Carmen Lee

PhD Candidate · Physics
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Education

Ph.D. in Physics — Hamilton, ON, Canada
McMaster University — September 2018-August 2022
Experimental soft matter physics.
Supervisory Committee: Prof. Kari Dalnoki-Veress, Prof. An-Chang Shi and Prof. James Forrest
Advisor: Prof. **Kari Dalnoki-Veress**

M.Sc. in Physics — Hamilton, ON, Canada
McMaster University — September 2016 - August 2018
Experimental soft matter physics. Thesis titled: "Capillary levelling of immiscible bilayer films"
Advisor: Prof. **Kari Dalnoki-Veress**

B.Sc. in Physics — Halifax, NS, Canada
Dalhousie University — September 2012 - May 2016
Minor in Earth Science
Certificates in Materials Science and Information Technology
First year in the Dalhousie Integrated Science Programme
Senior thesis in thin film electronics titled: "Pentacene thin film transistors for use in radiation dosimetry"
Advisor: Prof. **Ian Hill**

Research Interests

Soft matter physics • thin film flow • interfacial fluid mechanics • fluid instabilities • capillary-driven flow • elasticity • granular–continuum mechanics

Honours & Awards

2021	**Ontario Graduate Scholarship**, McMaster University & Province of Ontario	Hamilton, ON, Canada
2018	**Vanier Graduate Scholarship**, Natural Sciences and Engineering Research Council (NSERC)	Hamilton, ON, Canada
2017	**Ontario Graduate Scholarship**, McMaster University & Province of Ontario	Hamilton, ON, Canada
2016	**Canadian Graduate Scholarship - Masters**, Natural Sciences and Engineering Research Council (NSERC)	Hamilton, ON, Canada
2016	**Graduate Entrance Scholarship**, McMaster University	Hamilton, ON, Canada
2016	**Johnston Award**, Dalhousie University	Halifax, NS, Canada
2013-2016	**Dean's List**, Dalhousie University	Halifax, NS, Canada
2016	**Undergraduate Student Research Award**, Natural Sciences and Engineering Research Council (NSERC)	Halifax, NS, Canada
2015	**Undergraduate Student Research Award**, Natural Sciences and Engineering Research Council (NSERC)	Halifax, NS, Canada
2015	**Summer Research Award**, Dalhousie Research in Energy, Advanced Materials and Sustainability (DREAMS)	Halifax, NS, Canada
2014	**NSERC CREATE Training Program in Arctic Atmospheric Science**, Natural Sciences and Engineering Research Council of Canada (NSERC)	Halifax, NS, Canada
2012	**Michael J Keen Memorial Award**, Dalhousie University	Halifax, NS, Canada
2012	**J. G. MacGregor Award**, Dalhousie University	Halifax, NS, Canada
2012	**Renewable Entrance Scholarship**, Dalhousie University	Halifax, NS, Canada

Research Experience

McMaster University — Hamilton, ON, Canada
Research Assistant — September 2016 – present
Worked with Prof. Kari Dalnoki-Veress in the soft matter physics group. Experimental skills include atomic force microscopy, ellipsometry, optical microscopy, spin coating thin films. Fluency in Python and MATLAB programming languages for image analysis including edge detection, particle tracking, agent-based model simulations.

Dalhousie University Halifax, NS, Canada

Research Assistant May 2015- August 2016

Worked with Prof. Ian Hill in the thin-film electronics lab. Experimental skills include spin coating thin films, vacuum-aided vapour deposition, and evaluation of the performance of the solar cells under sun-like illumination. Use of CAD software. Knowledge of solar cell and transistor fabrication.

Dalhousie University Halifax, NS, Canada

Research Assistant May 2014-August 2015

Worked with Prof. James Drummond in analyzing satellite data. Use of Python to sample, analyze and present carbon monoxide data from the MOPITT satellite. Experience working with large datasets

Selected Publications

ORCID iD: 0000-0002-4397-6332

Mutliple droplets on a conical fiber: formation, motion, and droplet mergers
*C. Lee**, T.S. Chan*, A. Carlson, K. Dalnoki-Veress
Soft Matter, **18**, 1364-1370 (2022)
Co-first authorship

Noise resistant synchronization and collective rhythm switching in a model of animal group locomotion
G. N. Doering, B. Drawert, *C. Lee*, J. N. Pruitt, L. R. Petzold, K. Dalnoki-Veress
Royal Society Open Science, **9** 3, 211908 (2022)

Equity Diversity and Inclusion: A Graduate Student Perspective
S. Dawson, *C. Lee*, W. Kirkby, J. Wightman, R. Pillsworth
accepted, Physics in Canada (2021)

Film coating by directional droplet spreading on fibers
T.S. Chan*, *C. Lee**, C. Pedersen, K. Dalnoki-Veress, A. Carlson
Phys. Rev. Fluids **6**, 014004 (2021)
Co-first authorship

