CURRICULUM VITAE

Daniel A. Charlebois, Ph.D., P.Phys.

4-181 CCIS
Department of Physics
University of Alberta
Edmonton, AB T6G-2E1
Canada

Phone: 1-780-492-3985
E-mail: dcharleb@ualberta.ca
Web: www.ualberta.ca/~dcharleb
LinkedIn: www.linkedin.com/in/daniel-charlebois
Faculty Profile: www.apps.ualberta.ca/directory/person/dcharleb

Table of Contents

Education

University of Ottawa 2010-2014
Ph.D. Physics (Biological Physics, Supervisor: Prof. Mads Kærn)

- Thesis: Computational Investigations of Noise-Mediated Cell Population Dynamics (nominated for a thesis prize)

University of Ottawa 2008-2010
M.Sc. Physics (Biological Physics, Supervisor: Prof. Mads Kærn)

- Thesis: An Algorithm for the Stochastic Simulation of Gene Expression and Cell Population Dynamics

University of Calgary 2002-2008
B.Sc. Physics with Applied Mathematics Minor and
B.Sc. Biological Sciences

- Supervisor (honours stream projects): Prof. Stuart A. Kauffman, M.D.
- Co-Supervisor (honours stream projects): Dr. (now Prof.) André Ribeiro

Publications

34. "Peering Inside the Black Box: Explainable AI to Interpret Advanced Computer Vision Fungal Pathogen Prediction". *Joshua D. Guthrie, Shamanth S. Shankarnarayan, **Daniel A. Charlebois**. (2025). *bioRxiv*: 10.1101/2025.06.27.662051.

33. "Magnetic Field Platform for Well-Mixed and Spatially Structured Experiments on Microbial Populations". Akila Bandara, Enoki Li, **Daniel A. Charlebois**. (2024) *Biophysical Reports*, 4: 100165.

32. **"**Fitness Effects of a Demography-Dispersal Trade-Off in Expanding *Saccharomyces cerevisiae* Mats**". ***Rebekah Hall, *Akila Bandara, **Daniel A. Charlebois**. (2024) *Physical Biology*, 21: 026001.

31. "Machine Learning to Identify Clinically Relevant *Candida* Yeast Species". Shamanth A. Shankarnarayan, **Daniel A. Charlebois**. (2024) *Medical Mycology*, 62: myad134.

30. "Quantitative Systems-Based Prediction of Antimicrobial Resistance Evolution". **Daniel A. Charlebois**. (2023) *npj Systems Biology and Applications*, 9: 40.

29. "Identification and Elimination of Antifungal Tolerance in *Candida auris*". *Samira Rasouli Koohi, *Shamanth A. Shankarnarayan, Clare Maristela Galon, **Daniel A. Charlebois**. (2023) *Biomedicines*, 11: 898.

28. "Non-Genetic Resistance Facilitates Survival While Hindering the Evolution of Drug Resistance due to Intraspecific Competition". Joshua Guthrie, **Daniel A. Charlebois**. (2022) *Physical Biology*, 19: 066002.

27. "Machine Learning for Antimicrobial Resistance Research and Drug Development". Shamanth A. Shankarnarayan, Joshua D. Guthrie, **Daniel A. Charlebois**. (2022) *The Global Antimicrobial Resistance Epidemic – Innovative Approaches and Cutting-Edge Solutions*. Guillermo Téllez (Editor), ISBN: 978-1-80356-042-7.

26. "Lattice-Based Monte Carlo Simulation of the Effects of Nutrient Concentration and Magnetic Field Exposure on Yeast Colony Growth and Morphology". Rebekah Hall and **Daniel A. Charlebois**. (2021) *In Silico Biology*, 14: 53.

25. "Synthetic Gene Circuits for Antimicrobial Resistance and Cancer Research". *Kevin S. Farquhar, *Michael Tyler Guinn, Gábor Balázsi, **Daniel A. Charlebois**. (2021) *Synthetic Genomics – From BioBricks to Synthetic Genomes*. Michael Fernandez-Nino and Luis H. Reyes (Editors), ISBN 978-1-83969-639-8.

24. "Does Transcriptional Heterogeneity Facilitate the Development of Genetic Drug Resistance?", Kevin S. Farquhar, Samira Rasouli Koohi, **Daniel A. Charlebois**. (2021) *BioEssays*, 43: 2100043.

23. "Advancing Antimicrobial Resistance Through Quantitative Modeling and Synthetic Biology", Kevin S. Farquhar, Harold Flohr, **Daniel A. Charlebois**. (2020) *Frontiers in Bioengineering and Biotechnology*, 8: 583415.

22. Rebekah Hall, **Daniel A. Charlebois**, Book review on "A World Beyond Physics: The Emergence and Evolution of Life" by Stuart A. Kauffman. (2020) *The Quarterly Review of Biology*, 95: 133.

