Augusto Gerolin

Website: https://aiquantum.uottawa.ca/ | Date of CV: 16/04/2023

Education

Ph.D in Mathematics, Università di Pisa, Italy. Thesis title: *"Multi-marginal Optimal Transport and Potential Optimization problems for Schrödinger Operators"*. Pisa, Italy (2016).

Master 2 Recherche *"Mathématiques Fondamentales"*, Université de Grenoble and ENS-Lyon. MSc. thesis title: *"Un problème inverse semi-classique pour les opérateurs de Schrödinger"*. Grenoble, France (2009).

Recognitions

Canada Research Chair (Tier II) in AI at the interface of Chemistry and Mathematics (2022-2027).

Marie Skłodowska-Curie Fellowship at the Chemistry section at the Vrije Universiteit Amsterdam (2019-2021).

MSc. Scholarship for excellent international students. Rhône-Alpes region (2008-2009).

Research Profile

Dr. Gerolin is a mathematician by education and theoretical chemist by training. He develops rigorous *ab initio* computational methods for optimal transport (OT) theory, quantum chemistry and machine learning. With co-author S. Di Marino, he created novel mathematical tools for the Shannon Entropy regularization of Optimal Transport and prove theoretical guarantees of convergence for the Multi-marginal Iterative Proportional Fitting Procedure (or Sinkhorn algorithm). In Quantum Chemistry, he is the pioneer in interpreting One-body Reduced Density Matrix Functional Theory (1RDMFT) as a non-commutative optimal transport problem.

Employment History

Canada Research Chair (Tier II) in Artificial Ingelligence at the interface of Chemistry and Mathematics (2022/27).

Assistant Professor, Department of Chemistry and Biomolecular Sciences and the Department of Mathematics and Statistics, University of Ottawa. Ottawa, Canada (from 08/2021).

Marie Skłodowska-Curie Fellow, Department of Theoretical Chemistry, Vrije Universiteit Amsterdam. The Netherlands (2019-2021).

Postdoctoral researcher, Department of Mathematics and Statistics, University of Jyväskylä, Finland (2016-2019).

Research Associate, University of Bath, United Kingdom. Granted by the EPSRC *"Analysis of the effective long time-behaviour of molecular systems"*. PI: Prof. Johannes Zimmer (2015-2016).

***CnecOnline (private education company)*:** Developer of an interactive website and softwares, intended for learning and teaching science for primary school level. Technology developed using Adobe Flash and PHP/MySql. Website: http://www.cneconline.com.br. Softwares available up to request. (2004-2007)

Visiting Research positions

Visiting researcher at the University of Pisa.
Department of Mathematics (four months 01-05/2021).

Visiting researcher at the Institute for Pure & Applied Mathematics (IPAM).
University of California Los Angeles, United States (one month 01/2021).

Visiting researcher at the Simons Institute for the Theory of Computing.
University of Berkeley, United States. (four months 08-12/2021).

CASA – Centre for Analysis, Scientific Computing and Applications, working with Oliver Tse.
Eindhoven Institute of Technology, Netherlands. (two months 06-08/2021).

Probabilistic Machine Learning Group (PI: Samuel Kaski).
Department of Computer Sciences at Aalto University. Helsinki, Finland. (six months 06-12/2020).

Program Associate of the thematic program in *High Dimensional Hamilton-Jacobi PDEs*.
Institute for Pure & Applied Mathematics (IPAM). Los Angeles, United States (three months 03-06/2020).

Program Associate of the thematic program in *Optimal Transport*.
The Erwin Schrödinger Institute for Mathematics and Physics (ESI). Vienna, Austria (three weeks, 05/2019).

Program Associate of the programs on *Geometry and Learning from Data in 3D and Beyond*.
Institute for Pure & Applied Mathematics (IPAM). Los Angeles, United States. (two months 03/05-2019).

Program Associate of the programs on *Machine Learning and Many-body systems*.
Institute for Pure & Applied Mathematics (IPAM). Los Angeles, United States (three weeks 09/2016).

Program Associate of the Junior program in *Optimal Transport* at Hausdorff Institute. Bonn (one month 05/2015).

Program Associate of the Thematic Program on *Variational Problems in Physics, Economics and Geometry*
Fields Institute for Research in Mathematical Sciences. Toronto, Canada (5 months 07/12-2014).

Program Associate of the Semester in *Optimal Transport*.
Mathematical Sciences Research Institute (MSRI). Berkeley, United States (three months 08/11-2013).

