition
University of Guelph, Guelph, ON, Canada. May 2013.
(poster)
8. J. T. Cantin, T. Zeng, M. Schmidt, and P.-N. Roy
Path integral simulations of hydrogen molecules trapped in water clathrate cages
41st Southern Ontario Undergraduate Student Chemistry Conference
McMaster University, Hamilton, ON, Canada. March 2013.
(presentation)
7. K. Bishop, N. Faruk, M. Schmidt, and P.-N. Roy
Accelerating quantum molecular dynamics simulations using graphical processing units
41st Southern Ontario Undergraduate Student Chemistry Conference
McMaster University, Hamilton, ON, Canada. March 2013.
(presentation)
6. M. Schmidt, C. Ing, S. Constable, J. Yang, T. Zeng, and P.-N. Roy
Molecular dynamics simulations on various weakly bound water-parahydrogen systems at cold temperatures
28th Annual Symposium on Chemical Physics.
University of Waterloo, Waterloo, ON, Canada. November 2012.
(poster)
5. M. Schmidt, C. Ing, S. Constable, J. Yang, T. Zeng, and P.-N. Roy
Molecular dynamics simulations on various weakly bound water-parahydrogen systems at cold temperatures
25th Canadian Symposium on Theoretical and Computational Chemistry
University of Guelph, Guelph, ON, Canada. July 2012
(poster)
4. M. Schmidt, C. Ing, S. Constable, T. Zeng, J. Yang, M. Nyman, and P.-N. Roy
Molecular dynamics simulations on various weakly bound water-parahydrogen systems at ultracold temperature
67th International Symposium on Molecular Spectroscopy
The Ohio State University, Columbus, OH, United States of America. June 2012.
(presentation)
3. M. Schmidt, C. Ing, T. Zeng, R.J. Le Roy, M. Nooijen, and P.-N. Roy
Weakly bound systems: Accurate interaction potentials and Simulations of water clathrates and doped parahydrogen clusters.
27th Annual Symposium on Chemical Physics.
University of Waterloo, Waterloo, ON, Canada. November 2011.
(poster)
2. M. Schmidt and M. Nooijen
Vibrationally averaged long-range molecule-molecule dispersion coefficients from coupled-cluster calculations
Applied Mathematics, Modeling and Computational Science (AMMCS) Conference - 2011
Wilfrid Laurier University. Waterloo, ON, Canada. July 2011.
(presentation)

1. M. Schmidt and M. Nooijen
 Vibrationally averaged long-range molecule-molecule dispersion coefficients from coupled-cluster calculations
 66th International Symposium on Molecular Spectroscopy
 The Ohio State University, Columbus, OH, United States of America. June 2011.
 (presentation)

COMMITTEES

Board of Directors	WWSEF	2020-Present
Board of Directors	Victus Academy	2016-Present
“Roy Group” Group Meeting Administrator	University of Waterloo	2013-2018
Member of Symposium of Chemical Physics	University of Waterloo	2013-2016
Member of Teaching Assistant Workshop Organizing Committee	University of Waterloo	2014

OTHER LEADERSHIP EXPERIENCE

Hockey General Manager

- 2017-2019 – Victus Academy U18 Prep Team

Hockey Scout

- 2015-2017 Advance Scout and Video for Kitchener Dutchmen (GOJHL – Jr. B)

Hockey Coach

- 2014-2015 Waterloo Wolves Bantam A/AA Gold
- 2014 Southwest Crusaders AAA/AA Spring Hockey
- 2013-2014 St. Mary’s Eagles Varsity High School Hockey
- 2013-2014 Stratford Warriors Minor Bantam Rep
- 2013 Southwest Crusaders AA Spring Hockey
- 2013 Woodland Christian High School Hockey
- 2012-2013 Kitchener Jr. Rangers Peewee AA
- 2012-2013 Kitchener Jr. Rangers Midget MD Blue
- 2012 Southwest Crusaders AA Spring Hockey
- 2011-2012 Kitchener Jr. Rangers Minor Midget MD Red
- 2011 Southwest Crusaders AAA/AA Spring Hockey
- 2010-2011 Kitchener Jr. Rangers Major Bantam MD Red

Responsibilities :

- Developed and taught team systems to young athletes
- Taught and demonstrated on-ice hockey skills
- Developed yearly plans and individual practice plans for skill development and team systems
- Communicated effectively with staff, players, and parents

REFERENCES

Dr. Pierre-Nicholas Roy

Title: Professor & Canada Research Chair in Quantum Molecular Dynamics
Department of Chemistry at University of Waterloo
Relationship: M.Sc. and Ph.D. Supervisor
Phone: 519-888-4567 ext. 38640
Email: pnroy@uwaterloo.ca

Dr. Marcel Nooijen

Title: Professor - Department of Chemistry at University of Waterloo
Relationship: Member of my Ph.D. Advisory Committee
Course Instructor of my Teaching Assistantship
Undergraduate Fourth Year Project Advisor
Collaborator on a Published Paper
Phone: 519-888-4567 ext. 37708
Email: nooijen@uwaterloo.ca

Dr. Scott Hopkins

Title: Associate Professor - Department of Chemistry at University of Waterloo
Relationship: Member of my MSc. And Ph.D. Advisory Committees
Course Instructor of my Teaching Assistantship
Phone: 519-888-4567 ext. 33022
Email: shopkins@uwaterloo.ca