21. "Engineered Gene Networks Enable Non-Genetic Drug Resistance and Enhanced Cellular Robustness", Brendan Camellato, Ian J. Roney, Afnan Aziz, **Daniel A. Charlebois**, Mads Kærn. (2019) *Engineering Biology*, doi: 10.1049/enb.2019.0009.

20. "Role of Network-Mediated Stochasticity in Mammalian Drug Resistance", Kevin Farquhar, **Daniel A. Charlebois**, Mariola Szenk, Joseph Cohen, Dmitry Nevozhay, Gábor Balázsi. (2019) *Nature Communications*, 10: 2766.

19. "Modeling Cell Population Dynamics", **Daniel A. Charlebois**, Gábor Balázsi. (2019) *In Silico Biology*, 13: 21. (Among "Most read ISB articles in 2019").

18. "Multiscale Effects of Heating and Cooling on Genes and Gene Networks", **Daniel A. Charlebois**, Kevin Hauser, Sylvia Marshall, Gábor Balázsi. (2018) *Proceeding of the National Academy of Sciences of the United States of America*, 115: E10797.

17. "Negative Regulation Gene Circuits with Efflux Pump Control", ***Daniel A. Charlebois***, *Junchen Diao, Dmitry Nevozhay, Gábor Balázsi. (2018) *Methods in Molecular Biology*, 1772: 25.

16. “Backward Evolution from Gene Network Dynamics”. *Merzu Belete, ***Daniel A. Charlebois**, Gábor Balázsi. (2018) *bioRxiv*: 10.1101/369371.

15. “Frequency-Dependent Selection: A Diversifying Force in Microbial Populations”, **Daniel A. Charlebois**, Gábor Balázsi. (2016) *Molecular Systems Biology*, 12: 880.

14. “Efflux Pump Control Alters Synthetic Gene Circuit Function”, Junchen Diao, **Daniel A. Charlebois**, Dmitry Nevozhay, Zoltán Bódy, Csaba Pál, Gábor Balázsi. (2016) *ACS Synthetic Biology*, doi: 10.1021/acssynbio.5b00154.

13. “Effect and Evolution of Gene Expression Noise on the Fitness Landscape”, **Daniel A. Charlebois**. (2015) *Physical Review E*, 92: 022713.

12. “Coherent Feedforward Transcriptional Regulatory Motifs Enhance Drug Resistance”, **Daniel A. Charlebois**, Gábor Balázsi, Mads Kærn. (2014) *Physical Review E*, 89: 052708.

11. “An Accelerated Method for Simulating Population Dynamics”, **Daniel A. Charlebois**, Mads Kærn. (2013) *Communications in Computational Physics*, 14: 461.

10. **Daniel A. Charlebois**. Book review on “Number-Crunching” by Paul J. Nahin. (2013) *Physics in Canada*, 69: 72.

9. “What all the Noise is About: The Physical Basis of Cellular Individuality”. **Daniel A. Charlebois**, Mads Kærn. (2012) *Canadian Journal of Physics*, 90: 919.

8. “Gene Expression Noise Facilitates Adaptation and Drug Resistance Independently of Mutation”. **Daniel A. Charlebois**, Nezar Abdennur, Mads Kærn. (2011) *Physical Review Letters*, 117: 218101.

7. “An Algorithm for the Stochastic Simulation of Gene Expression and Heterogeneous Population Dynamics”. **Daniel A. Charlebois**, Dawn Fraser, Jukka Intosalmi, Mads Kærn. (2011) *Communications in Computational Physics*, 9: 89.

6. “Stochastic Gene Expression and the Processing and Propagation of Noisy Signals in Genetic Networks”. **Daniel A. Charlebois**, Theodore J. Perkins, Mads Kærn. (2011) *Information Processing and Biological Systems*. A.S. Ribeiro and S. Niiranen (Editors). Springer-Verlag, pg. 89-112, ISBN: 978-3-642-19620-1.

5. “Dynamics of Stochastic Gene Rings”. **Daniel A. Charlebois**. (2010) *Canadian Undergraduate Physics Journal*, 8: 13.

4. "A Biophysicist Ponders the Application of Hidden Metric Spaces to Genetic Networks". **Daniel Charlebois**. (2009) *Nature*, 458: 811.

3. **Daniel Charlebois**, Book review on “The Human Side of Einstein” by Walter Isaacson. (2008) *Canadian Undergraduate Physics Journal*, 8: 37.

2. “*CellLine*, a Stochastic Cell Lineage Simulator”. Andre S. Ribeiro, **Daniel A. Charlebois**, Jason Lloyd-Price. (2007) *Bioinformatics*, 23: 3409.

