MANUELA GIROTTI

Status **Italy** - citizen, **Canada** - permanent resident.

Current position

Mila – Québec Artificial Intelligence Institute 2019–now
Université de Montréal, Montréal, QC Canada
Master in Machine Learning, supervisor Prof. Ioannis Mitliagkas

Affiliations

Department of Mathematics and Statistics
Concordia University, Montréal, Québec, Canada
Affiliate Assistant Professor 10/2017–10/2020

Department of Mathematics
Colorado State University, Fort Collins, CO
Visiting Research Fellow 01/2019–12/2019

Past positions

Department of Mathematics
John Abbott College, Sainte-Anne-de-Bellevue, QC
Mathematics professor 03/2019–12/2019

Department of Mathematics
Colorado State University, Fort Collins, CO
Postdoctoral Fellow 01/2017–12/2108

Institut de Recherche en Mathématique et Physique
Université catholique de Louvain, Louvain-la-neuve, Belgium
Postdoctoral Fellow / Assistante de recherche 11/2014–10/2016

Education

Concordia University, Montréal, QC Canada 2010–2014
Ph.D. in Mathematics, supervisor Prof. Marco Bertola
Thesis title: *"Riemann-Hilbert approach to Gap Probabilities of Determinantal Point Processes"*.
External examiner: Prof. Alexander R. Its (IUPUI). Thesis ranking: excellent.

Università degli Studi di Milano, Milan, Italy 2008–2010
Laurea Magistrale (M.Sc.) in Mathematics, supervisor Prof. Elisabetta Rocca
Thesis title: *"Time relaxation of a phase-field model with entropy balance"*.
Thesis grade: 110/110 *cum laude*[*].

Università degli Studi di Milano, Milan, Italy 2005–2008
Laurea Triennale (B.Sc.) in Mathematics, supervisor Prof. Dietmar Klemm
Thesis title: *"Dirac's magnetic monopole"*.
Thesis grade: 110/110 *cum laude*[*].

Publications

- "Vanishing time-relaxation for a phase-field model with entropy balance", *Adv. Math. Sci. Appl.*, 22(**2**), 553-575, 2012.
- "Riemann-Hilbert approach to gap probabilities for the Generalized Bessel process", *Math. Phys. Anal. Geom.* **17** (1), 183-211, 2014.

[*]Performance in the final examination is graded from 66 to 110. A *cum laude* can be added to the maximum grade as a special distinction.

- "Asymptotics of the Tacnode process: a transition between the gap probabilities from the Tacnode to the Airy process", *Nonlinearity* **27**, 1937-1968, 2014.
- "Riemann-Hilbert approach to gap probabilities for the Bessel process", *Phys. D*, 295-296C, 103-121, 2015.
- "Large gap asymptotics at the hard edge for product random matrices and Muttalib-Borodin ensembles", *Internat. Math. Res. Notices*, rnx202, 2017 (with T. Claeys and D. Stivigny).
- "Fredholm determinant solutions of the Painlevé II hierarchy and gap probabilities of determinantal point processes", *Internat. Math. Res. Notices*, rnz168, 2019 (with T. Claeys and M. Cafasso).
- "Rigorous asymptotics of a KdV soliton gas", submitted, 2019 (with T. Grava, R. Jenkins and K. McLaughlin).
- "Ballistic decay of the correlation functions of a spring system with random initial data", in preparation, 2020 (with K. McLaughlin and T.Grava).

Visits and research experiences

(for periods going from one to four weeks)

- June 2012, *PIMS-Mprime Summer School in Probability*, University of British Columbia (Canada);
- March 2014, Université catholique de Louvain (Belgium), upon invitation of Prof. Tom Claeys;
- May 2015 and February 2016, Université d'Angers (France), upon invitation of Prof. Mattia Cafasso;
- June 2017, SISSA (Italy), upon invitation of Prof. Marco Bertola and Prof. Tamara Grava;
- May 2018, Université catholique de Louvain (Belgium), upon invitation of Prof. Tom Claeys;
- June 2018, SISSA (Italy), upon invitation of Prof. Tamara Grava;
- October 2019, Tulane University (LA), upon invitation of Prof. Victor Moll.

