

Aidan I. Brown

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Education and Research Experience

- 2018– **Postdoctoral Fellow**, *Dept. of Physics, University of California, San Diego*
Biological Physics and Nonequilibrium Statistical Mechanics of confined proteins with Prof. [Elena Koslover](#).
- 2015–2018 **Postdoctoral Fellow**, *Dept. of Physics, Simon Fraser University*
Biological Physics and Nonequilibrium Statistical Mechanics of molecular machines with Prof. [David Sivak](#).
- 2012–2015 **Ph.D. in Physics**, *Dalhousie University*
Thesis: “Quantitative modelling of autophagy-related protein dynamics and clustering on peroxisome surfaces.” Advisor: Prof. [Andrew Rutenberg](#).
- 2010–2012 **M.Sc. in Physics**, *Dalhousie University*
Thesis: “Fixed nitrogen dynamics and heterocyst patterning in filamentous heterocystous cyanobacteria.” Advisor: Prof. [Andrew Rutenberg](#).
- 2006–2010 **B.Sc. Honours in Physics**, *University of Guelph*
Thesis: “Optical Conductivity of Graphene.” Advisor: Prof. [Elisabeth Nicol](#).
GPA: 94.5%. [Governor General’s Silver Medalist](#).
Summer research: biophysics and statistical mechanics theory with Profs. [Rob Wickham](#) and [John Dutcher](#), condensed matter theory with Prof. [Stefan Kycia](#).

Awards and Fellowships

Major Awards

- 2012-2015 **Canada Graduate Scholarship, Ph.D**, *Natural Sciences and Engineering Research Council of Canada (NSERC)*, C\$35,000/yr
- 2012-2014 **Killam Predoctoral Scholarship, Ph.D**, *Dalhousie University*, C\$25,000/yr
- 2012-2014 **Walter C Sumner Memorial Fellowship**, *Dalhousie University*, C\$6,000/yr
- 2010-2012 **Killam Predoctoral Scholarship, M.Sc**, *Dalhousie University*, C\$20,000/yr
- 2010-2011 **Canada Graduate Scholarship, M.Sc**, *NSERC*, C\$17,500/yr
- 2010 **Governor General’s Silver Medal**, *University of Guelph*, awarded to the two graduating students with highest GPAs across the university

Minor Awards

- 2016 **Biophysical Journal Outstanding Poster Award**, *Engineering Approaches to Biomolec-*

ular Motors conference, for best postdoc poster

- 2011,2013,2015 **Shirley Chan Student Travel Award**, *APS Division of Biological Physics*
- 2014 **Student Travel Support Grant**, *Canadian Mathematical Society*
- 2013 **William Leiper Memorial Graduate Scholarship**, *Dalhousie University Department of Physics and Atmospheric Science*, awarded to a current graduate student in the department
- 2013 **Travel Award for Excellence in Graduate Research**, *APS Forum on Graduate Student Affairs*
- 2010-2012 **ACEnet Fellowship**, *ACEnet*
- 2010 **Society of Excellence**, *University of Guelph College of Physical and Engineering Science*, for academic achievement and contributions to the university community
- 2008,2009 **NSERC Undergraduate Student Research Award**, *University of Guelph Department of Physics*
- 2009 **MacNaughton Scholarship**, *University of Guelph Department of Physics*
- 2008 **Copernicus Scholarship**, *University of Guelph Department of Physics*
- 2007-2009 **Dean's Scholarship**, *University of Guelph College of Physical and Engineering Science*

Publications

peer-reviewed: 14 / first author: 11

- 14 DOI **AI Brown** and DA Sivak. "Allocating and splitting free energy to maximize molecular machine flux." *J. Phys. Chem. B*, **122**, 1387-1393 (2018)
- 13 DOI **AI Brown** and DA Sivak. "Allocating dissipation across a molecular machine cycle to maximize flux." *Proc. Natl. Acad. Sci. USA*, **114**, 11057-11062 (2017).
- 12 [arxiv](#) [PiC](#) **AI Brown** and DA Sivak. "Toward the design principles of molecular machines." *Physics in Canada*, **73**, 61-66 (2017).
- 11 DOI **AI Brown** and AD Rutenberg. "A model of autophagy size selectivity by receptor clustering on peroxisomes." *Front. Phys.*, **5**, 14 (2017).
- 10 DOI **AI Brown** and DA Sivak. "Effective dissipation: breaking time-reversal symmetry in driven microscopic energy transmission." *Phys. Rev. E*, **94**, 032137 (2016).
- 9 DOI AD Rutenberg, **AI Brown**, and L Kreplak. "Uniform spatial distribution of collagen fibril radii within tendon implies local activation of pC-collagen at individual fibrils." *Phys. Biol.*, **13**, 046008 (2016).
- 8 DOI SG Farrell, **AI Brown**, and AD Rutenberg. "Single file diffusion into a semi-infinite tube." *Phys. Biol.*, **12**, 064001 (2015).
- 7 DOI **AI Brown** and AD Rutenberg. "Cluster coarsening on drops exhibits strong and sudden

size-selectivity.” *Soft Matter*, **11**, 3786-3793 (2015).

