Isaac De Vlugt – Curriculum Vitae

Citizenship Canadian, American **Email** ijsdevlugt@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

Sept. 2019 - Present MSc Physics – University of Waterloo
NSERC Canada Graduate Scholarship - Master's
Cumulative GPA: 97.33
Expected date of completion: Dec. 2021

Sept. 2014 - Apr. 2019 BSc Chemical Physics, Honours, Co-op – University of Waterloo
University of Waterloo Science Alumni Gold Medal
Cumulative GPA: 95.7%

Sept. 2009 - June 2014 Ontario Secondary School Diploma – Strathroy District Collegiate Institute
13 Highest-achievement awards
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.

Publications

Merali, E., De Vlugt, I., Melko, R. "Stochastic Series Expansion Quantum Monte Carlo forRydberg Arrays." (2021) arXiv:2107.00766

Morawetz, S., De Vlugt, I., Carrasquilla, J., Melko, R. "U(1) symmetric recurrent neural networks for quantum state reconstruction." Physical Review A 104.1 (2021): 012401

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

Award / Scholarship Name	Award Source	Year(s) awarded	Total award value (CAD)

Alexander Graham Bell CGS-D	NSERC	2021 – 2024 (deferred)	105,000
President's Graduate Scholarship	UWaterloo	2019, 2020, 2021	5,000
Waterloo AI Institute Graduate Scholarships	Waterloo AI Institute	2021	5,000
Ontario Graduate Scholarship	Ministry of Training, College & University	2020, 2021(deferred)	15,000
Science Graduate Award	UWaterloo	2020, 2021	Variable
UWaterloo Graduate Scholarship	UWaterloo	2020, 2021	Variable
Alexander Graham Bell CGS-M	NSERC	2019 – 2020	17,500
Marie Curie Graduate Student Award	UWaterloo	2020	191
UW Alumni Gold Medal	UWaterloo	2019	N/A
Science Scholarship for Excellence	UWaterloo	2019	700
Chemical Physics Upper-Year Scholarship	UWaterloo	2016, 2018, 2019	200 – 300
Undergraduate Student Research Award	NSERC	2015, 2017, 2019	4,500
Jerome T. Miller Prize	UWaterloo	2017	100
UW President's Scholarship of Distinction	UWaterloo	2015	2,000
NOVA Chemicals Entrance Scholarship	UWaterloo	2015	1,000
J. Gladstone Mills Memorial Award	SDCI	2014	N/A
M.K. McIntyre Award	SDCI	2014	N/A

World War One Memorial Award	SDCI	2014	N/A
Meridian Lightweight Technologies Award	Meridian Lightweight Technologies	2014	400

Additional Employment Experience

June 2020 - Aug. 2020 Creative Desctruction Lab, Toronto, ON
Teaching Assistant & Hackathon Judge

- Provide documentation and support for the annual Cohort Bootcamp projects (4 projects total)
- Provided feedback and comments to hackathon participants

Jan. 2020 - Apr. 2020 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 & 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