1. “Effects of Microarray Noise on Inference Efficiency of a Stochastic Model of Gene Networks". **Daniel A. Charlebois**, Andre S. Ribeiro, Antti Lehmussola, Jason Lloyd-Price, Olli Yli-Harja, Stuart A. Kauffman. (2007) *WSEAS Transactions on Biology and Biomedicine*, Vol. 4: 15.

*Equal contribution. Underline denotes trainee.

Research Experience

Associate Professor (Biophysics, tenured)

Department of Physics, University of Alberta July 2025

Assistant Professor (Biophysics, tenure-track)

Department of Physics, University of Alberta 2019-June 2025

Adjunct Professor

Department of Biomedical Engineering, University of Alberta 2023-2028

Department of Biological Sciences, University of Alberta 2021-2025

Affiliate Faculty Member

Collaborative Mathematical Biology Group, University of Alberta 2020-Present

Collaborator

Antimicrobial Resistance – One Health Consortium, University of Calgary 2021-Present

Natural Sciences and Engineering Research Council Postdoctoral Fellow/Associate

Laufer Center for Physical and Quantitative Biology, Stony Brook University 2014-2019

- Supervisor: Prof. Gábor Balázsi

Research Assistant

Ottawa Institute of Systems Biology, University of Ottawa 2008-2014

Institute for Biocomplexity and Informatics, University of Calgary 2005-2007

Canadian Blood Services, National Epidemiology and Surveillance Division 2005

Teaching Experience

Instructor

*Course Convenor & Instructor, University of Alberta Winter 2022, *2023, 2024, *2025
Course: ENPH 131 – Mechanics

Instructor, University of Alberta Fall 2022
Course: BIOPH 201 – Introduction to Biophysics

Instructor, University of Alberta Winter 2021, 2022, 2024, 2025
Course: BIOPH401/501 – Advanced Biophysics

Instructor, University of Alberta Winter 2020
Course: PHYS495/595 – Intro to Biophysics

Co-Instructor, Stony Brook University Winter 2017 & Fall 2018
WISE Course: Women in the Laboratory:
Introduction to Science, Engineering, and Mathematics Research

Independent Project Supervisor

Course: PHYS 499 – Undergraduate Research Project Fall 2023 & Fall 2020
Students: Sanjina Aurin (2023); Joshua Guthrie (2020) and Samiha Ali (2020)

Miscellaneous

Guest Lecturer, Stony Brook University Winter 2018
Course: Genetic Engineering

Guest Lecturer, Stony Brook University Winter 2018
Women in Science and Engineering Course: Opportunities in STEM and Beyond

Laboratory Guest Instructor, Stony Brook University Fall 2016
Physical and Quantitative Biology

Guest Lecturer, Stony Brook University Summer 2016
Course: Introduction to Biomedical Engineering

Teaching Assistant, Department of Physics, University of Ottawa 2008-2012
Courses: Statistical Thermodynamics, Mechanics, Theoretical Physics,
Fundamentals of Physics I, II, & III

Highly Qualified Personnel

Trainees

Postdoctoral Fellow:

- Dr. Shamanth Shankarnarayan (2021-Present)

Technician/Research Assistant:

- Joshua Guthrie, Research Assistant (2024-Present)
- Samira Rasouli Koohi, Laboratory Technician & Research Assistant (2025-Present)

PhD Students/*Candidates:

- *Harold Flohr, Department of Physics, University of Alberta (2020-Present)
- Clare Maristela Galon, Department of Physics, University of Alberta (2022-Present)

MSc Students:

- Sanjina Rahman Aurin, Department Physics, University of Alberta (2024-Present)
- Luca Bassani, Department of Biomedical Engineering, Politecnico di Torino, (2025 - Present) - Co-supervised by Prof. Jack Tuszynski

BSc Students:

- Aidan Dozorec, Department of Engineering, University of Alberta (Summer 2025)
- Vishva Ayer, Department of Physics, University of Alberta (Summer 2025)

Alumni:

- Akila Bandara, Department of Physics, PhD Physics, University of Alberta [Graduate Supervisor] (2020-2025)
- Joshua Guthrie, Department of Physics, MSc Physics, University of Alberta [Graduate Supervisor] (2022-2024)
    - Current Position: Research Assistant, Charlebois Research Group
- Samira Rasouli Koohi, Department of Physics, MSc Physics, University of Alberta [Graduate Supervisor] (2021-2024)
    - Current Position: Laboratory Technician, Charlebois Research Group
- Enoki Li, BSc Pharmacology (expected 2027), University of Alberta [Undergraduate Research Supervisor] (2023-2024)
    - Current Position: Undergraduate student and president of Mycology Club, University of Alberta
- Sanjina Rahman Aurin, BSc Physics (Hons.), University of Alberta [PHYS499 and Undergraduate Research Supervisor – Co-supervised by Prof. Frank Hegmann] (2022-2023)
    - Current Position: Master's student in Charlebois Research Group
- Joshua Guthrie, Department of Physics, University of Alberta [PHYS499 and Undergraduate Research Supervisor] (2020-2021)
    - Current Position: Master's student in Charlebois Research Group

