

# MANUELA GIROTTI

<b>Status</b>	<b>Italy</b> - citizen, <b>Canada</b> - permanent resident.	
<b>Current position</b>	<b>Mila – Québec Artificial Intelligence Institute</b> Université de Montréal, Montréal, QC Canada Professional Master in Machine Learning, supervisor Prof. Joshua Benjo	2019–now
<b>Affiliations</b>	<b>Department of Mathematics and Statistics</b> Concordia University, Montréal, Québec, Canada Affiliate Assistant Professor	10/2017–10/2020
	<b>Department of Mathematics</b> Colorado State University, Fort Collins, CO Visiting Research Fellow	01/2019–12/2019
<b>Past positions</b>	<b>Department of Mathematics</b> John Abbott College, Sainte-Anne-de-Bellevue, QC Mathematics professor	03/2019–12/2019
	<b>Department of Mathematics</b> Colorado State University, Fort Collins, CO Postdoctoral Fellow	01/2017–12/2018
	<b>Institut de Recherche en Mathématique et Physique</b> Université catholique de Louvain, Louvain-la-neuve, Belgium Postdoctoral Fellow / Assistante de recherche	11/2014–10/2016
<b>Education</b>	<b>Concordia University</b> , Montréal, QC Canada Ph.D. in Mathematics, supervisor Prof. Marco Bertola Thesis title: “ <i>Riemann-Hilbert approach to Gap Probabilities of Determinantal Point Processes</i> ”. External examiner: Prof. Alexander R. Its (IUPUI). Thesis ranking: excellent.	2010–2014
	<b>Università degli Studi di Milano</b> , Milan, Italy Laurea Magistrale (M.Sc.) in Mathematics, supervisor Prof. Elisabetta Rocca Thesis title: “ <i>Time relaxation of a phase-field model with entropy balance</i> ”. Thesis grade: 110/110 <i>cum laude</i> *.	2008–2010
	<b>Università degli Studi di Milano</b> , Milan, Italy Laurea Triennale (B.Sc.) in Mathematics, supervisor Prof. Dietmar Klemm Thesis title: “ <i>Dirac’s magnetic monopole</i> ”. Thesis grade: 110/110 <i>cum laude</i> *.	2005–2008
<b>Publications</b>	<ul style="list-style-type: none"><li>- “Vanishing time-relaxation for a phase-field model with entropy balance”, <i>Adv. Math. Sci. Appl.</i>, 22(2), 553-575, 2012.</li><li>- “Riemann-Hilbert approach to gap probabilities for the Generalized Bessel process”, <i>Math. Phys. Anal. Geom.</i> <b>17</b> (1), 183-211, 2014.</li></ul>	

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\*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;

	<ul style="list-style-type: none"> <li>- teaching assistant of MATH 201 - Elementary Functions, Concordia University, Fall 2013;</li> <li>- technical assistant of WeBWork for the courses MATH 200, 201, 202, 203, 204, 205, Concordia University, Fall 2012 - Summer 2014;</li> <li>- instructor of MATH 205 - Differential and Integral Calculus II, Concordia University, Winter 2011 and Fall 2011;</li> <li>- tutor at Math Help Center, Concordia University, Fall 2010 and Fall 2013.</li> </ul>
<b>Student supervision</b>	<ul style="list-style-type: none"> <li>- supervisor of one student for a project in the Honors Option of the course MATH 345, Colorado State University, Spring 2018.</li> </ul>
<b>Scholarships and awards</b>	<p>High school</p> <ul style="list-style-type: none"> <li>- Borsa di studio SKF (high school scholarship), SKF Industrie S.p.A., 2000–2005.</li> <li>- 2<sup>nd</sup> qualified for Certamen Taurinense (Latin literature competition), May 2005.</li> </ul> <p>Università degli Studi di Milano</p> <ul style="list-style-type: none"> <li>- Fondo per il sostegno dei giovani e per favorire la mobilità degli studenti (partial tuition waiver), 2005–2008.</li> </ul> <p>Concordia University</p> <ul style="list-style-type: none"> <li>- Faculty of Arts&amp;Science Graduate Fellowship, 2010–2013.</li> <li>- Concordia University Partial Tuition Graduate Scholarship for International Students, 2010–2011.</li> <li>- ISM Scholarship, Institut des Sciences Mathématiques (ISM, Montréal), 2011–2012.</li> <li>- ISM Travel Scholarship, Institut des Sciences Mathématiques (ISM, Montréal), June 2011;</li> <li>- Exemption des frais de scolarité supplémentaires (MEQ), Ministère de l'Éducation, du Loisir et du Sport du Québec, 2011–2013.</li> <li>- Concordia Merit Scholarship, 2012–2013.</li> <li>- Campaign for a New Millennium Graduate Scholarship - Faculty of Arts&amp;Science, 2013–2014.</li> <li>- Concordia Accelerator Award, 2014.</li> </ul> <p>Colorado State University</p> <ul style="list-style-type: none"> <li>- International Presidential Fellow program, 2017–2018.</li> </ul> <p>John Abbott College</p> <ul style="list-style-type: none"> <li>- Professional Development funding, 2019.</li> </ul>
<b>Institutional responsibilities, membership of scientific societies</b>	<ul style="list-style-type: none"> <li>- <b>2011–2013:</b> president of the Mathematics&amp;Statistics Graduate Students Association (MASGSA), Concordia University.</li> <li>- <b>2011–2013:</b> Graduate Students Representative, Department of Mathematics and Statistics, Concordia University.</li> <li>- <b>2012–2013:</b> member of the Departmental Appraisal Committee, Concordia University.</li> <li>- 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).</li> </ul>