Participation to research projects

- **2014–2016:** member of Interuniversity Attraction Poles - Dynamics, Geometry and Statistical Physics (DYGEST), Belgium.
- **2014–2016:** team member of the European Research Council project "Critical phenomena in random matrix theory and integrable systems" (CRaMIS), principal investigator Prof. Tom Claeys.
- **2018-2019:** international team member of the European project "Integrable Partial Differential Equations: Geometry, Asymptotics, and Numerics" (IPaDEGAN).

Teaching activities

- instructor of MATH-015 - Algebra&Trigonometry, John Abbott College, Winter 2019 and Fall 2019;
- instructor of MATH-NYB - Calculus II, John Abbott College, Winter 2019 and Fall 2019;
- instructor of MATH 530 - Mathematics for Scientists and Engineers, Colorado State University, Fall 2018;
- instructor of MATH 345 - Differential Equations (Honors option), Colorado State University, Spring 2018;
- lecture course on Determinantal Point Processes and Random Matrices (MATH 676 Topics in Mathematics), Colorado State University, Fall 2017;
- instructor of MATH 317 - Advanced Calculus of one variable, Colorado State University, Fall 2017;
- instructor of MATH 369 - Linear Algebra I, Colorado State University, Spring 2017;

- teaching assistant of MATH 201 - Elementary Functions, Concordia University, Fall 2013;
- technical assistant of WeBWorK for the courses MATH 200, 201, 202, 203, 204, 205, Concordia University, Fall 2012 - Summer 2014;
- instructor of MATH 205 - Differential and Integral Calculus II, Concordia University, Winter 2011 and Fall 2011;
- tutor at Math Help Center, Concordia University, Fall 2010 and Fall 2013.

Student supervision

- supervisor of one student for a project in the Honors Option of the course MATH 345, Colorado State University, Spring 2018.

Scholarships and awards

High school

- Borsa di studio SKF (high school scholarship), SKF Industrie S.p.A., 2000–2005.
- 2nd qualified for Certamen Taurinense (Latin literature competition), May 2005.

Università degli Studi di Milano

- Fondo per il sostegno dei giovani e per favorire la mobilità degli studenti (partial tuition waiver), 2005–2008.

Concordia University

- Faculty of Arts&Science Graduate Fellowship, 2010–2013.
- Concordia University Partial Tuition Graduate Scholarship for International Students, 2010–2011.
- ISM Scholarship, Institut des Sciences Mathématiques (ISM, Montréal), 2011–2012.
- ISM Travel Scholarship, Institut des Sciences Mathématiques (ISM, Montréal), June 2011;
- Exemption des frais de scolarité supplémentaires (MEQ), Ministère de l'Éducation, du Loisir et du Sport du Québec, 2011–2013.
- Concordia Merit Scholarship, 2012–2013.
- Campaign for a New Millennium Graduate Scholarship - Faculty of Arts&Science, 2013-2014.
- Concordia Accelerator Award, 2014.

Colorado State University

- International Presidential Fellow program, 2017–2018.

John Abbott College

- Professional Development funding, 2019.

Institutional responsibilities, membership of scientific societies

- **2011–2013:** president of the Mathematics&Statistics Graduate Students Association (MASGSA), Concordia University.
- **2011–2013:** Graduate Students Representative, Department of Mathematics and Statistics, Concordia University.
- **2012–2013:** member of the Departmental Appraisal Committee, Concordia University.
- member of the Scientific Societies: GNAMPA (Mathematical Analysis, Probability and their Applications, Italy; 2010–2011), American Mathematical Society (2010–2014 and 2017–2018), Italian Scientific Community in Canada - Québec section (2011–2014 and 2019–now).

Qualifications

Qualifiée aux fonctions de Maître de Conférence 02/2016–12/2020
Section 25 - Mathématiques
Ministère de l'Éducation nationale, de l'Enseignement supérieur et de la Recherche, France.

Computer Skills

Languages: Python, Java, C++, HTML, Perl.
Software: WebWork, MatLab, LaTeX, Maple.
Python libraries: PyTorch, SciKitLearn, Numpy, Matplotlib, Pandas.

Languages

- Italian (native)
- English (full professional proficiency, C2)
- French (full professional proficiency, C2)
- Dutch (elementary proficiency, A1)
- Persian (elementary proficiency, A1).

Organizational activities

- organizer of the Graduate Students Seminar series, Concordia University, 2012–2013.
- organizer of seminar series of the Mathematical Physics group, UC Louvain, 2015–2016.
- co-organizer of the Postdoc Seminar series, Colorado State University, 2017–2018.