Visiting Researcher, IMPA. Rio de Janeiro, Brazil. Granted by CNPq/CNRS (seven months 01-07/2010).

Research Funding History

Long-Program at the Institute of Pure and Applied Mathematics (USA, 2025) $\sim$ 690 000 CAD (main applicant).

Ontario Research Fund – Research Infrastructure $\sim$ 225 715 CAD (PI).

The Fields Institute of Mathematical Sciences $\sim$ 25 000 CAD (co-PI).

Canada Foundation for Innovation (CFI) - John R. Evans Leaders Fund $\sim$ 225 715 CAD (PI).

Natural Sciences and Engineering Research Council (Discovery Grant) $\sim$ 120 000 CAD (PI, 01/2022-12/2027).

New Frontiers in Research Fund $\sim$ 250 000 CAD (PI, 04/2022-03/2024).

Canada Research Chair $\sim$ 600 000 CAD (PI, 01/2021-12/2026).

Marie Skłodowska-Curie Individual Fellowship $\sim$ 200 000 euro (PI, 05/2019-04/2021).

Federation of Finnish Learned Societies 5 000 euro (co-applicant, 02-10/2017)

Ph.D. grant at University of Pisa. CNPq $\sim$ 70 000 euro (PI, 11/2012-10/2016).

MSc. Scholarship for excellent international students. Rhône-Alpes region $\sim$ 12 000 euro (09/2008-07/2009).

Science Outreach and Educational projects $\sim$ 20 000 euro (in total). Finnish Cultural Foundation (2018), La Limonaia (2012), Festival della Scienza di Genova (2012) and University of Lyon (2010).

Activities

Supervision of junior researchers at graduate and postgraduate level

My current research group at the University of Ottawa is formed by the following members:

- Adolfo Vargaz-Jimenez, Postdoctoral researcher (2022-).

- Nataliia Monina, Graduate student in Mathematics (2022-).

- Dmitry Evdokimov, Graduate student in AI for Chemistry (2022-).

- Pavlo Pelikh, Graduate student in Mathematics and Machine Learning (2022-).

- Valeria Kolesnik, Master student in Data Sciences (2022-).

- Vitalii Bielievtsov, Master student in Data Sciences (2022-).

- Fanch Coudreuse, Visiting PhD student in Mathematics from ENS-Lyon (6 months, 2023-)

- Annina Lieberherr, Visiting PhD student in Chemistry from the University of Oxford (6 months, 2023).

- Zhiyi Lin, MSc student and Summer Intern (3 months, 2023).

- Olivia Green, Visiting undergraduate student in Mathematics from the Univ. of Nottingham (3 months, 2023).

- Rebecca Mulder, Visiting undergraduate student in Chemistry from the University New Brunswick (Canada) (co-supervisd with Prof. S. De Baerdemacker)

- Nikita Davydov, Visiting undergraduate student in Computer Science from Kharkiv University (1 year, 2023-).

In addition, I have (co-)supervised four projects of **Ph.D. students**, including one in artificial intelligence, one in chemistry and three in mathematics.

- Juri Grossi (2019) on *Kinetic correlation functionals in Density Functional Theory* at Vrije Universitet Amsterdam;

- Lorenzo Portinale (2019-) on *Non-commutative Optimal Transport* at IST Austria;

- Dario Feliciangeli (2019-) on *One-body Reduced Density Matrix functional theory* at IST Austria;

- Anna Kausamo (2017-2019) on *Multi-marginal Optimal Transport* at University of Jyväskylä.

I have supervised give **master thesis** enrolled in the programs of

École Normale Supérieur de Lyon, co-supervised with D. Trevisan (Pisa)

- Fanch Coudreuse on *Quantum Wasserstein distances between quantum channels*.

Artificial Intelligence at University of Amsterdam:

- Lorian Coltof on *Multi-marginal Wasserstein Generative Adversarial Networks* (2020);

Biomedical Mathematics at Vrije Universitet Amsterdam:

- Finn Bohte on *Computational Optimal Transport* (2020);

Pure Mathematics at University of Rwanda:

- Jean Harerimana on *Some mathematical models for Population Growth and Crowd Motion* (2016); and

- Alexis Manishimwe on *Mathematics of Soap Bubbles: Why Soap Bubbles are Spherical?* (2014).