Droplet migration on conical fibers
C. Fournier, *C. Lee*, R. Schulman, E. Raphaël, K. Dalnoki-Veress
Eur. Phys. J. E **45** 12 (2021)

Capillary levelling of immiscible bilayer films
V. Bertin*, *C. Lee**, T. Salez, E. Raphaël, K. Dalnoki-Veress
J. Fluid Mech. **911** A13 (2021)
Co-first authorship

Work Experience

McMaster University Hamilton, ON, Canada

Teaching Assistant September 2016 - present

Introduction to experiments, one-on-one lab assistance (∼30 students), answering questions, test invigilation as well as marking quizzes, lab reports and exams for undergraduate and graduate courses.
Classes taught:

- **PHYS 1A03**: Introductory Physics
- **PHYS 1D03**: Mechanics
- **PHYS 1E03**: Waves, Electricity and Magnetic Fields
- **PHYS 2H04**: Thermodynamics
- **Astronomy/Origins 2B03**: The Big Questions
- **PHYS 2P03**: Introductory Laboratory
- **PHYS 4S03/6S03**: Molecular Biophysics

McMaster University Hamilton, ON, Canada

Head Teaching Assistant September 2019 - present

Organization of teaching assistants (∼15) who were running tutorials, and grading. Responsibilities include instructing TAs of their duties, organizing course timelines, and ensuring consistency between sections.
Classes taught:

- **Astronomy/Origins 2B03**: The Big Questions

Dalhousie University Halifax, NS, Canada
Teaching Assistant September 2015 - May 2016
Introduction to experiments, one-on-one lab assistance (∼30 students), answering questions, test invigilation as well as marking quizzes, lab reports and exams.
Classes taught:
- **PHYC 1300**: Physics in and around you
- **PHYC 1290**: Introduction to Physics

Invited Talks

Weekly Seminar Göttigen, Germany
Max Planck Institute for Dynamics and Self-Organization June 2019
Oral presentation titled: "Capillary Driven Flow"

"Experiences of Women in Physics" panel McMaster University
Canadian Conference for Undergraduate Women in Physics January 2017
Invited panelist

Conferences & Summer Schools

Canadian Association of Physicists Annual Congress Hamilton, NS, Canada
Conference June 2022
Oral presentation titled: "Buckling instabilities in moving chains of droplets"
Second place in division student competition

American Physical Society - March Meeting Chicago, IL
Conference March 2022
Oral presentation titled: "Coiling and buckling instabilities in moving chains of droplets impacting an interface"

American Physical Society - March Meeting virtual
Conference March 2021
Oral presentation titled: "A Granular analog to the Collapse of Liquid threads"

Soft Matter Canada virtual
Conference June 2020
Oral '3 minute flash talk' presentation titled: "The Cheerios Effect below a Thin Elastic Film"
First place in student competition

American Physical Society - March Meeting virtual
Conference March 2020
Oral presentation titled: "The Cheerios Effect below a Thin Elastic Film"

Liquids at Interfaces : Fall School 2019 Cargese, Corsica
Summer School October 2019
A week long course.

Lindau Nobel Laureate Meetings Lindau, Germany
Conference March 2019
E-poster titled: "Migration of droplets on a conical fiber"

American Physical Society - March Meeting Boston, MA
Conference March 2019
Oral presentation titled: "Migration of droplets on a conical fiber"

Canadian Association of Physicists Annual Congress Halifax, NS, Canada
Conference June 2018
Oral presentation titled: "Capillary leveling of thin polymer films on a fluid substrate"
Second place in student competition

Soft Matter Canada Halifax, NS, Canada
Conference June 2018
Poster presentation titled: "Capillary leveling of thin polymer films on a fluid substrate"
First place in student competition

American Physical Society - March Meeting Los Angeles, CA, USA
Conference March 2018
Oral presentation titled: " Capillary levelling of a stepped polymer film on an immiscible liquid substrate"

Department of Physics and Astronomy Symposium Day McMaster University
Conference October 2017
Oral presentation titled: " Capillary levelling of a stepped polymer film on an immiscible liquid substrate"
First place in competition

Summer School on Soft Solids and Complex Fluids UMass Amherst
Summer School June 2017
A week long course

Canadian Conference for Undergraduate Women in Physics Dalhousie University
Conference January 2016
Oral presentation titled: "Optimizing Isoindigo Small-Molecule Acceptors in Organic Solar Cells"

Canadian Undergraduate Physics Conference Trent University
Conference October 2015
Oral presentation titled: " Optimizing Isoindigo Small-Molecule Acceptors in Organic Solar Cells"
First place in competition

Atlantic Universities Physics and Astronomy Conference Mount Allison University
Conference February 2015
Oral presentation titled: " Analyzing Tropospheric Carbon Monoxide over North America and Urban Centers Using MOPITT data."