- Samiha Ali, BSc Mathematical and Statistical Sciences & Physics, University of Alberta [PHYS499 and Undergraduate Research Supervisor] (2020-2023)
    - Current Position: Air Operations Support Technician - Canadian Armed Forces
- Rebekah Hall, BSc Mathematical and Statistical Sciences (Hons.), University of Alberta [Undergraduate Research Supervisor] (2019-2022)
    - Current Position: Master's Student (Supervisor: Prof. Ailene MacPherson), Department of Mathematics, Simon Fraser University
- Sylvia Marshall, BSc Chemistry (Hons.), Laufer Center for Physical and Quantitative Biology, Stony Brook University [Undergraduate Thesis Co-Supervisor with Prof. Gábor Balázsi] (2015- 2016)
    - Current Position: Ophthalmology Resident Physician, University at Buffalo

Trainee Awards

- Vishva Iyer: Science Experiential Skills Advantage (2025)
- Aidan Dozorec: NSERC Undergraduate Student Research Award (2025)
- Dr. Shamanth Shankarnarayan: Post Doctoral Research Day Speed Talk First Prize (2024)
- Clare Maristela Galon: DOST-UAlberta S&T Graduate Scholarship (2022-2025)
- Joshua Guthrie: AGES – Indigenous (2023); NSERC Undergraduate Student Research Award (2021)
- Sanjina Rahman Aurin: Summer Undergraduate Physics Research Experience Award (2023); CCUWiP Travel Award (2023); URI Undergraduate Researcher Stipend (2022); Faculty of Science Undergrad Symposium Best Overall Presentation Award (2022)
- Samiha Ali: CCUWiP Travel Award (2023); URI Support Fund (2021)
- Enoki Li, URI Undergraduate Researcher Stipend (2023)
- Harold Flohr: Graduate Student Teaching Award (2022)
- Rebekah Hall: Dean's Silver Medal in Science (2022); NSERC Undergraduate Student Research Award (2021); AI Summer Research Studentship (2020)

Mentoring

Mentor 2019-2024
University of Alberta-Women in Science and Engineering (UA-WISE)/
Women in Scholarship, Engineering, Science, and Technology (WiSEST)
Mentorship Program

iGEM Faculty Advisor 2022-2023
University of Alberta
Genetically engineered bacteria to fight *Candida albicans* infections through detection, localization, and toxin production.

Advisor 2016-2018
Stony Brook University
Senior Design Project in Biomedical Engineering

International Genetically Engineered Machine (iGEM) Competition Advisor 2014
Stony Brook University
Model of a Synthetic *E. Coli* System for Programmed Melittin Formation
(bronze medal awarded at championship)

iGEM Advisor 2013
University of Ottawa
Modeling a synthetic fold-change molecule detector network in budding yeast
(gold medal awarded at championship)

Assisted Prof. Kærn and Prof. Balázsi with training and supervising undergraduate and graduate students (theoretical and experimental projects) 2010-2019

Grants & Fellowships

Accelerating Innovations into CarE (AICE) - Concepts (Principal Investigator) 2024-2027

- Alberta Innovates, $750,000
- "Machine Learning Driven Point-of-Care Test Device for Identifying Clinically Important Yeast Species"
- Co-Investigator: Prof. Ying Tsui

Health Research Training Platform (Collaborator) 2024-2030

- Canadian Institutes of Health Research (Total: $2,700,000)
- "Canadian One Health Antimicrobial Resistance Health Research Training Network (CAN-AMR-Net)"
- Funding Pool: One Health: Antimicrobial Resistance
- Nominated Principal Applicant: Dr. Herman Barkema (University of Calgary)

Business Strategy Internship (Technical Lead) 2024-2025

- Lab2Market Validate – Mitacs
- $15,000 (Mitacs $7,500 + Edmonton Unlimited $7,500)
- "Machine Learning Based Point-of-Care Device for Rapid Diagnosis of Clinically Relevant Fungal Pathogens"
- Partner Organization: Edmonton Unlimited
- Entrepreneurial Lead: Dr. Shamanth Shankarnarayan

Research Grant (Co-Primary Investigator) 2024-2027

- Human Frontier Science Program, $518,713 USD (Total: $1,200,000 USD)
- "How Predictable is Evolution? Eco-Evolutionary Dynamics of Fungi Across Biological Scales"
- Co-Primary Investigators: Prof. Meike Wortel (University of Amsterdam) and Prof. Michael Manhart (Rutgers University)