And the following **Bachelor projects** in Chemistry, Mathematics, Computer Sciences and Physics:

- Daniel Calero on *Dispersion interactions via the SCE limit in DFT* at uOttawa (2022);

- Ben Langton on *Multi-marginal Optimal Transport with Coulomb costs* at uOttawa (2022);

- Akshay Raman on *Deep Generavative Models and Optimal Transport* at uOttawa (2022);

- Liam Meades on *Strictly correlated limit of Density Functional Theory* at uOttawa (2022);

- Yuman Hordik* on *IR Spectrum Comparison and Identification* at Vrije Universitet Amsterdam (2020); and

- Annina Lieberherr on *Distances Between Electron Densities from Optimal Transport* at ETH Zurich (2019).

(* *co-supervized with Software for Chemistry & Materials*)

Editorial activities: Reviewer

Journal of Functional Analysis;

SIAM Journal of Mathematical Analysis;

SIAM Journal on Scientific Computing;

Journal of Mathematical Imaging and Vision;

International Congress of Machine Learning (ICML);

International Conference on Artificial Intelligence and Statistics (AISTATS);

Neural Information Processing Systems (NeurIPS).

International collaboration

Membership

European Laboratory for Learning and Intelligent Systems (ELLIS, `https://ellis.eu/`) - since 7/2021.

Applied Mathematics Laboratory, Centre de recherches mathématiques (CRM).

Educational Project: *Signs of Mathematics* (http://jyu.fi/somath).

Long-time visiting Scholars (at uOttawa)

Marco Caroccia (Assistant professor, Politecnico di Milano) from April to July 2023.

Oliver Tse (Assistant professor, TU/Eindhoven) from June to September 2023 (sabbatical).

Organization of Scientific Activities, including Schools and Workshops

Thematic Program at the Institute of Pure and Applied Mathematics, Los Angeles, USA (lead organizer, 2025).

Research in Teams (SQuaREs) at American Institute of Mathematics, Caltech, USA (March, 2023).

School and Workshop on *Mathematics of Machine Learning*. Centro De Giorgi, Pisa, Italy (January, 2023).

Young European Statisticians (YES) at TU Eindhoven, Netherlands (September, 2022).

Research in Teams with Mircea Petrache (Chile) at BIRS in Banff, Canada (2019)

School and Workshop *Optimal Transport meets Density Functional Theory* in Jyväskylä, Finland (2017).

Research in Pairs with S. Di Marino (Genova) and L. Nenna (Orsay) at MFO. Oberwolfach, Germanny (2017).

1st and 3rd EIAGIME Graduate School Meeting at Universidade of São Paulo, Brazil (2008 and 2010).

Math Student Workshop at An-Najah University. Nablus, Palestine (2010).

Mini-Course Lecturer

Crash Course on Density Functional Theory. OTmeetsDFT, University of Jyväskylä (June 2017).

Introduction to Geometry Measure Theory. EIAGIME, University of São Paulo (September 2010).

FatGraphs: Feynman Diagrams (five weeks). Math Student Workshop at An-Najah University, An-Najah. Palestine (July-August 2010).

Committee Memberships

Reviewer for the European Research Executive Agency - Marie Sklodowska-Curie Postdoctoral Fellowships;

Reviewer for the Exploration competition of the New Frontiers in Research Fund (NFRF).

