Ian Chow

MSc. Astronomy Candidate | University of Western Ontario

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Research Interests

Astrostatistics, Machine Learning, Exoplanets, Dynamics

Education

PRESENT – Sep. 2023 | **University of Western Ontario** | *London, ON, Canada*
MSc. Astronomy
Cumulative GPA of **4.00/4.00**
Thesis : Orbital and Physical Properties of Decameter-Sized Earth Impactors
Supervisor : Prof. Peter G. Brown

May 2023 – Sep. 2018 | **University of Toronto** | *Toronto, ON, Canada*
Honours BSc. Astronomy & Physics Specialist, Statistics Major, Mathematics Minor
Graduated with High Distinction – Cumulative GPA of **3.60/4.00**
Astronomy Thesis : Analyzing Radial Velocity Data from the Resonant Planetary System HD 45364
Supervisors : Dr. Sam Hadden, Prof. Hanno Rein
Statistics Thesis : Probabilistic Dimensionality Reduction Methods for Stellar Chemodynamics
Supervisor : Prof. Joshua S. Speagle

Additional Research Positions

Aug. 2023 – May 2023 | **Dunlap Institute for Astronomy & Astrophysics, University of Toronto** | *Toronto, ON, Canada*
Summer Undergraduate Research Assistant
Project : Understanding the impact of Bayesian inference on ultra-light axion limits
Supervisor : Dr. Keir Rogers

Aug. 2022 – May 2022 | **Canadian Institute for Theoretical Astrophysics (CITA)** | *Toronto, ON, Canada*
Summer Undergraduate Research Fellow
Project : Modelling Migration Scenarios of Resonant Planets Using Radial Velocity Data
Supervisors : Dr. Sam Hadden, Prof. Hanno Rein

Relevant Coursework

Astrophysics Modern Astrophysics (stellar structure/evolution, nucleosynthesis, galaxies, cosmology), Small-Body and Planetary Formation & Dynamics, Classical Mechanics, Thermal Physics, Quantum Mechanics, Classical & Relativistic Electrodynamics, Nonlinear Physics and Chaos, Time-Series Analysis

Statistics Probability & Statistics, Data Analysis, Survey Sampling and Observational Data, Statistical Computation, Machine Learning

Peer-Reviewed Publications

First Author

1. **Chow, I.**, & Brown, P.G. "Decameter-Sized Earth Impactors – I : Orbital Properties", in review at Icarus.
2. **Chow, I.**, & Hadden, S. "Influence of Modeling Assumptions on the Inferred Dynamical State of Resonant Systems : A Case Study of the HD 45364 System", in review at ApJ.

Awards, Scholarships, Fellowships & Honours

2024 **NASA Space Apps Challenge Global Finalist**, honour — *NASA*
2024-2025 **Ontario Graduate Scholarship**, $15,000 CAD — *University of Western Ontario*
2023-2024 **Western Graduate Research Scholarship**, $8,257 CAD — *University of Western Ontario*
2023 **SURP Poster Competition Award**, $50 CAD — *University of Toronto*
2023 **Summer Undergraduate Research Program (SURP) Fellowship**, $9,980 CAD — *University of Toronto*
2022 **Summer Undergraduate Research Fellowship (SURF)**, $9,500 CAD — *CITA*

2021-2022 **Smith Solis Research Scholarship in Astronomy and Astrophysics**, $1,250 CAD *University of Toronto*
2020-2023 **Dean's List Scholar**, honour *University of Toronto*

Teaching Experience

My duties in the following course included delivering lectures and conducting in-class demonstrations, developing course curricula, holding office hours, proctoring, grading and reviewing exams.

2024 **Astronomy 1021 : General Astronomy**, Teaching Assistant & Guest Lecturer *University of Western Ontario*

My duties in the following course included supervising lab sessions and grading lab reports.

2023-2024 **First-Year Physics Labs**, Teaching Assistant (x2) *University of Western Ontario*

My duties in the following courses included leading in-person tutorials and help centres, running midterm viewing sessions, proctoring, grading and reviewing exams.

2024 **Physics 1402 : Physics for Engineering Students II**, Teaching Assistant *University of Western Ontario*
2023 **Physics 1201 : Physics for the Sciences I**, Teaching Assistant *University of Western Ontario*

Relevant Professional Experience

Sep. 2020 – Jun. 2020 | **Innovere Medical** *Markham, ON, Canada*
Software Developer

- Automated detection of dropouts in time-series audio data from an MRI scanner's wireless audio system using power spectrum analysis in MATLAB and Python, eliminating 20+ hours of work weekly
- Developed and tested TechSmart, an in-house multimedia app for patient use during MRI scans, with company's software development team

MATLAB | Python | Signal Processing

Aug. 2019 – Jun. 2019 | **Plantiga Technologies** *Vancouver, BC, Canada*
Software Developer

- Developed methods to compute physical fitness heuristics from time-series acceleration (g-force) data, using signal processing techniques like digital filtering and convolution in Python (NumPy, SciPy, Pandas) to improve detection of foot impacts
- Field-tested and validated hardware such as sensor shoe insoles that track movement
- Acquired data from company partners such as physiotherapy clinics, universities (University of British Columbia, Simon Fraser University), and sports organizations (Houston Rockets, US Tennis Association)
- Wrote documentation of company products and services for clients