- 6 [DOI](#) **AI Brown**, L Kreplak, and AD Rutenberg. “An equilibrium double-twist model for the radial structure of collagen fibrils.” *Soft Matter*, **10**, 8500-8511 (2014).
- 5 [DOI](#) CR Nayak, **AI Brown**, and AD Rutenberg. “Protein translocation without specific quality control in a computational model of the Tat system.” *Phys. Biol.*, **11**, 056005 (2014).
- 4 [DOI](#) **AI Brown**, PK Kim, and AD Rutenberg. “PEX5 and ubiquitin dynamics on mammalian peroxisome membranes.” *PLoS Comput. Biol.*, **10**, e1003426 (2014).
- 3 [DOI](#) **AI Brown** and AD Rutenberg. “A storage-based model of heterocyst commitment and patterning in cyanobacteria.” *Phys. Biol.*, **11**, 016001 (2014).
- 2 [DOI](#) **AI Brown** and AD Rutenberg. “Heterocyst placement strategies to maximize the growth of cyanobacterial filaments.” *Phys. Biol.*, **9**, 046002 (2012).
- 1 [DOI](#) **AI Brown** and AD Rutenberg. “Reconciling cyanobacterial fixed-nitrogen distribution and transport experiments with quantitative modelling.” *Phys. Biol.*, **9**, 016007 (2012).

Manuscripts Under Review and In Preparation

AI Brown and DA Sivak. “Pulling cargo increases the precision of molecular motor progress.” In preparation.

Advising and Mentoring Experience

Undergraduate researchers, Simon Fraser University

2016 – 2018 Arshia Zarrin. “Dissipation and irreversibility in model molecular motors.”

Undergraduate researchers, Dalhousie University

2014 – 2015 Spencer Farrell. “Single file diffusion into semi-infinite tubes”

2014 Will Musgrave. “Photobleaching fluctuations with rotational dynamics”

2012 Elias Zoghaib. “Fixed nitrogen storage models with filamentous cyanobacteria”

Teaching Experience

2015,2016 **Guest Lecturer**, *Simon Fraser University: Nonequilibrium Statistical Mechanics and Stochastic Processes; Thermodynamics; Soft Condensed Matter and Biological Physics.*

2010 – 2011 **Teaching Assistant**, *Dalhousie University: Modern Physics, Electricity and Magnetism, Introduction to Numerical Programming, Statistical Mechanics.* Designed and ran tutorials, created problem set solution keys, and graded problem sets.

2010 **Lab Instructor**, *Dalhousie University: Introduction to Physics.* Demonstrated experiments, assessed students orally, and supported students as they completed experiments.

Teaching Training

- 2016 **Instructional Skills Workshop**, *Simon Fraser University: Teaching and Learning Centre*. Three day intensive workshop focusing on lesson planning, participative and active learning techniques, and providing effective feedback.

Selected Talks

- JUNE 2017 [Frontiers in Biophysics](#), University of British Columbia.
- JAN 2017 Mehta, Korolev, and Segrè Group Meeting, Boston University.
- MAR 2016 [Postdoc Research Day](#), Simon Fraser University.
- MAR 2016 American Physical Society March Meeting.
- MAR 2015 American Physical Society March Meeting.
- JAN 2015 Biophysics/Soft Matter Seminar, Simon Fraser University.
- JUN 2014 Canadian Mathematical Society Summer Meeting. *Invited*.
- APR 2014 [Physics of Soft and Biological Matter Conference](#). *Selected for talk*.
- DEC 2013 [Waterloo Soft Matter Theory Conference](#).
- JUN 2013 Canadian Mathematical Society Summer Meeting.
- MAR 2013 American Physical Society March Meeting.
- MAR 2011 American Physical Society March Meeting.
- MAR 2010 American Physical Society March Meeting.

Selected Posters

- JAN 2017 [Berkeley Statistical Mechanics Meeting](#).
- JAN 2017 [Stochastic Physics in Biology Gordon Conference](#).
- JUN 2016 [Engineering Approaches to Biomolecular Motors](#). *Poster Prize*.
- APR 2013 [Chemical Biophysics Symposium](#).
- APR 2012 [Chemical Biophysics Symposium](#).
- JUN 2011 7th International Conference on Biological Physics.

Journal Peer-Review Service

- 2017 Physical Review X
- 2014 Physical Review Letters
- 2014 MDPI Life

Other University Activities

- 2015 – 2018 Co-organizer, [Simon Fraser University Biophysics / Soft Matter seminar series](#)
- 2011 – 2013 President, Dalhousie Graduate Physics Society
- 2009 – 2010 Physics Representative to College Council, College of Physical and Engineering Science, University of Guelph
- 2009 – 2010 Executive Member, Physics Club, University of Guelph

2008 – 2010 Undergraduate Representative, Dept. of Physics Curriculum Committee, University of Guelph