Ali Ramadhan

Interests: Atmospheric, ocean, and climate dynamics · Open science practices · Computational science education

Department of Physics and Astronomy, University of Waterloo, Waterloo, ON N2L 3G1, Canada

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Education

University of Waterloo *Waterloo, ON*

M.Sc. in Physics (Expected Aug 2017) *2016-Present*

Supervisor: Joseph Sanderson (Thesis: Creating molecular motion movies using Coulomb explosion imaging and Bayesian inference)

University of Waterloo *Waterloo, ON*

B.Sc. in Physics (Honours Co-operative) with Joint Honours Mathematics *2016*

Graduating Dean's Honours List (Senior thesis: Dissociation dynamics of the OCS molecule induced by soft X-ray synchrotron radiation)

Research Experience

University of Waterloo *Waterloo, ON*

Research assistant, Department of Physics and Astronomy *Aug 2013 - Present*

- 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 *Tokyo, Japan*

Research assistant, Department of Chemistry *Sep - Dec 2014*

- Developed a method to synthesize and control the end-caps of polyynes (long carbon chains) using ultrashort laser pulses.
- Characterized polyyne 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 *Toronto, ON*

Bioinformatics specialist, Informatics and Bio-computing Program *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

TA 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

Other experience

2016- **Project Lead**, Project Lovelace (An open online platform for developing computational thinking in science students.)
2015- **Organizational Team Member and Head Tutor**, Frontier College (Canadian literacy organization)
2012- **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 - Present*

- 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

Working papers

2016 **First evidence of end-cap control in the synthesis of long-chain polyynes by intense ultrashort laser pulse irradiation**, A. Ramadhan, M. Wesolowski, T. Wakabayashi, H. Shiromaru, T. Fujino, T. Kodama, W. Duley, J. Sanderson, Submitted (2016). Preprint available at arXiv:1612.00320 [physics.chem-ph].

2016 **Different sensing mechanisms and operation stability enhancement in a reduced graphene oxide gel and PMMA hybrid photodetector**, D. Alsaedi, M. Irannejad, K Ibrahim, A. Ramadhan, J. Sanderson, A. Almutairi, K. Mussleman, O. Rahami, M. Yavuz, Submitted (2016).

Refereed papers

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).

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. Hajialamdari, A. Ramadhan, K. Musselman, J. Sanderson, M. Yavuz, *Advanced Materials Interfaces* **3**, 1500864 (2016).

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*, 830-831 (2014). (Conference paper)

2014 **Welding of Au Microwires by Femtosecond Laser Irradiation**, N. Ly, M. Mayer, A. Ramadhan, and J. Sanderson, *Proceedings of the 14th IEEE International Conference on Nanotechnology*, 146-149 (2014). (Conference paper)

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**, 332-336 (2014).

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 Polyyne Production in Toluene using Femtosecond Laser Pulses**, Kindai University Physical Chemistry Colloqium, Osaka, Japan. (Invited seminar talk)

2014 **Imaging of Structure in the OCS^{6+} molecule using intense variable pulse length 7-200fs laser pulses**, Photonics North 2014, Montréal, QC, Canada. (Oral)

2013 **Coulomb Explosion Imaging of CO_2 and OCS in Intense Femtosecond Laser Radiation**, Canadian Undergraduate Physics Conference 2013, Hamilton, ON, Canada. (Oral)

Awards

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**, NSERC

2014 **Xerox Research Centre of Canada Limited Work-Term Report Award**, University of Waterloo

2013 **Undergraduate Student Research Award**, Natural Sciences and Engineering Research Council of Canada (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