Maximilian Puelma Touzel, PhD

Research Scientist @ ComplexDataLab,
Mila/Université de Montréal/McGill University
Member, Centre for the Study of Democratic Citizenship

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Education

2011–2015 **PhD – Physics**, *University of Goettingen*, Germany, International Max Planck Research School in the Physics of Biological and Complex Systems
Dissertation: Cellular dynamics and stable chaos in balanced networks

2008–2009 **Master of Science – Physics**, *University of Toronto*, Canada

2001–2006 **Honours Bachelor of Science – Mathematics & Physics (Double Specialist)**, *University of Toronto*, Canada

Research Interests

- *AI-powered applied quantitative cognitive & social science of human & machine decision-making*
- *Applications to socio-{political, economic, technical, environmental} dilemmas*:
  - climate crisis (carbon tax), political polarization (COVID-19 pandemic), AI manipulation (elections)

Areas: statistical inference, reinforcement learning/decision-making, deep learning, NLP, network dynamics

Previous Areas: NeuroAI, Biophysics, Computational Neuroscience, Quantum Information.

Paid Research Positions

2024–present **Complex Data Lab Research Scientist**, *Mila, McGill, Université de Montréal*
- Societal-Scale Manipulation Simulation Team Lead (many-agent simulations using large language models; evaluating manipulation threats/defenses; scalable theory of many minds)
- Measuring political polarization in network/text data from social media
- Topic modelling of carbon tax public opinion

2023–2024 **Canadian Excellence Research Council on Autonomous AI Research Manager**, *Mila, Université de Montréal*, Montréal, Canada
- supervisor/advisor/liaison for CERC group's scientific research
- Team Lead for Agent Abstraction project

2020–2023 **Canadian Excellence Research Council on Autonomous AI Research Associate**, *Mila, Université de Montréal*, Montréal, Canada
- Co-Team Lead of Scalabale continual reinforcement learning project

2018–2020 **IVADO award Post-Doctoral Fellow**, *Mila, Université de Montréal*, Montréal, Canada, Advisors: Yoshua Bengio & Guillaume Lajoie
- Improving training for recurrent neural network models using dynamical systems
- Reinforcement learning models/neural implementations of human and primate decision-making
- NeuroAI community service (Public Reading Group and NeurIPs workshop organization)

2015–2018 **European Research Council-funded Post-Doctoral Fellow**, *Laboratoire de physique théorique, École normale supérieure*, Paris, Advisors: Aleksandra Walczak & Thierry Mora
- statistical inference of probabilistic models of genetic recombination and selection processes
- model-based inference of repertoire dynamics using high-throughput sequencing

2010–2015 **International Max Planck Research School Excellence Award Doctoral Researcher**, *Theoretical Neurophysics Group, Max Planck Institute for Dynamics and Self-Organization*, Goettingen, Germany, Advisor: Fred Wolf
- statistical physics of neural networks, response theory, neural classifiers
- Lead Organizer of Summer School for 3 years

2009–2010 **Master's Researcher**, *Systems Biophysics Lab, Department of Physics, University of Toronto*, Toronto. Canada, Advisor: William Ryu
- thermotaxis experiment design and confocal imaging experiments for *C. elegans*

2004–2005 **Undergraduate Researcher**, *Centre for Quantum Information and Quantum Control, University of Toronto, Department of Physics, University of Toronto*, Toronto. Canada, Advisor: Aephraim Steinberg
- optimal measurement theory in quantum state discrimination

Professional Experience

2007–2008 **Science Communicator**, *Ontario Science Centre*, Toronto. Canada
- Experience and Demonstration-based Public Science Communication

Peer-Reviewed Publications

[18] Maximilian Puelma Touzel and Erick Lachapelle. "Ideology from topic mixture statistics: inference method and example application to carbon tax public opinion". In: *Environmental Data Science* 3 (2024), e10. DOI: 10.1017/eds.2023.44.