Contributions

Selected presentations

Date	Location	Context or inviting institution
08/2023	Tokyo (Japan)	International Congress on Industrial and Applied Mathematics
04/2023	Fribourg (Switzerland)	Mathematics Colloquium of the University of Fribourg
04/2023	Fribourg (Switzerland)	Chemistry Seminar at the University of Fribourg
01/2023	Berkeley (USA)	Workshop at Simons Institute for the Theory of Computing
01/2023	Pisa (Italy)	Minicourse on Mathematics of Machine Learning
12/2022	Los Angeles (USA)	Workshop High Dimensional PDEs
05/2022	Ottawa (Canada)	Tutorial at 17th Canadian Workshop on Information Theory
05/2022	Santiago (Chile)	IMC - Universidad Católica de Chile
04/2022	Online (Canada)	Physical, Theoretical and Comp. Chemistry seminar of the Chemical Institute of Canada
01/2022	Los Angeles (USA)	High Dimensional Hamilton-Jacobi equations
12/2021	Los Angeles (USA)	Geometry and Learning Reunion Conference I
11/2021	Marseille (France)	CIRM Workshop: Schrödinger Problem and Mean-field PDE Systems
10/2021	Berkeley (USA)	Workshop on Dynamics and Discretization: PDEs, Sampling, and Optimization
06/2021	Amsterdam (Netherlands)	AutoCheMo Machine Learning Workshop organized by SCM
05/2021	Bilbao (Spain)	SIAM Conference on Materials Science
02/2021	Ottawa (Canada)	Departmental Colloquium
07/2020	Vienna (Austria)	ICML Invertible Neural Networks and Normalizing Flows (oral presentation)
06/2020	Los Angeles (USA)	Hamilton-Jacobi PDEs Workshop
02/2020	Eindhoven (Netherlands)	CASA Colloquium
02/2020	Levico Terme (Italy)	Italian meeting on Calculus of Variations
11/2019	Utrecht (Netherlands)	Applied Mathematics Seminar
10/2019	Pisa (Italy)	Mathematical and Computational Aspects of Machine Learning (contributed)
09/2019	Amsterdam (Netherlands)	General Mathematics Colloquium
07/2019	Schiermonnikoog (NL)	Workshop Calculus of Variations on Schiermonnikoog
06/2019	Cortona (Italy)	Workshop People in Optimal Transport
05/2019	Vienna (Austria)	Erwin Schrödinger Institute
05/2019	Helsinki (Finland)	Aalto University Stochastic seminar
04/2019	Radboud (Netherlands)	Probability and Stochastic seminar
03/2019	Jyväskylä (Finland)	Analysis seminar
01/2019	Banff (Canada)	Workshop Optimal Transport methods in Density Functional Theory
03/2018	Helsinki (Finland)	Aalto University Analysis and Geometry Seminar
01/2018	Joensuu (Finland)	Finnish Mathematical Days
12/2017	Munich (Germany)	Munich-Augsburg Analysis Seminar
02/2017	London (UK)	New trends in Mathematical Physics at the interface of Analysis and Probability
12/2016	Porto Alegre (Brazil)	UFRGS Mathematical Physics Seminar
10/2016	London (UK)	UCL Statistics Seminar
09/2016	Los Angeles (USA)	UCLA Analysis Seminar
05/2016	Cardiff (UK)	New Trends in nonlinear PDEs: from theory to applications (contributed)
05/2016	Bath (UK)	Young Applied Analysts in the UK
02/2016	Bath (UK)	South-West meeting on Generalised Solutions for Nonlinear PDEs

Publications and citations

Peer-reviewed journals

1) D. Feliciangeli, A. Gerolin, L. Portinale. *A Non-Commutative Entropic Optimal Transport Approach to Quantum Composite Systems at Positive Temperature*. 34 pages. Accepted to Journal of Functional Analysis (2023).

   Link: https://arxiv.org/pdf/2106.11217.pdf

2) S. Vuckovic, A. Gerolin, T. J. Daas, H. Bahmann, G. Friesecke, P. Gori-Giorgi. *Density Functionals based on the mathematical structure of the strong-interaction limit of DFT*. WIREs Computational and Molecular Science (2022).

   Link: https://wires.onlinelibrary.wiley.com/doi/full/10.1002/wcms.1634.

Link: https://arxiv.org/pdf/2303.00496.pdf

3) A. Mallasto, A. Gerolin, H. Q. Mihn. *Entropy-Regularized 2-Wasserstein Distance between Gaussian Measures.* 32 pages. Journal of Information Geometry, pages 289-323 (2022).

   Link: https://link.springer.com/article/10.1007/s41884-021-00052-8

4) S. Di Marino and A. Gerolin. *An Optimal Transport approach for the Schrödinger bridge problem and convergence of Sinkhorn algorithm.* Journal of Scientific Computing Volume 85, Issue 3, 1-28 (2020).

   Link: https://link.springer.com/article/10.1007/s10915-020-01325-7

5) A. Gerolin, A. Kausamo and T. Rajala. *Multi-marginal Entropy-Trasport with repulsive costs.* Calculus of Variations and Partial Differential Equations, Volume 59, Issue 3, 1-20 (2020).

   Link: https://link.springer.com/article/10.1007%2Fs00526-020-01735-3

6) A. Gerolin, J. Grossi and P. Gori-Giorgi. *Kinetic Correlation Functionals from the Entropic Regularization of the Strictly Correlated Electrons Problem.* Journal of Chemical Theory and Computation, Volume 16, Issue 1, 488-498 (2019).

   Link: https://pubs.acs.org/doi/abs/10.1021/acs.jctc.9b01133

7) A. Gerolin, A. Kausamo and T. Rajala. *Non-existence of optimal transport maps for the multi-marginal repulsive harmonic cost.* SIAM Journal Mathematical Analysis, Volume 51, Issue 3, 2359-2371 (2019).