Canadian Undergraduate Physics Conference Queen's University
Conference October 2014
Oral presentation titled: " Analyzing Tropospheric Carbon Monoxide over North America and Urban Centers Using MOPITT data."

Student supervision and mentorship

All students have been co-supervised with Dr. Kari Dalnoki-Veress

Julia Azzi McMaster University
Thesis student Sept 2021 - present
Thesis title: Boundary effects on stacked polymer thin films

Angela Moskal McMaster University
NSERC USRA student May 2021 - August 2021
Project title: Boundary effects on stacked polymer thin films

Darren Tran McMaster University
Thesis student September 2020-April 2021
Thesis title: Interfacial coarsening of a bubble raft

Julia Azzi McMaster University
NSERC USRA student May 2020-August 2020
Project title: Viscous coiliing instability on a rotating substrate

Abigail Buller McMaster University
NSERC USRA student May 2019-August 2019
Project title: The collective motion of ants and the cheerios effect under a thin elastic

Katerina Mioc McMaster University
Thesis Student September 2018-April 2019
Thesis title: Hanging Pendant drops on thin flexible fibers

Lauren Dutcher Guelph University
Co-op student May 2018 - August 2018
Project title: Controlling wrinkling patterns in thin films

McMaster University September 2018 - present
Mentoring Activities Graduate mentorship organizer
Coordinated graduate-graduate student mentorship and graduate-undergraduate student mentorship in the Department of Physics and Astronomy

Equity, Diversity and Inclusion work and Science Outreach

Selected activities

Promoting Inclusion in Physics and Astronomy — McMaster University
President — September 2018 - Present
Promoting Inclusion in Physics and Astronomy (PIPA) is a group of like-minded individuals, primarily graduate students who work toward making our department a more inclusive, diverse and supportive environment. We have three main functions within the department centered around community building through networking, outreach and socializing. We have also led the discussion during #SHUTDOWNSTEM in June 2020 to address inequities in the Physics and Astronomy department.

Elevate: A Day for Inclusion in Science — virtual
Lead Organizer — September 2020 - Present
Elevate: A Day for Inclusion in Science is a day-long outreach event for all Grade 10 students with particular invitation to students who identify with traditionally equity seeking groups in STEM (e.g. BIPOC, 2SLGBTQI+, those with disabilities, women). The goal of Elevate is to provide a day to encourage students to be confident in themselves and foster a love of science by providing an inclusive event filled with fun science related activities and scientist role models through interactive and meaningful keynote lectures, hands-on science activities, workshops on barriers in science, 'Ask an Undergrad' panel, and an opportunity to meet with scientists for a wide variety of fields of science. My role was to coordinate speakers, timelines, recruitment and hosting

Graduate Student Representative in Physics and Astronomy Department — Hamilton, ON, Canada
January 2018 - August 2021
I attended faculty meetings on behalf of the graduate student body to advocate for students in the department. During this time, I have move the department toward including graduate students in faculty hiring processes and discussed comprehensive exams among other topics. I have also relayed information to the graduate student body.

McMaster Alumni outreach events — virtual
Outreach speaker — June 2020-May 2021
I presented on the "Phases of Matter", and "The Physics of Food" to children in age range of 4-18. I answered questions, led hands-on activities and presented complex topics at an appropriate level for children.

Science on Tap — Hamilton, ON, Canada
Organizer and presenter — June 2018 - March 2020
Science on Tap brings scientific discussions to a bar with the opportunity to interact with researchers in various scientific fields as they present some of science's most intriguing phenomena. I was an organizer for this event as well as a featured scientist.

Soapbox Science — Toronto, ON, Canada
Scientist speaker — September 2018
Soapbox Science is a novel public outreach platform for promoting women and non-binary scientists and the science they do. Our events transform public areas into an arena for public learning and scientific debate. My topic was "Squishy Physics: Learning complex physics through everyday observations".

Canadian Undergraduate Physics Conference — Dalhousie University
Vice President of Sponsorship — May 2015 - October 2016
The role includes organizing sponsorship for the conference. This includes contacting universities, research institutions and government organizations to secure funds for the conference. General aid to the organization with the rest of the conference planning was given as well.

Canadian Conference for Undergraduate Women in Physics — Dalhousie University
Vice President of Events — February 2015 - January 2016
The role includes organizing events for the conference. This includes panels, workshops, lab tours and scheduling for the conference. Ordering and design of conference programs, t-shirts, bags, and other promotional items included. General aid to the organization with the rest of the conference planning was given as well.

Physics Fun and Discovery Days — Halifax, NS, Canada
Demonstrator — May 2014 - August 2016
Demonstrated physics experiments to junior and senior high students during Dalhousie University physics department's annual Physics Fun and Discovery Days. Included explaining physical earth processes and supervising hands-on experimentation of basic physical concepts.