Python | Signal Processing | Data Analytics

Aug. 2017 – Jun. 2017 | **Synced Review** *Toronto, ON, Canada*
Research Intern

- Conducted literature review focusing on advancements in reinforcement learning used in adversarial-search board and video game artificial intelligence programs for a company report
- Worked with company team to research and edit review articles on industry trends in machine learning and robotics technology

Machine Learning | Artificial Intelligence | Literature Review

Conference Presentations

2024 CASCA AGM	"Properties of Decameter Earth Impactors." Poster.	*Toronto, ON, Canada*
2024 DDA 55 Meeting	"The Dynamical Origin of Decameter Earth Impactors." Contributed talk.	*Toronto, ON, Canada*
2023 CASCA AGM	"Identifying birth environments of isolated stars : a probabilistic dimensionality reduction model for stellar chemical abundances." Poster.	*Penticton, BC, Canada*
2022 CITA Planet Day	"Modelling Migration Scenarios of Resonant Planets Using Radial Velocity Data." Contributed talk.	*Toronto, ON, Canada*

Departmental Presentations, Seminars & Academic Talks

2024 NASA Day	"The Dynamical Origin of Decameter Earth Impactors." Invited talk (Virtual).	*NASA Meteoroid Environment Office*
2023 SURP Symposium	"Understanding the impact of Bayesian inference on ultra-light axion limits." Poster.	*University of Toronto*
2022 SURF Presentation	"Modelling Migration Scenarios of Resonant Planets Using Radial Velocity Data." Invited talk.	*University of Toronto*

Leadership, Volunteering & Extracurricular Experience

PRESENT – Jun. 2024 | **Hume Cronyn Memorial Observatory** | *London, ON, Canada*
Volunteer

- Volunteered at astronomy Public Nights attended by 80+ visitors weekly at the University of Western Ontario's Cronyn Observatory

Jun. 2024 – Sep. 2023 | **Consensus Trivia**
Question Writer/Editor

- Wrote and edited trivia questions for Consensus Trivia, a federally registered not-for-profit organization that runs team-based trivia tournaments for 80+ high school and collegiate teams across Canada
- Moderated and kept score for tournament games as a staffer

May 2023 – Jan. 2019 | **University of Toronto Academic Trivia Club** | *Toronto, ON, Canada*
Vice President, Competitor, Tournament Organizer & Question Writer/Editor

- Elected Vice President of the University of Toronto's Academic Trivia Club during the 2020-2021 and 2021-2022 academic years organizing twice-weekly practices and social events, managing club Facebook group and Discord server with 300+ members, and moderating practices and tournament games
- Represented the University of Toronto at 30+ trivia (quiz bowl) tournaments across Canada and the U.S. as a competitor with several top finishes at North American championships, such as leading the team to fourth place at the 2022 Division II Intercollegiate Championship Tournament in Chicago
- Organized and directed several collegiate and high school tournaments, including the 2021 University of Toronto Collegiate Novice and the 2022 University of Ottawa ACF Fall tournaments, played by 30+ collegiate teams in total across Canada and the U.S.
- Wrote and edited trivia questions across a wide range of academic disciplines (including astronomy and physics) for 2022 WORKSHOP, 2023 Canadian Novice, and 2024 MRNA III, collegiate tournaments played by 80+ teams in total across Canada, the U.S., and the U.K.

Media Experience

Oct. 2023 **SURP Student Spotlight** Interview — *Dunlap Institute for Astronomy & Astrophysics, University of Toronto*

Projects

SkyShield Orrery 2024
ia-chow.github.io/projects/skyshield-orrery
An in-browser physics-based virtual interactive Solar System orrery developed for the 2024 NASA Space Apps Challenge and selected by NASA as one of 40 Global Finalists out of 10 000 submitted projects. Hosted on a personal website.
HTML CSS JavaScript

fasano-franceschini-test 2024
github.com/wmpg/fasano-franceschini-test
A Python implementation for the multivariate extension of the two-sample Kolmogorov-Smirnov (K-S) statistical test described by Fasano & Franceschini (1987). Used in Chow & Brown, in review at Icarus.
Python

Here I Stand Calculator 2020
ia-chow.github.io/projects/his/
An online calculator tool to compute the odds of various outcomes for the strategy board game Here I Stand, written to familiarize myself with HTML, CSS and JavaScript. Hosted on a personal website.
HTML CSS JavaScript

Skills

Programming	Python (NumPy, SciPy, Pandas, Matplotlib, Keras/TensorFlow, scikit-learn), MATLAB, R (ggplot, dplyr), HTML5 (Bootstrap), CSS, JavaScript (Node.js)
Software	LaTeX, Git/GitHub, Jupyter Notebook, Anaconda, R Suite, Bash, Linux (ssh), Microsoft Excel
Languages	English (fluent), French (intermediate), Cantonese (spoken)

Other Affiliations

2024- **Institute for Earth and Space Exploration** *University of Western Ontario*