   Link: https://epubs.siam.org/doi/abs/10.1137/18M1186514?mobileUi=0

8) A. Gerolin, A. Kausamo and T. Rajala. *Duality theory for multi-marginal optimal transport with repulsive costs in metric spaces.* ESAIM: Control, Optimisation and Calculus of Variations 25, 62 (2019).

   Link: https://www.esaim-cocv.org/articles/cocv/abs/2019/01/cocv180074/cocv180074.html

   Link (open access): https://arxiv.org/abs/1805.00880

9) M. Seidl, S. Di Marino, A. Gerolin, L. Nenna, K. J. H. Giesbertz and P. Gori-Giorgi. *The strictly-correlated electron functional for spherically symmetric systems revisited.* Accepted in Physical Review A (2017).

   Link: https://arxiv.org/abs/1702.05022

10) G. Lani, S. Di Marino, A. Gerolin, R. van Leeuwen and P. Gori-Giorgi. *The adiabatic strictly-correlated-electrons functional: kernel and exact properties.* Physical Chemistry Chemical Physics, Volume 18, 21092-21101 (2016).

    Link: https://pubs.rsc.org/en/content/articlelanding/2016/cp/c6cp00339g!divAbstract

11) A. Gerolin. *Multi-marginal Optimal Transport and Potential Optimization problems for Schrödinger Operators.* Doctoral dissertation. University of Pisa. Available at University of Pisa Electronic theses and dissertations repository. ETD-06272016-100841 (2016).

12) A. Gerolin. *"Un problème spectral inverse semi-classique".* Master Thesis. Institut Fourier, Université de Grenoble. Available upon Request (2009).

Book Chapter

13) G. Friesecke, A. Gerolin, P. Gori-Giorgi. *The Strictly Correlated Electrons approach in Density Functional Theory. Density Functional Theory.* To appear as a Chapter in a book "Density Functional Theory" edited by Éric Cancès, Gero Friesecke and Lin Lin (2022).

    Link: https://arxiv.org/pdf/2202.09760.pdf

14) S. Di Marino, A. Gerolin and L. Nenna. *Multi-marginal Optimal Transport for repulsive costs.* In Topological Optimization and Optimal Transport: in the Applied Sciences. Volume 17 - Radon Series on Computational and Applied Mathematics (2017).

    Link: https://www.degruyter.com/view/title/511802

    Link (open access): https://arxiv.org/abs/1506.04565

Conference proceedings

15) S. Di Marino, A. Gerolin. *Optimal Transport losses and Sinkhorn algorithm with convex regularization*. Neural Information processing systems Workshop: Optimal Transport and Machine Learning (2021).

   Link: https://arxiv.org/pdf/2007.00976.pdf

16) C. Finlay, A. Gerolin, A. Oberman and A. Pooladian. *Learning Normalizing Flows from Entropy-Kantorovich potentials*. Invertible Neural Networks, Normalizing Flows, and Explicit Likelihood Models at International Congress of Machine Learning (2020).

   Link: https://invertibleworkshop.github.io/INNF_2020/accepted_papers/pdfs/31.pdf

Submitted and Non-refereed contributions

17) S. Di Marino, A. Gerolin, L. Nenna. *Universal diagonal estimates for minimizers of the Levy-Lieb functional*. arXiv preprint arXiv:2303.00496 (2023).

   Link: https://arxiv.org/pdf/1910.03875.pdf

18) A. Mallasto, G. Montúfar, A. Gerolin. *How well do WGANs estimate the Wasserstein metric?* 23 pages. (2019).

   Link: https://arxiv.org/pdf/1910.03875.pdf

Exhibits (Curator): Mathematical Education and Public Understanding of Sciences

High-school teachers workshop on interdisciplinary teaching in mathematics, organized in the framework of the Finnish program Lumatikka https://lumatikka.luma.fi/. Jyväskylä, Finland (2018-2019)

Teoria del Caos, inpredivibilità e sistemi dinamici, Open Days Università di Pisa, Italy (February 2014).

Does the flap of a butterfly's wings in Brazil straight leaning tower of Pisa?, Festival della Scienza di Genova, Genoa, Italy (November 2012).

Effetto Farfalla, La Limonaia, Pisa, Italy (April 2012).