Project Grant (Co-Applicant) 2024-2029

- Canadian Institutes of Health Research, $47,080 (Total: $840,000)
- "Decoding the Mechanisms of Beta-Lactam Resistance in *Streptococcus suis*: A Genomic, Structural and Epidemiological Analysis"
- Nominated Principal Applicant: Dr. Nahuel Fittipaldi (Université de Montréal)

Infrastructure Operating Funds – CFI-JELF (Primary Investigator) 2022-2027

- Canada Foundation for Innovation, $24,742
- "Mitigation of Drug Resistance in Bacteria and Pathogenic Yeasts"
- * Infrastructure operating funds for CFI-JELF

Discovery Grant (Primary Investigator) 2020-*2026

- Natural Sciences and Engineering Research Council of Canada, $174,000
- "Biophysical models of the effect of the physico-chemical environment on genetic networks"
- *One-year automatic extension/additional funding due to COVID-19

New Frontiers in Research Fund – Exploration (Primary Investigator) 2020-2024

- Government of Canada, $250,000
- "Understanding and mitigating drug resistance: Quantitative models and synthetic gene networks"
- Collaborators: Prof. Jack Tuszynski (University of Alberta) and Dr. Michael Manhart (ETH Zurich)

Amii Resource Allocation Panel 2022-2024

- Alberta Machine Intelligence Institute (Amii), $59,356
- "Machine learning to detect and mitigate drug-resistant pathogens"

AI4Society Grant Preparation Support (Lead) 2022-2023

- AI4Society, University of Alberta, $2,000
- "Machine learning and antifungal adjuvants to mitigate human fungal pathogens"

AI4Society Seed Grant (Lead) 2021-2022

- AI4Society, University of Alberta, $10,000
- "Machine learning to rapidly detect drug-resistant human fungal pathogens"

*John R. Evans Leaders Fund (Primary Investigator) 2019-2022

- Canada Foundation for Innovation, $98,969
- "Mitigation of Drug Resistance in Bacteria and Pathogenic Yeasts"

Research Capacity Program - Small Equipment Grant (Primary Investigator) 2019-2022

- Government of Alberta, Ministry of Jobs, Economy and Innovation, $98,969
- "Mitigation of Drug Resistance in Bacteria and Pathogenic Yeasts"
- *Matching funds for CFI-JELF

Discovery Launch Supplement (Primary Investigator) 2020-2021

- Natural Sciences and Engineering Research Council of Canada, $12,500
- "Biophysical models of the effect of the physico-chemical environment on genetic networks"

Discovery COVID-19 Supplement (Primary Investigator) 2020-2021

- Natural Sciences and Engineering Research Council of Canada, $4,640
- "Biophysical models of the effect of the physico-chemical environment on genetic networks"

Start-Up Funds 2019-2024

- Faculty of Science, University of Alberta

GPU Grant (Primary Investigator) 2018

- NVIDIA Corporation, 2 Titan X Pascal GPUs valued at $3,000

Postdoctoral Fellowship 2014-2016

- Natural Sciences and Engineering Research Council of Canada, $90,000

GPU Grant (Primary Investigator) 2014

- NVIDIA Corporation, 2 Tesla K40 GPU Accelerators valued at $15,000

Awards & Scholarships

Audrey & Randy Lomnes Early Career Endowment Award in Physics 2021-2024

- Department of Physics, University of Alberta and Audrey & Randy Lomnes, $113,945 (inaugural winner)
- "Identification and Mitigation of Drug Resistance in the Yeast Pathogen *Candida auris*"

Faculty of Graduate and Postdoctoral Studies Dean's Scholarship 2014
(University of Ottawa, for doctorate, $3,000)

Queen Elizabeth II Scholarship in Science and Technology 2012-2014
(Government of Ontario, $30,000)

Excellence Scholarship 2012-2014
(University of Ottawa, $16,000)

Faculty of Graduate and Postdoctoral Studies Dean's Scholarship 2010
(University of Ottawa, for master's with a thesis, $1,500)

Jason Lang Scholarship 2008
(Government of Alberta, $1,000)

Laurence Decore Award for Student Leadership 2006
(Government of Alberta, $500)

Computer Science Undergraduate Society 2005
Schlumberger Calgary Technology Centre Award
(CSUS and Schlumberger Information Systems, $1,000)

ExxonMobil Higher Education Award 2002-2005
(ExxonMobil, $15,000)

Scientific Talks

39. "Beyond Genetic Resistance: Antifungal Tolerance and Novel Adjuvants", Canadian Chemistry Conference and Exhibition (CSC 2025), Rogers Centre, Ottawa, Canada, June 17, 2025. (Invited)

38. "Novel Devices and Discoveries in Drug Resistance and Magnetobiology", colloquium hosted by the Department of Physics, University of Alberta, Edmonton, Canada, September 13, 2024.

