

Ali Ramadhan

INTERESTS: ATMOSPHERIC, OCEAN, AND CLIMATE DYNAMICS · COMPUTATIONAL PHYSICS · COMPUTATIONAL SCIENCE EDUCATION
Department of Earth, Atmospheric, and Planetary Sciences, Massachusetts Institute of Technology, Cambridge, MA 02139, USA

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Education

Massachusetts Institute of Technology

PHD IN CLIMATE PHYSICS AND CHEMISTRY

Cambridge, MA

2017-Present

University of Waterloo

MSc IN PHYSICS

Thesis: Molecular movies and geometry reconstruction using Coulomb explosion imaging

Waterloo, ON

2017

University of Waterloo

BSc IN PHYSICS (HONOURS CO-OPERATIVE) WITH JOINT HONOURS MATHEMATICS

Graduating Dean's Honours List

Waterloo, ON

2016

Research Experience

University of Waterloo

RESEARCH ASSISTANT, DEPARTMENT OF PHYSICS AND ASTRONOMY

Waterloo, ON

Aug 2013 - Aug 2017

- Developing a computational framework for creating molecular movies using Coulomb explosion imaging and Bayesian inference.
- Demonstrated the feasibility of performing Coulomb explosion imaging using single X-ray photons at the Canadian Light Source synchrotron during four visits, two of them alone, showing that they offer faster ionization and higher time resolution than laser pulses.
- Collaborated with engineering groups to weld microwires and synthesize tunable graphene oxide gels using ultrashort pulse lasers.

Tokyo Metropolitan University

RESEARCH ASSISTANT, DEPARTMENT OF CHEMISTRY

Tokyo, Japan

Sep - Dec 2014

- Developed a method to synthesize and control the end-caps of polyynes (long carbon chains) using ultrashort laser pulses.
- Characterized polyne samples using liquid chromatography at Kindai University where I was invited to give a seminar talk.
- Enrolled in language courses and self-studied Japanese, improving my communication and teamwork skills with my labmates.

Ontario Institute for Cancer Research

BIOINFORMATICS SPECIALIST, INFORMATICS AND BIO-COMPUTING PROGRAM

Toronto, ON

Jan - Apr 2013

- Processed and published a wide variety of model organism genomic data sets to multiple databases where they are publicly available for use by the scientific community in cancer research.
- Automated the vast majority of the data processing, publishing my data sets two weeks ahead of deadline.

Teaching Experience

- 2016 **Graduate Teaching Assistant**, Thermal Physics, University of Waterloo
- 2016 **Drop-in Tutor (4x)**, Calculus II, University of Waterloo
- 2015 **Undergraduate Teaching Assistant**, Electricity & Magnetism I, University of Waterloo
- 2015 **Undergraduate Teaching Assistant**, Discrete Mathematics, University of Waterloo
- 2015 **Drop-in Tutor (2x)**, Electricity & Magnetism I, University of Waterloo
- 2014 **Drop-in Tutor**, Linear Algebra I, University of Waterloo
- 2014 **Undergraduate Teaching Assistant (2x)**, Physics I: Mechanics, University of Waterloo
- 2014 **Undergraduate Teaching Assistant (2x)**, Calculus II, University of Waterloo
- 2013 **Undergraduate Teaching Assistant**, Linear Algebra I, University of Waterloo
- 2016- **Project Lead**, Project Lovelace (An open online platform for developing computational thinking in science students.)
- 2015-17 **Organizational Team Member and Head Tutor**, Frontier College (Canadian literacy organization)
- 2012-17 **Private Tutor**, Independent and through AccessAbility Services, University of Waterloo

Recent Activities

Project Lovelace

projectlovelace.net

PROJECT LEAD

Sep 2016 - Present

- Developing an open online platform for instilling computational thinking skills in science students throughout the undergraduate curriculum and better equip them with the computational tools required for modern scientific research.
- Creating effective and high-quality problems, and working with a faculty advisor on integration into physics courses.

Frontier College

[Waterloo, ON](#)

ORGANIZATIONAL TEAM AND HEAD TUTOR

Jan 2015 - Aug 2017

- Working with local schools to develop new educational math programs and games for students in grades 4-8.
- Tutored middle and high-school students one-on-one in math, science, and English for two nights a week.

UW Cooking Club

[University of Waterloo](#)

FOUNDER, PRESIDENT (5X)

Sep 2012 - Sep 2016

- Founded a club for students who enjoy cooking to meet and to teach other students how to cook.
- Led a team of 12-25 executive members as president to plan events, recruit members, and ensure smooth club operation.
- Planned and hosted cooking classes, competitions, potlucks, bake sales, BBQ's, restaurant outings, and field trips. Many events were highly attended (50-100) and members consistently rated our classes highly.

