Ryan Ripsman

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Education

M.SC, UNIVERSITY OF TORONTO **EXPECTED GRADUATION DATE: JUNE 2024**

- Department of Laboratory Medicine and Pathobiology
- Thesis: Determining the feasibility of Integrating multi-omic liquid biopsy technology into a pediatric precision oncology program

B.SC, UNIVERSITY OF TORONTO **SEPTEMBER 2017 - JUNE 2022**

- cGPA: 4.0
- Physics major
- Mathematics minor
- Statistics minor

Academic Experience

MASTERS STUDENT, THE SHLIEN LAB **AUGUST 2022 – PRESENT**

- Developed a set of computational protocols for the use of liquid biopsy data for precision oncology
- Worked on machine learning tools to reduce the noise in cell-free nucleic acid data
- Co-supervised the research projects of a medical student and undergraduate co-op student

RESEARCH ASSISTANT, THE HILFINGER GROUP **NOVEMBER 2020 – OCTOBER 2022**

- Analyzed the noise properties of biomolecular control systems
- Derived thermodynamic constraints on the noise suppression capabilities of biological systems
- Ran simulations in C++ of stochastic biological systems
- Second author of a manuscript in PNAS

RESEARCH ASSISTANT, THE SHLIEN LAB **SEPTEMBER 2020 – SEPTEMBER 2021**

- Performed a meta-analysis of 6 cohorts of patients treated with immune checkpoint inhibition
- Developed a computational method for measuring the average mutation abundance of tumors using bulk RNA and DNA-seq data
- Identified genetic and epigenetic markers that predict response to immune checkpoint inhibition
- Third author of a manuscript in Science Advances

RESEARCH ASSISTANT, THE JAMES LAB **APRIL 2020 – SEPTEMBER 2020**

- Researched three-dimensionally polarized electromagnetic fields

- Developed a novel measure for the degree of polarization of three-dimensional fields

RESEARCH ASSISTANT, THE GOYAL GROUP **APRIL 2019 – JANUARY 2020**

- Awarded the Undergraduate Summer Research Award from NSERC
- Examined the differentiation of cardiac cells in zebrafish embryos using single-cell RNA sequencing data
- Developed pipelines for clustering the cells into groups of similar tissue using the R package Seurat
- Constructed developmental trajectories for zebrafish cardiac tissue

RESEARCH ASSISTANT, THE XU LAB **SEPTEMBER 2018 – APRIL 2019**

- Examined the development of different writing systems
- Conducted a literature review on human perception of written characters
- Used Python packages to analyze large corpora of text to find patterns between different writing systems

RESEARCH ASSISTANT, THE YANG LAB **APRIL 2018 – JULY 2018**

- Awarded the Department of Physics' Summer Undergraduate Research Fellowship
- Examined quantum materials using second harmonic generation
- Helped develop and set up new experimental configurations

Teaching Experience

PHYA21 TA, DEPARTMENT OF PHYSICS **JANUARY 2023 – APRIL 2023**

- Ran weekly laboratories and tutorial sessions
- Marked quizzes, worksheets and lab reports

WDI TA, DEPARTMENT OF COMPUTER SCIENCE **JANUARY 2023 – APRIL 2023**

- Marked writing assignments for first- and second-year computer science courses
- Provided feedback to students to help them improve their writing

ASSISTANT INVIGILATOR, BIO120H1 **SEPTEMBER 2022 – DECEMBER 2022**

- Helped ensure a proper and fair exam writing environment

Presentations and Publications

PEER REVIEWED PUBLICATIONS

Zatzman, M, Fuligini, **Ripsman, R**, et.al. (2022) Widespread hypertranscription in aggressive human cancers. Science Advances.

Kell, B, **Ripsman, R**, Hilfinger, A. (2023) Noise properties of adaptation-conferring biochemical control modules. Proceedings of the National Academy of Sciences.

ABSTRACTS AND POSTERS

Ripsman, R, Venier, R, Shlien, S. (2023) Deep whole genome sequencing of circulating tumour DNA for de-novo mutation calling. Genetics and Genome Biology retreat, Niagara, ON. *Oral Presentation*

Brayden Kell, **Ripsman, R**, Hilfinger, A. (2022) Achieving robust perfect adaptation while suppressing stochastic fluctuations in biochemical reaction networks. Canadian Association of Physicists Congress, Hamilton, ON.	*Poster Presentation*
Brayden Kell, **Ripsman, R**, Hilfinger, A. (2022) Achieving robust perfect adaptation while suppressing stochastic fluctuations in biochemical reaction networks. Conference on Quantitative Approaches in Biology, Evanston, IL.	*Oral Presentation*
Ripsman, R, Zatzman, M, Shlien, S. (2021) Average Mutation Abundance: A Novel Prognostic Factor for Survival and ICI response in cancer patients. Sickkids Summer Research Symposium, Toronto, ON.	*Poster Presentation*
Ripsman, R, Dasgupta, S, Goyal, S. (2020) The Transcriptional Dynamics of Cardiac Differentiation in Zebrafish. 2020 Canadian Undergraduate Physics Conference, London, ON.	*Oral and Poster Presentations*
Ripsman, R, Dasgupta, S, Goyal, S. (2019) Examining the Differentiation of Cardiac Progenitors Using Unsupervised Machine Learning. University of Toronto Undergraduate Research Fair, Toronto, ON.	*Poster Presentation*
Ripsman, R, Bartram, M, Yang, L. (2018) Probing the Symmetry of $SrRuO_3$ Using Second Harmonic Generation. University of Toronto Undergraduate Research Fair, Toronto, ON.	*Poster Presentation*

Awards and Scholarships

- Ontario Graduate Scholarship (2023)
- University of Toronto Fellowship (2022)
- A.C. Hollis Hallet Scholarship for Physics (2019, 2022)
- University of Toronto Scholar (2021)
- 8^{th} place in the Canadian Association of Physics' Prize Exam (2021)
- The 3T0 M.&P. and Associate Scholarship (2020)
- Best poster design at the Canadian Undergraduate Physics Conference (2020)
- C.L. Burton Scholarship for Mathematical and Physical Sciences (2020)
  NSERC Undergraduate Student Research Award (2019)
- Rueben Wells Leonard scholarship (2018)
- Summer Undergraduate Research Fellowship (2018)
- University of Toronto's President's Scholarship (2017)
- Dennis Waldman Scholarship (2017)

Leadership Activities and Community Involvement

- Graduate advisor for the Spectatorial (2022 – 2023)
- Senior Editor at the Spectatorial (2021 – 2022)
- Staff Science Writer at the Trinity Times (2020 – 2023)
- Volunteer at Cortellucci Vaughan Hospital (2020 – 2021)

- Volunteer at Mount Sinai Hospital (2019 – 2020)
- Tutoring university physics, mathematics, and statistics (2018 – present)

Technical Skills

PROGRAMMING LANGUAGES
Python, R, MATLAB, Bash, C/C++

COMPETENCIES
Biology, Statistics, Mathematical modelling, Simulation, Next generation sequencing, Machine Learning, Technical writing, Scientific communication