37. "Fungi Under the Microscope: A Novel Magnetic Field Platform and Discoveries in Yeast Magnetobiology", seminar hosted by the Institute for Quantum Science and Technology, University of Calgary, Calgary, Canada, August 29, 2024. (Invited)

36. "Genetic Networks, Gene Expression Noise, and Drug Resistance Evolution", Biophysics-Physical Biology seminar hosted by Virginia Tech, Blacksburg, USA, May 17, 2024. (Invited)

35. "Drug Resistance Evolution in Yeast Harboring Synthetic Gene Circuits", SynBio 6.0, University of British Columbia, Vancouver, Canada, May 16, 2024.

34. "Identification and Mitigation of Antifungal Drug Tolerance in Fungal Pathogens", Biochemistry 623/626 Seminar, Department of Biochemistry, University of Alberta, Edmonton, Canada, October 25, 2023. (Invited)

33. "Predicting Antimicrobial Resistance Evolution", Mathematical Cell Biology Seminar, University of Alberta, Edmonton, Canada, October 17, 2023.

32. "Noise, Networks, and Population Dynamics in the Evolution of Drug Resistance", 2023 Canadian Association of Physicists Congress, University of New Brunswick, Fredericton, Canada, June 20, 2023 (Invited)

31. "Identification and Elimination of Antifungal Drug Tolerance in *Candida auris*", 4th Annual CanFunNet Fungal Biology Conference, University of Western Ontario, Canada, May 31, 2023.

30. “Machine Learning to Detect Drug-Resistant Fungal Pathogens”, Antimicrobial Resistance – One Health Consortium 2nd Annual Retreat, Banff Center for the Arts and Creativity, Banff, Canada, September 27, 2022.

29. “Nongenetic Resistance Enhances Population Survival While Hindering the Evolution of Drug Resistance”, Physical and Quantitative Methods to Overcome Antibiotic Resistance, Biophysical Society in Stockholm, Sweden, August 17, 2022.

28. “Transition from Nongenetic to Genetic Antifungal Resistance: Insights from Mathematical Models, Genetically Engineered Yeast, and Pathogenic Fungi”, 3rd Annual CanFunNet Fungal Biology Conference, University of Alberta, Canada, June 2, 2022. (Keynote)

27. “Quantitative Model Systems for Antimicrobial Resistance Research”, Antimicrobial Resistance – One Health Consortium, University of Calgary, Canada, April 14, 2022. (Invited)

26. “Lattice-Based Simulations of Yeast Colony Growth Under Low-Nutrient Conditions and Magnetic Field Exposure”, seminar hosted by Quantitative Biophysics in Canada (QBIOC), June 24, 2021. (Invited)

25. “Quantifying the Transition from Non-Genetic to Genetic Drug Resistance”, seminar hosted by the Department of Physics, Simon Fraser University, Canada, April 14, 2021. (Invited)

24. “Quantifying the Transition from Non-Genetic to Genetic Drug Resistance”, seminar hosted by the Department of Physics, Concordia University, Canada, April 7, 2021. (Invited)

23. “Effects of Temperature and Drugs on the Function, Dynamics, and Evolution of Gene Regulatory Networks and Antimicrobial Resistance”, seminar hosted by the Department of Biological Sciences, University of Alberta, Canada, November 19, 2020. (Invited)

22. “Drug Resistance: Noise, Networks, and Evolution” seminar hosted by the Department of Physics and Astronomy, University of Calgary, Canada, October 29, 2020. (Invited)

21. “Investigations on Drug Resistance: Mathematical and Engineered Model Systems”, Mathematical Biology Seminar Series, seminar hosted by the Collaborative Mathematical Biology Group & Department of Mathematics and Statistics, University of Alberta, Canada, April 6, 2020. (Invited)

20. “Gene Network-Mediated Heterogeneity in Mammalian Drug Resistance”, Advances in Theoretical and Experimental Methods for Analyzing Complex Regulatory Networks, BIRS, Banff, Canada, February 20, 2020. (Invited)

19. “The Role of Gene Network-Mediated Stochasticity in Mammalian Drug Resistance”, LBD 2019 Webinar on Biosystems/Laboratory of Biosystem Dynamics, hosted by Tampere University, Finland, December 10, 2019. (Invited)

18. “Non-genetic to Genetic Antimicrobial Resistance: Mechanisms from Mathematical and Fungal Model Systems”, Biochemistry 623 and Molecular and Cellular Biology Seminar, Department of Biochemistry, University of Alberta, Edmonton, Canada, November 5, 2019. (Invited)

17. “Gene Networks and Drug Resistance: Breakthroughs Using Novel Model Systems”, Biological & Biomedical Engineering Research Symposium, McGill University, Montreal, Canada, March 22, 2019. (Keynote)

16. “Multiscale Effects of Temperature on Synthetic Gene Circuits”, American Physical Society March Meeting, Boston, USA, March 4, 2019.

