Isaac De Vlugt – Curriculum Vitae

Citizenship Canadian, American **Email** ijsdevlu@uwaterloo.ca

Languages

- **English**
- **French**

  Intermediate proficiency
  Certificat d'études en français intensif – June 2014
  Strathroy District Collegiate Institute, Strathroy, Ontario

Programming Languages & Software

- Python
- Julia
- C++
- LaTex
- Gaussian 09

Education

2019-Current Candidate for MSc Physics – The University of Waterloo, Waterloo, ON

Current cumulative GPA: 97.33%
Expected date of completion: September 2021

2014-2019 BSc Chemical Physics, Honours, Co-operative Program – The University of Waterloo, Waterloo, ON

University of Waterloo Alumni Gold Medal recipient
Cumulative GPA: 95.74%
Dean's Honours List

2009-2014 Ontario Secondary School Diploma – Strathroy District Collegiate Institute, Strathroy, ON

Cumulative GPA: 95%

Research Employment Experience

May 2018 - Aug. 2018 Melko Group, The University of Waterloo, Waterloo, ON
Software Developer and Research Assistant

Under the supervision of Prof. Roger Melko, open-source software to perform quantum state reconstruction using neural networks was developed collaboratively. This research was motivated by the need for access to such software for experimentalists and for other applications in quantum information and condensed matter physics.

Sept. 2017 - Dec. 2017 Roy Group, The University of Waterloo, Waterloo, ON
Research Assistant

Under the supervision of Prof. P.N. Roy, direct operation (the use of ladder operators) and renormalization groups were proposed as faster routes for diagonalizing the Hamiltonian that describes a rotor-doped C_{60} based nano-molecular assembly. Direct operation and renormalization group formalisms were implemented in custom-written C++ programs utilizing the ARPACK eigen-solving package. This research was motivated by possible applications that rotor-doped C_{60} based nano-molecular assemblies may have in quantum information devices.

Sept. 2016 - Apr. 2017 Hopkins Lab, The University of Waterloo, Waterloo, ON
Research Assistant

Under the supervision of Prof. W.S. Hopkins, density functional theory calculations on transition metal- containing $B_{12}X_{12}^{2-}$ (X = H, F) clusters were performed using Gaussian 09. This theoretical work was done to compare to and justify observations made from infrared multiple photon dissociation spectra obtained from the CLIO (Centre Laser Infrarouge d'Orsay) free-electron laser in France. Experimental data obtained was processed through custom-written programs in Python. Motivation for this work includes applications in quantum computing and chemical hydrogen storage.

Peer-Reviewed Publications

De Vlugt, I., Iouchtchenko, D., Merali, E., Roy, P.-N., Melko, R.G. "Reconstructing quantum molecular rotor ground states." Physical Review B 102.3 (2020): 035108

Beach, M., De Vlugt, I., Golubeva, A., Huembeli, P., Kulchytskyy, B., Luo, X., Melko, R., Merali, E., Torlai, G. "QuCumber: wavefunction reconstruction with neural networks." SciPost Phys. 7.1 (2019): 009

De Vlugt, I., Lecours, M., Carr, P., Anwar, A., Marta, R., Fillion, E., Steinmetz, V., Hopkins, W. "Infrared-Driven Charge Transfer in Transition Metal-Containing $B_{12}X_{12}^{2-}$ (X = H, F) Clusters." The Journal of Physical Chemistry A 122.35 (2018): 7051-7061

Presentations

2018 De Vlugt, I., Iouchtchenko, D., Halverson, T., Roy, P.N. "Computing Bound States of Rotor Chains and Arrays Using Direct Operation and Renormalization Groups." Southern Ontario Undergraduate Student Chemistry Conference, March 2018, Wilfred Laurier University, Waterloo, ON. Presentation Session.

2017 De Vlugt, I., Iouchtchenko, D., Halverson, T., Roy, P.N. "Computing Bound States of Rotor Chains and Arrays Using Direct Operation." Symposium on Chemical Physics, Nov. 2017, The University of Waterloo, Waterloo, ON. Poster Session.

Iouchtchenko, D., Ganahl, M., De Vlugt, I., Halverson, T., Roy, P.N. "Density Matrix Renormalization Group for the Ground State of Linear Chains of Linear Rigid Rotors with Dipolar Interactions Using the Angular Momentum Ladder Operator." Symposium on Chemical Physics, Nov. 2017, The University of Waterloo, Waterloo, ON. Poster Session.

De Vlugt, I., Lecours, M., Carr, P., Anwar, A., Marta, R., Fillion, E., Steinmetz, V., Hopkins, W. "Infrared-Driven Charge Transfer in Transition Metal $B_{12}H_{12}^{2-}$ Clusters." Southern Ontario Undergraduate Student Chemistry Conference, March 2017, York University, Toronto, ON. Presentation Session.

2016 De Vlugt, I., Lecours, M., Carr, P., Anwar, A., Marta, R., Fillion, E., Steinmetz, V., Hopkins, W. "Infrared-Driven Charge Transfer in Cu, Ag and Cd $B_{12}H_{12}^{2-}$ Clusters." Symposium on Chemical Physics, Nov. 2016, The University of Waterloo, Waterloo, ON. Poster Session.