<b>Qualifications</b>	<i>Qualifiée aux fonctions de Maître de Conférence</i> Section 25 - Mathématiques Ministère de l'Éducation nationale, de l'Enseignement supérieur et de la Recherche, France.	02/2016–12/2020
<b>Computer Skills</b>	<u>Languages:</u> Python, Java, C++, HTML, Perl. <u>Software:</u> WebWork, MatLab, L <sup>A</sup> T <sub>E</sub> X, Maple. Python libraries: PyTorch, SciKitLearn, Numpy, Matplotlib, Pandas.	
<b>Languages</b>	<ul style="list-style-type: none"> <li>- Italian (native)</li> <li>- English (full professional proficiency, C2)</li> <li>- French (full professional proficiency, C2)</li> <li>- Dutch (elementary proficiency, A1)</li> <li>- Persian (elementary proficiency, A1).</li> </ul>	
<b>Organizational activities</b>	<ul style="list-style-type: none"> <li>- organizer of the Graduate Students Seminar series, Concordia University, 2012–2013.</li> <li>- organizer of seminar series of the Mathematical Physics group, UC Louvain, 2015–2016.</li> <li>- co-organizer of the Postdoc Seminar series, Colorado State University, 2017–2018.</li> </ul>	
<b>Mathematics outreach</b>	<ul style="list-style-type: none"> <li>- invited talk “<i>A Peek into the Math world: from abstraction to applications</i>” at the Institut Italien de Culture de Montréal, 2012.</li> <li>- co-organizer of the Mathematics installations at Exposcience - Stewart Hall Science&amp;Technology Exhibition (Concordia University), Pointe-Claire (QC), 2012–2013.</li> <li>- volunteer for Math Day 2017 and Math Day 2018, Colorado State University, 2017–2018.</li> <li>- invited talk “<i>A Peek into the Math world: randomness and matrices</i>” for the International Presidential Fellow program, 2018.</li> <li>- organizer of a public screening of the Math documentary “The Discreet Charm of Geometry” (by Ekaterina Eremenko), Colorado State University, 2018 (in progress).</li> <li>- invited talk “<i>Solitons 101</i>” at (MD)<sup>2</sup> Math Day, John Abbott College, 2019.</li> </ul>	
<b>Other outreach</b>	<ul style="list-style-type: none"> <li>- journalist for the high-school magazine “Il Salice”, Torino, 2000–2005.</li> <li>- volunteer at the event amfAR Milano 2009, amfAR - The Foundation for AIDS research, 2009.</li> <li>- 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.</li> <li>- volunteer at the events Café Scientifique 2012 and Café Scientifique 2013 (sponsored by CIHR – McGill University Health Center; organized by Comunità Scientifica Italiana in Canada), Montréal, 2012–2013.</li> <li>- volunteer at the nonprofit restaurant FoCo Cafe, Fort Collins (CO), 2017–2018.</li> <li>- 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).</li> </ul>	
<b>Other interests</b>	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  $\tau$ -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 Mid-western 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.