15. “Heterogeneity in Mammalian Drug Resistance”, Gordon Research Conference on Drug Resistance, Bryant University, Smithfield, USA, July 25, 2018.

14. “Stochasticity in Mammalian Drug Resistance”, American Physical Society March Meeting, Los Angeles, USA, March 7, 2018.

13. “Functional Effects of Heating and Cooling Gene Networks”, LBD 2017 Webinar on Biosystems, online conference hosted by the Tampere University of Technology, Finland, December 11, 2017. (Invited)

12. “Effect of Temperature on Synthetic Positive and Negative Feedback Gene Circuits”, APS March Meeting, New Orleans, USA, March 16, 2017.

11. “Evolving Drug Resistance: Quantitative Models and Synthetic Gene Networks”, Mini-Workshop: Cellular Heterogeneity and Evolution, Stony Brook University, Stony Brook, USA, August 25, 2016. (Invited)

10. “Gene Expression Noise, Fitness Landscapes, and Evolution”, APS March Meeting, Baltimore, USA, March 16, 2016.

9. “Theoretical Investigations on the Development of Drug Resistance”, Laufer Center Retreat, Old Field Club, Stony Brook, USA, April 20, 2015.

8. “From Mathematical Models to the Laboratory: Shedding New Light on Drug Resistance”, SBU Postdoc Spotlight, Stony Brook University, Stony Brook, USA, September 18, 2014.

7. “Modelling & Simulation of Cellular Population Dynamics: The Case for Noise-Mediated Drug Resistance”, Mathematical Tools for Evolutionary Systems Biology, BIRS, Banff, Canada, May 29, 2013. (Invited)

6. “Gene Expression Noise Facilitates Adaptation and Drug Resistance Independently of Mutation”, Ottawa-Carleton Institute for Physics, University of Carleton, Ottawa, Canada, April 30, 2013.

5. “Simulating Heterogeneous Cell Populations and the Development of Noise Induced Drug Resistance”, University of Texas MD Anderson Cancer Center, Houston, USA, August 20, 2012.

4. “Modelling Drug Resistance in Cell Populations", 2011 OISB Symposium, Montebello, Canada, June 8, 2011.

3. “Stochastic Simulation of Gene Expression and Heterogeneous Population Dynamics”, Ottawa-Carleton Institute for Physics, University of Carleton, Ottawa, Canada, December 15, 2009.

2. “*P53Sim*, Multiple Cells and Cell Lineage P53-Mdm2 Feedback Loop Delayed Stochastic Simulator”, Department of Physics and Astronomy, University of Calgary, Calgary, Canada, April 25, 2007.

1. “Inference Algorithms, Threshold Test for Gene Regulatory Networks”, Department of Biological Sciences, University of Calgary, Calgary, Canada, April 6, 2006.

Service & Public Outreach

Physics Grad Fair, “Focus Area: Biophysics” talk, University of Alberta (Fall 2023 & Fall 2024)

15th Annual Symposium for Graduate Physics Research, “Pathways to Academia” talk and panel discussion, University of Alberta Graduate Physics Students Association (2024)

Early Career Reviewer - Reviewer in Training Program, CIHR Project Grant, Microbiology & Infectious Diseases (Spring 2023)

Grant Reviewer, Canadian Foundation for Innovation-John R. Evans Leaders Fund (2023 - Present)

CIFAR Biophysics-Machine Learning Hiring Committee (2023 - 2024)

Scientific Organizing Committee, Biophysical Society of Canada 8th Annual Meeting, hosted by the University of Calgary (2022 - 2023)

External Grant Reviewer, New Frontiers in Research Fund – Exploration (2020 - Present)

Member, Undergraduate Biophysics Degree Program Development Committee, Department of Physics, University of Alberta (2019 - Present)

Graduate Supervisory Committee Member & Candidacy Exam/Thesis Defense Examiner, Department of Physics, University of Alberta (2019 - Present)

Organizing Committee, 3rd Annual CanFunNet Fungal Biology Conference, hosted by the University of Alberta (2021 - 2022)

Member, Graduate Admissions Committee, Department of Physics,
University of Alberta (2019-2022)

External Reviewer (Evaluation Group: 1505 – Physics), National Science and Engineering Research Council of Canada (2021)