Un promenade autour de la Mécanique Quantique. "Difussions de Savoirs". University of Lyon and CCSTI-Rhône. *Faitês Touner la Science*. Lyon, France (October 2010).

Tutor at Matemateca (http://matemateca.ime.usp.br/) (2006-2008).

Languages skills

English, *Advanced*.	Italian, *Fluent*.	Spanish, *Intermediate*.
French, *Fluent*.	Portuguese, *Fluent*.	

Teaching Activities

University of Ottawa (2022-):
   1. Calculus (2023)
   2. Quantum Mechanical Methods - Theory (2023)
   3. Introduction to Machine Learning for Chemistry (2023) – co-taught with Francesco Gentile.
   4. Optimal Transport and Machine Learning (2022)

Vrije Universiteit Amsterdam (2019-):
   3. BSc courses on Mathematical Methods in Quantum Chemistry (2020)
   4. Mathematics for Chemistry III (2019).

At University of Jyväskylä: designing and teaching the BSc course *Topics in Mathematics of Data Sciences* (2019) and the Ph.D. course *Optimal Transport and Density Functional Theory* (2018).

This course is offered to 3*rd* year Bachelor students in Chemistry (joint degree UvA-VU) and develops more advanced mathematical aspects of quantum chemistry. The course is elective, but has about 25 students registered every year (out of 50/60 students in the chemistry degree).

5. Wiskunde door Chemici III (2019)

I am the teaching assistant of Prof. P. Gori-Giorgi on this 2*nd* year Bachelor Chemistry course (joint degree UvA-VU). The course teaches basic mathematics needed for quantum mechanics and I was responsible mainly for the exercise classes.

University of Jyväskylä (2018-2019):

6. BSc course *Topics in Mathematics of Data Science* (2019)

The goal of the course was to introduce examples of supervised and unsupervised learning tasks and to develop basic mathematical tools to understand them. Among the mathematical topics covered by this course were optimization, convex analysis, probability and concentration inequalities.

It was the first time when a course on Mathematical aspects of Machine Learning was offered at the University of Jyväskylä and this course was entirely designed by me. The course welcomed around 15 bachelor students from different academic paths such as mathematics, statistics, computer sciences and physics.

7. Ph.D course *Optimal Transport and Density Functional Theory* (2018)

The goal of the course was to build bridges between two active (but disjoint) research groups at the University of Jyväskylä: Optimal Transport (Mathematics) and Density Functional Theory (Physics). The course was entirely designed by myself and welcomed around 12 graduate students in mathematics and physics.

In the first three weeks of the course Michael Seidl (Physics) introduced the Density Functional Theory formalism from a physics viewpoint. The remaining part of the course was done by myself and the goal was to develop a mathematical framework solving questions raised by Michael Seidl.

Università di Pisa (2011-2015):

8. Pre-Calculus for engineering students (2015)

9. Pre-Calculus for Biology (2014/2015 and 2013/2014)

10. Analysis I, Geology (2011)

These are very traditional courses at the University of Pisa. The courses 3. and 5. are one-semester courses, while the course 4. is a one year course. The goal was to introduce Differential and Integral Calculus in the Real line for first year students.

The main challenges in teaching for engineering and biology students are to maintain the audience of about 100 students motivated during the lectures. Besides the preparation of the lectures, the instructor is also responsible, together with a committee, to design the written exam and to perform oral examinations.

As a teaching assistant:

11. Analysis II for Chemical engineering (2012/2013)

12. Analysis II for Aerospace engineering (2012/2013)

13. Mathematics for Economy (2013/2014 and 2012/2013)

My main duties were to prepare exercise worksheets and to give exercise lectures complementing the course. I took part of the evaluation of written and oral exams.

IMPA, Rio de Janeiro (2010):

14. PhD course on **Spectral Theory** (2010)

I was the teaching Assistant (theory and exercises lectures) of the Prof. J. Zubelli. I gave exercise lectures, prepared worksheets and in two occasions during the semester taught the theoretical lectures.

Université Joseph-Fourier, Grenoble (2009):

15. *Théorie de la Measure et Intégration* (2009)

I was the tutor (exercise lectures) of the *Licence 3* course (3rd/4th year course) of Prof. T. Gallay (2009). The tutor is a traditional role in the French *classe préparatoire*. The main role of the tutor is to evaluate and assist the students on improving their mathematical thinking and writing skills.

Universidade de São Paulo (2007-2008):

16. Calculus I (2007-2008)

Tutor of the undergraduate course on one variable Calculus.