Mathematics outreach

- invited talk *"A Peek into the Math world: from abstraction to applications"* at the Institut Italien de Culture de Montréal, 2012.
- co-organizer of the Mathematics installations at Exposcience - Stewart Hall Science&Technology Exhibition (Concordia University), Pointe-Claire (QC), 2012–2013.
- volunteer for Math Day 2017 and Math Day 2018, Colorado State University, 2017–2018.
- invited talk *"A Peek into the Math world: randomness and matrices"* for the International Presidential Fellow program, 2018.
- organizer of a public screening of the Math documentary "The Discreet Charm of Geometry" (by Ekaterina Eremenko), Colorado State University, 2018 (in progress).
- invited talk *"Solitons 101"* at $(MD)^2$ Math Day, John Abbott College, 2019.

Other outreach

- journalist for the high-school magazine "Il Salice", Torino, 2000–2005.
- volunteer at the event amfAR Milano 2009, amfAR - The Foundation for AIDS research, 2009.
- volunteer for the project "Test di usabilità sulla Biblioteca Digitale dell'Università degli Studi di Milano" (test of usability of the university Digital Library), Università degli Studi di Milano, 2010.
- volunteer at the events Café Scientique 2012 and Café Scientique 2013 (sponsored by CIHR – McGill University Health Center; organized by Comunità Scientifica Italiana in Canada), Montréal, 2012–2013.
- volunteer at the nonprofit restaurant FoCo Cafe, Fort Collins (CO), 2017–2018.
- part of the following choirs as alto singer: Schola Gregoriana Mediolanensis (Milano, Italy; 2009–2010), Stella Matutina (Bruxelles, Belgium; 2014–2016), Concordia University Choir (2011–2014 and 2019–now).

Other interests

sailing (Passeport Voile - Niveau 3 Croisière, Fédération Française de Voile, 2019), singing, skiing, cooking.

Invited talks

- *Time relaxation of a phase-field model with entropy balance*, Concordia University, 2011.
- *Gap probabilities for the Generalized Bessel process: a Riemann-Hilbert approach*, Concordia University, 2013.
- *Gap probabilities and Isomonodromic τ-function: from integrable systems to non-intersecting Brownian motion*, Università degli Studi Milano-Bicocca, Milan (Italy).
- *Gap Probabilities of the Tacnode process*, Centre de Recherche Mathématiques (CRM), Montréal.
- *Riemann-Hilbert approach to Gap Probabilities of Determinantal Point Processes*, KU Leuven (Belgium), 2015.
- *Smallest singular value distribution and large gap asymptotics for products of random matrices*, at the conference "Six-vertex model, dimers, shapes, and all that", Simons Center for Geometry and Physics, Stony Brook University (NY).
- *"Integrable" gap probabilities for the Generalized Bessel process*, at the conference "Painlevé Equations and Discrete Dynamics", Banff International Research Station (BIRS).
- *Smallest singular value distribution and large gap asymptotics for products of random matrices*, University of Michigan (MI), 2017.
- *Smallest singular value distribution and large gap asymptotics for products of random matrices*, at the 14th International Symposium on Orthogonal Polynomials, Special Functions and Applications (OPSFA14), University of Kent (UK).
- *Integrable gap probabilities for the Generalized Bessel process*, at the conference "Painlevé Equations and Applications: A Workshop in Memory of A. A. Kapaev", Michigan Center for Applied and Interdisciplinary Mathematics (MCAIM), Ann Arbor (MI), 2017.
- *Asymptotics of gap probabilities via Riemann-Hilbert approach*, at the AMS Joint Mathematics Meeting, San Diego (CA), 2018.
- *Rigorous asymptotics of the soliton gas*, at the AMS Spring Meeting, Vanderbilt University, Nashville (TN, USA), 2018.
- *Rigorous asymptotics of a KdV soliton gas*, at the conference "Hamiltonian systems & applications", Università degli Studi Milano-Bicocca, Milano (Italy), 2018.
- *A KdV soliton gas: asymptotic analysis via Riemann–Hilbert problems*, at the Midwestern Workshop on Asymptotic Analysis, Indiana University, Bloomington, IN, 2018.
- *Waves and solitons: the case of a Korteweg-de Vries solitonic gas*, Departmental Colloquium at Tulane University, New Orleans, LA, 2019.