Publications

- 2017 **Molecular movies and geometry reconstruction using Coulomb explosion imaging**, [A. Ramadhan](#), Master's thesis, University of Waterloo, Waterloo, Ontario (2017). URI: 10012/12190.
- 2017 **Synthesis of hydrogen-and methyl-capped long-chain polyynes by intense ultrashort laser pulse irradiation of toluene**, [A. Ramadhan](#), M. Wesolowski, T. Wakabayashi, H. Shiromaru, T. Fujino, T. Kodama, W. Duley, J. Sanderson, *Carbon* **118**, 680–85 (2017). DOI: 10.1016/j.carbon.2017.03.096. arXiv: 1612.00320.
- 2016 **Ultrafast molecular dynamics of dissociative ionization in OCS probed by soft X-ray synchrotron radiation**, [A. Ramadhan](#), B. Wales, I. Gauthier, R. Karimi, M. MacDonald, L. Zuin, J. Sanderson, *Journal of Physics B: Atomic, Molecular, and Optical Physics* **49**, 215602 (2016). DOI: 10.1088/0953-4075/49/21/215602. arXiv: 1606.08789.
- 2016 **A Novel Femtosecond Laser-Assisted Method for the Synthesis of Reduced Graphene Oxide Gels and Thin Films with Tunable Properties**, K. Ibrahim, M. Irannejad, M. Hajjalamdari, [A. Ramadhan](#), K. Musselman, J. Sanderson, M. Yavuz, *Advanced Materials Interfaces* **3**, 1500864 (2016). DOI: 10.1002/admi.201500864
- 2014 **Ultrafast Light Interaction with Graphene Oxide Aqueous Solution**, K. Ibrahim, M. Irannejad, [A. Ramadhan](#), W. Alayak, J. Sanderson, B. Cui, A. Brzezinski, M. Yavuz, *Proceedings of the 14th IEEE International Conference on Nanotechnology*, 830–31 (2014). DOI: 10.1109/NANO.2014.6968088
- 2014 **Welding of Au Microwires by Femtosecond Laser Irradiation**, N. Ly, M. Mayer, [A. Ramadhan](#), J. Sanderson, *Proceedings of the 14th IEEE International Conference on Nanotechnology*, 146–49 (2014). DOI: 10.1109/NANO.2014.6968136
- 2014 **Coulomb imaging of the concerted and stepwise break up processes of OCS ions in intense femtosecond laser radiation**, B. Wales, É. Bisson, R. Karimi, S. Beaulieu, [A. Ramadhan](#), M. Giguère, Z. Long, W. Liu, J. Kieffer, F. Légaré, J. Sanderson, *Journal of Electron Spectroscopy and Related Phenomena* **195**, 332–36 (2014). DOI: 10.1016/j.e1spec.2014.05.003

Presentations

- 2016 **Comparing Coulomb explosion dynamics of multiply charged OCS after ionization by soft X-rays and few cycle femtosecond laser pulses**, Photonics North 2016, Québec City, QC, Canada. (Oral)
- 2015 **Reconstructing Molecular Geometries of Small Molecules using Coulomb Explosion Imaging**, Compute Ontario Research Day, Kitchener, ON, Canada. (Oral)
- 2015 **Dissociative ionization dynamics of the OCS molecule induced by soft X-rays**, Canadian Light Source 18th Annual Users' Meeting, Saskatoon, SK, Canada. (Poster)
- 2014 **Coulomb Explosion Imaging and Polyene Production in Toluene using Femtosecond Laser Pulses**, Kindai University Physical Chemistry Colloquium, Osaka, Japan. (Invited seminar talk)
- 2014 **Imaging of Structure in the OCS⁶⁺ molecule using intense variable pulse length 7-200fs laser pulses**, Photonics North 2014, Montréal, QC, Canada. (Oral)
- 2013 **Coulomb Explosion Imaging of CO₂ and OCS in Intense Femtosecond Laser Radiation**, Canadian Undergraduate Physics Conference 2013, Hamilton, ON, Canada. (Oral)

Awards and Honors

- 2017 **Praecis Presidential Graduate Fellowship**, Massachusetts Institute of Technology (MIT)
- 2017 **Jule Charney Prize**, Program in Atmospheres, Oceans and Climate, MIT
- 2016 **Alexander Graham Bell Canada Graduate Scholarship**, NSERC
- 2016 **President's Graduate Scholarship**, University of Waterloo
- 2016 **Marie Curie Award**, University of Waterloo
- 2016 **Dean's Honours List (7x)**, University of Waterloo
- 2015 **Undergraduate Student Research Award**, Natural Sciences and Engineering Research Council of Canada (NSERC)
- 2014 **Xerox Research Centre of Canada Award for Excellence in Oral Communication**, University of Waterloo
- 2013 **Undergraduate Student Research Award**, NSERC
- 2011 **Merit Scholarship**, University of Waterloo

Skills

Experimental Ultrashort pulse lasers, laser amplifiers, synchrotron experiments, ultra-high vacuum systems, optical systems and setups, oscilloscopes, high-voltage systems, ultraviolet-visible, photoluminescence, and Raman spectroscopy, high-performance liquid chromatography

Computational Python, C/C++, Java, Perl, bash, Julia, Scheme, MATLAB, Mathematica, R, Origin, ROOT, LabVIEW, HTML/CSS, LaTeX, git