Marcello Ghini Bettiol

Curriculum vitae

The University of Chicago
Committee on Computational
and Applied Mathematics
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Education

2025 – present Doctor of Philosophy (Ph.D.) in Computational and Applied Mathematics, University of Chicago, USA
2025 Master of Science (M.Sc.) in Mathematics, University of Toronto, Canada
2024 Honors Bachelor of Science (*summa cum laude*) in Mathematics & Physics, University of Toronto, Canada
2019 High School (with honors), Colégio Visconde de Porto Seguro, Brazil

Grants and Awards

2025 McCormick Fellowship, University of Chicago, US$ 5,000
2024 – 2025 Master's Scholarship, University of Toronto, CA$ 53,350
Summer 2024 Research Assistant, University of Toronto, CA$ 6,250
2020 – 2024 Dean's List Scholar in the Faculty of Arts & Sciences, University of Toronto

Research interests

Mathematical Physics, Numerical Analysis, Probability, Random Matrix Theory, Lattice Models in Statistical Physics

Research experience

2024 – present **Computing Lattice Sums, University of Toronto**
Ongoing collaboration with Kirill Serkh, Torsten Kessler, and Andreas Buchheit to develop an efficient way of computing sums and averages over quasiperiodic lattices and Coulomb gases. The goal is to publish articles detailing the method and several of its applications in Condensed Matter and Topological Quantum Physics.

2023 – present **Evaluating the Spectrum of Airy's Integral Operator, University of Toronto**
Ongoing collaboration with Kirill Serkh and Zewen Shen to efficiently compute the spectrum of an integral operator on the half-line with a shifted Airy function kernel. The goal is to publish articles detailing this new method together with applications in Gaussian Ensembles and Random Matrix Theory.

Summer 2022 **Supervised Study in Dark Matter Detection, University of Toronto**
Under the supervision of Prof. Miriam Diamond and in collaboration with the SuperCDMS project at SNOLAB, studied different methods to improve direct detection of dark matter. The project was concluded with the formulation and implementation of a new technique that uses Silicon and Germanium crystals to detect dark matter particles.

Talks and conferences

Invited speaker

Oct 2024 University of Toronto, Graduate Seminar. *Random Matrix Theory and the Airy Integral Spectrum*
Aug 2024 Schloss Dagstuhl, Germany. *Bispectral Operators and Random Matrix Theory*
Apr 2024 University of Toronto, Seminar in Mathematics. *Contact Structures and Weinstein in 3-manifolds*
Apr 2024 University of Toronto, General Relativity. *Riemannian Positive Mass Theorem*
Jan 2024 University of Toronto, Seminar in Mathematics. *Triangulations of 3-manifolds*

Participant

May 2025 University of Toronto, Ontario Graduate Mathematics Conference.
Mar 2025 University of Toronto, Math & CS Symposium.
2023 – 2025 Fields Institute, Clay Mathematics Institute Lectures
2022 – 2025 University of Toronto, Analysis & Applied Math Weekly Seminar
2022 – 2025 University of Toronto, Mathematics Weekly Departmental Colloquium

2022 – 2025 University of Toronto, Blyth Lecture Series

2024 Fields Institute, Thematic Program on Randomness and Geometry
Attended several mini-courses and seminar series on various topics including probabilistic approach to quantum Yang-Mills theories, first-passage percolation (and other models of random metric spaces), and random walks on groups.

2023 Fields Institute, Thematic Program on Operator Algebras and Applications
Attended several workshops on noncommutative geometry, sub-Riemannian geometry, mathematical physics, random matrix theory, representation theory, cyclic homology, number theory, and arithmetic geometry.

Teaching experience

University of Toronto

Winter 2025 Calculus and Linear Algebra for Commerce II

Fall 2024 Calculus and Linear Algebra for Commerce I

2018 – 2022 Volunteer Teacher of Mathematics & Physics
Taught several middle schools and high schools in less privileged communities of São Paulo, Brazil. Topics included: precalculus, basic real/complex analysis, linear algebra, classical/quantum mechanics, electromagnetism, and thermodynamics.

Skills

– Scientific programming in Python, Mathematica, MATLAB, Fortran 77, Fortran 90, C, and C++
– Fluency in English, Portuguese, Spanish, Italian, and German

Memberships

– American Mathematical Society (AMS), member since 2024
– Canadian Mathematical Society (CMS), member since 2024

Extracurricular activities

2019 – present Organizer of "Science Week" at Colégio Visconde de Porto Seguro
Yearly event to promote science among students featuring Physics, Biology, and Chemistry experiments, and a Math professor's plenary talk.

2022 – 2023 Advisor for Daquiprafora International Student College Applications
Mentored several prospective international undergraduate students from Brazil and was invited to speak in Daquiprafora's outreach events.

Summer 2019 Intern at the Facultad de Ciencias Forestales, Universidad de Concepción, Chile
Assisted with lab research on *Fusarium circinatum* by preparing culture media for fungi growth.

2016 – 2019 Competitor at the Brazilian Mathematics Olympiads
Honorable mention in the Brazilian Math Olympiad for 4 consecutive years.

2016 – 2019 Competitor at the Brazilian Physics Olympiads
Represented my school in the final round of the São Paulo Physics Olympiad in 2019; awarded honorable mention in the Brazilian Physics Olympiad for 4 consecutive years.

2018 – 2019 Chief Editor of Colégio Visconde de Porto Seguro Newspaper Cultural Magazine
Wrote and revised articles with the student government on global and local matters.

2017 – 2019 Founder and President of Colégio Visconde de Porto Seguro Scientific Library
Founder and manager of the scientific library with over 150 monthly users. Recognized by school's board as the "Greatest Scientific Outreach Enterprise" in its history.

2017 – 2018 Institute for Theoretical Physics (IFT-Unesp) courses on Gravitation, General Relativity, Astrophysics, and Quantum Mechanics
Lecture series at IFT-Unesp led by Pedro Vieira, Rogerio Rosenfeld, and Nathan Berkovits. Assisted professors with simulations, and received an Extraordinary Aptitude for Mathematical Physics Certificate.

Jul 2018 Unicamp Physics course on Superconductors
Attended lectures and workshops on superconductors and assisted two ongoing experiments to verify superconductor characteristics of a compound.

Community service

2014 – present **Endangered Tree Planting**
Significantly afforested local community in Campinas, Brazil, by planting more than 10,000 endangered native Brazilian trees.

2021 – 2025 **Member of the Not Far From the Tree (NFFTT) Initiative**
Picked over 1,000 pounds of different fruits from trees in Toronto. At NFFTT, 1/3 of the harvest goes to the tree owner, 1/3 is split among the volunteers, and 1/3 is donated to social service agencies.

2020 – 2025 **Registered Volunteer Note Taker at the University of Toronto**
Weekly uploaded my lecture notes to the University of Toronto accessibility services website.

2018 – 2022 **Volunteer at Lar São Vicente de Paulo**
Worked as a volunteer in a charity senior housing in Campinas, Brazil; built a garden, planted vegetables, and cleaned the facilities to improve the life quality of the 25 residents.

Hobbies

Watchmaking, Go, hiking, Chess, cycling, classical guitar, and swimming