Judge, Best Student Oral Presentation, Division of Physics in Medicine and Biology, Canadian Association of Physicists Virtual Congress (2020)

Pint of Science Festival Talk, “Physics + Biology = Weapons Against Drug Resistance”, Pint of Science Canada, online (2020)

Judge, Nat Rutter "Outstanding Technician of the Year" Award, Sigma Xi, University of Alberta Chapter (2020)

S^4 Humans of Physics Talk, “Daniel Charlebois = Human Biophysicist”, Department of Physics, University of Alberta (2019)

APS March Meeting Focus Session Co-Organizer and Chair, Single-Cell Variability and Dynamics, and Evolutionary Systems Biology I & II, Los Angeles (2018)

Moderator, SBU Postdoc Spotlight, Stony Brook University (2017)

Judge, Three Minute Thesis Competition, Stony Brook University (2017)

Editorial Board Member, *In Silico Biology* (2016-Present)

TEDx Talk, “Drug Resistance: A New Paradigm”, Stony Brook University (2016)

Member, Postdoc Advisory Committee, Stony Brook University (2016-2019)

Panel Participant, NSF Graduate Research Fellowship Program information session, Stony Brook University (2016)

Grant Review Panelist, National Science Foundation (2016)

SBU Postdoc Spotlight Presentation, “From Mathematical Models to the Laboratory: Shedding New Light on Drug Resistance”, Stony Brook University (2014)
Journal Reviewer: *Advances in Difference Equations*, *BioEssays*, *BioSystems*, *Bioinformatics, BMC Biology*, *DNA Research*, *Earth Systems and Environment Science*, *FEBS Letters*, *In Silico Biology*, *Journal of Clinical Microbiology*, *Molecular Biosystems*, *Physical Biology*, *Physical Review E*, *Physical Review Letters*, *PLOS*

Biology, *PLOS Computational Biology, PLOS ONE, Translational Oncology, Trends in Microbiology*

Media

"Research Explores how Fungi Become Drug-Resistant", *Folio* article by Adrianna MacPherson (updated May 7, 2024; originally posted January 23, 2023)

"Antifungal tolerance in Candida auris contributes to treatment failure", *Medical News - Life Sciences* article written by Dr. Priyom Bose (March 23, 2023)

"Academia Obscura: Mycology", *UCalgary NUTV* video interview with Ingrid Vargas (February 14, 2023)

"Solving a Fungal Problem", *CBC Radio Active* radio interview with Jessica Ng (January 31, 2023)

CBC The Homestretch radio interview with Chris dela Torre (January 31, 2023)

"Solutions are built on basic science", *Contours* article by Christina Frangou (December 16, 2022)

"Effects of Nutrient and Magnetic Field Exposure on Yeast Colony Growth", *Faculti* video interview (May 26, 2022)

"Four Faculty of Science Researchers Receive Funding for State-of-the-Art Research Tools", *UAlberta Faculty of Science News* article by Andrew Lyle (August 11, 2021)

"Students Convert Physics Lessons to Practical Use with Undergraduate Research Projects", *UAlberta Department of Physics News* article by Suzette Chan (March 16, 2021)

"Audrey and Randy Lomnes Early Career Endowment Award", *UAlberta Department of Physics News* article by Suzette Chan (December 15, 2020)

"Biophysicist Launches Drug Resistance Research Program", *UAlberta Faculty of Science News* by Katie Willis (May 19, 2020)

"New Assistant Professor Examines Drug Resistance Through Physics and Biology", *UAlberta Faculty of Science News* article by Katie Willis (October 11, 2019)

Languages & Technical Skills

Languages: Fluent in English and French

Operating Systems: Windows, Mac, Linux

Software: MATLAB, Mathematica, XPPAUT, MatCont, LaTeX, OpenMP, FCS Express

Programming Languages: Fortran, Python, C++, Pascal
Quantitative Skills: Modeling biological systems using ordinary differential equations, stochastic differential equations, and stochastic simulations, development of Monte Carlo cell population simulation algorithms

Experimental Skills: bacterial, fungal, and mammalian cell culture, flow cytometry, fluorescence microscopy, microfluidics, cell counter, plate reader, gel electrophoresis, yeast transformation, drug resistance/evolution experiments

Professional Memberships

American Association for the Advancement of Science (member since 2017)

Biophysical Society (member since 2021)

Biophysical Society of Canada (member since 2019)

Canadian Association of Physicists (member since 2008, Professional Physicist, P.Phys., since 2011)

Canadian Institutes of Health Research – College of Reviewers (member 2023 – 2026)

Engineers Without Borders (member since 2004)

National Postdoctoral Association (affiliate member 2014-2019)

New York Academy of Sciences (member 2015-2019)

Sigma Xi (elected, full member since 2010)