Awards and Scholarships

2019 **NSERC Alexander Graham Bell Canada Graduate Scholarship - Masters**
The CGS M program provides financial support to high-calibre scholars who are engaged in eligible master's or, in some cases, doctoral programs in Canada.

President's Graduate Scholarship
The President's Graduate Scholarship is provided to outstanding graduate students who hold certain major federally and provincially funded competition-based scholarships.

University of Waterloo Graduate Scholarship
The University of Waterloo Graduate Scholarship is awarded to graduate students registered full time in a Master's or Doctoral program at the University of Waterloo with a minimum first-class (80%) cumulative average in their current program or over the last two full-time academic years.

University of Waterloo Alumni Gold Medal
The Office of Alumni Affairs recognizes top graduating students for academic achievement, by awarding the Alumni Gold Medal at convocation.

Science Scholarship for Excellence
Based on academic achievement in the previous year.

Chemical Physics Upper-Year Scholarship
Based on academic achievement in the previous year.

NSERC Undergraduate Student Research Award
NSERC Undergraduate Research Awards enable the recipient to gain research experience by working full time with an NSERC grant holder on a research project in a university laboratory.

2018 **Chemical Physics Upper-Year Scholarship**
Based on academic achievement in the previous year.

NSERC Undergraduate Student Research Award
NSERC Undergraduate Research Awards enable the recipient to gain research experience by working full time with an NSERC grant holder on a research project in a university laboratory.

2017 **Jerome T. Miller Memorial Prize**
The prize is awarded on the basis of marks to the student in their third year of a program which combines studies in Chemistry and Physics.

NSERC Undergraduate Student Research Award
NSERC Undergraduate Research Awards enable the recipient to gain research experience by working full time with an NSERC grant holder on a research project in a university laboratory.

2016 **Chemical Physics Upper-Year Scholarship**
Based on academic achievement in the previous year.

2015 **University of Waterloo President's Scholarship of Distinction**
This award is given to students who are admitted to the University of Waterloo with an early-May admission average of 95% or above.

NOVA Chemicals Entrance Scholarship
Two scholarships are awarded based on academic performance to students admitted to the University of Waterloo: one to a student entering a Physical Sciences program and one to a student entering Chemical Engineering.

2014 **J. Gladstone Mills Memorial Award**
For the graduating student with the highest academic excellence.

M.K. McIntyre Award
For the highest grade in grade 12 enriched English.

World War One Memorial Award
For the highest average proceeding to grade 12.

Meridian Lightweight Technologies Award
For the highest grade in grade 12 physics.

Roger Kennedy Memorial Award
For the highest grade in grade 12 chemistry.

Additional Employment Experience

Jan. 2020 - Current
The University of Waterloo (Physics Department), Waterloo, ON
Teaching Assistant (PHYS 122)

- Run a weekly tutorial session for students enrolled in PHYS 122 (simple-harmonic motion, sound, Coulomb's Law and circuits)
- Mark weekly quizzes

Sept. 2009 - Current
Private Guitar Teaching, Strathroy & Waterloo, ON
Self-employed

- Teach beginner guitar students music theory and performance-enhancing techniques

May 2019 - July 2019
LCBO Logistics Facility, London, Ontario
Warehouse Worker

- Loaded cases of beer, liquor, wine and spirits onto a conveyor belt
- Improved line speed and strengthened teamworking skills

Jan. 2016- Arpil 2016
360 Education Labs, Waterloo, ON
Operations Lead and Online Tutor

- Provided regular bilingual online tutoring services to high school students in mathematics, physics and chemistry
- Executed company operations, such as scheduling and sales assistance
- Fashioned special marketing and educational curriculum development related projects

May 2015 - Aug. 2015
Highbury Pools, London, ON
General Labourer

- Welded vinyl pool liner pieces together for liner-installation companies
- Learned procedures and operations in a factory setting
- Accelerated daily production of pool liners

Oct. 2011 - June 2014
Union Burger, Strathroy, ON
Cashier & Chef

- Created a pleasant experience for customers at the cash register
- Prepared high-quality food in a fast-paced environment
- Improved workplace efficiency

Summer 2012 & Summer 2013
Southside Produce, Baton Rouge, LA, USA
Cashier (seasonal)

- Enhanced the experience customers had at the cash-out area
- Social skills matured by interacting with customers and employees from diverse cultures

Volunteering & Community Involvement

Jan. 2020 - Current — Kitchener-Waterloo Humane Society, Kitchener, ON
Volunteer

- Provide animals at the adoption facility a clean and joyful living environment
- Assist with community outreach events

2009 - 2019 — Private Tutoring, Strathroy & Waterloo, ON
Volunteer

- Provide help sessions for fellow students struggling in certain subjects

Nov. 2017 — Salvation Army, Baton Rouge, LA, USA
Volunteer

- Prepared and served Thanksgiving meals to those in need during American Thanksgiving

2010 — Women's Rural Resource Centre, Strathroy, ON
Walk a Mile in Her Shoes Participant

- Participated in the "Walk a Mile in Her Shoes" event to aid and raise awareness for the local Women's Rural Resource Centre in Strathroy, ON

Activities and Interests

- Electric guitar player (2008 - current)
- Avid American football fan