[17] Maximilian Puelma Touzel, Amin Memarian, Matthew Riemer, Andrei Mircea, Andrew Robert Williams, Elin Ahlstrand, Lucas Lehnert, Rupali Bhati, Guillaume Dumas, and Irina Rish. "Scalable Approaches for a Theory of Many Minds". In: *ICML Agentic Markets Workshop*. 2024. URL: https://openreview.net/forum?id=P0oG5gDh6T.

[16] Maximilian Puelma Touzel, Sneheel Sarangi, Austin Welch, Gayatri Krishnakumar, Dan Zhao, Zachary Yang, Hao Yu, Ethan Kosak-Hine, Tom Gibbs, Andreea Musulan, Camille Thibault, Busra Tugce Gurbuz, Reihaneh Rabbany, Jean-François Godbout, and Kellin Pelrine. "A Simulation System Towards Solving Societal-Scale Manipulation". In: *NeurIPS Workshop on Socially Responsible Language Modelling Research*. 2024. URL: https://openreview.net/forum?id=fVl2Dhn4Kr.

[15] Meriem Bensouda Koraichi, Maximilian Puelma Touzel, Andrea Mazzolini, Thierry Mora, and Aleksandra M Walczak. "NoisET: Noise Learning and Expansion Detection of T-Cell Receptors". In: *The Journal of Physical Chemistry A* 126.40 (2022), pp. 7407–7414. DOI: 10.1021/acs.jpca.2c05002. URL: https://doi.org/10.1021/acs.jpca.2c05002.

[14] Maximilian Puelma Touzel, Paul Cisek, and Guillaume Lajoie. "Performance-gated deliberation: A context-adapted strategy in which urgency is opportunity cost". In: *PLOS Computational Biology* 18.5 (May 2022), pp. 1–33. DOI: 10.1371/journal.pcbi.1010080. URL: https://doi.org/10.1371/journal.pcbi.1010080.

[13] Maximilian Puelma Touzel, Amin Memarian, Matthew D Riemer, Rupali Bhati, and Irina Rish. "Summarizing Societies: Agent Abstraction in Multi-Agent Reinforcement Learning". In: *ICLR Workshop: From Cells to Societies: Collective Learning across Scales*. 2022. URL: https://openreview.net/forum?id=Sc9ESMyTZ9.

[12] Matthew Riemer, Sharath Chandra Raparthy, Ignacio Cases, Gopeshh Subbaraj, Maximilian Puelma Touzel, and Irina Rish. "Continual Learning In Environments With Polynomial Mixing Times". In: *Advances in Neural Information Processing Systems*. Ed. by S Koyejo, S Mohamed, A Agarwal, D Belgrave, K Cho, and A Oh. Vol. 35. Curran Associates, Inc., 2022, pp. 21961–21973. URL: https://proceedings.neurips.cc/paper_files/paper/2022/file/89c61fce5a8b73871d1c4073f486b134-Paper-Conference.pdf.

[11] Ryan Vogt, Maximilian Puelma Touzel, Eli Shlizerman, and Guillaume Lajoie. "On Lyapunov Exponents for RNNs: Understanding Information Propagation Using Dynamical Systems Tools". In: *Frontiers in Applied Mathematics and Statistics* 8 (2022). DOI: 10.3389/fams.2022.818799. URL: https://www.frontiersin.org/articles/10.3389/fams.2022.818799.

[10] Maximilian Puelma Touzel, Aleksandra M Walczak, and Thierry Mora. "Inferring the immune response from repertoire sequencing". In: *PLoS Computational Biology* 16.4 (2020), pp. 1–21. DOI: 10.1371/journal.pcbi.1007873. URL: http://dx.doi.org/10.1371/journal.pcbi.1007873.

[9] Giancarlo Kerg, Kyle Goyette, Maximilian Puelma Touzel, Gauthier Gidel, Eugene Vorontsov, Yoshua Bengio, and Guillaume Lajoie. "Non-normal Recurrent Neural Network (nnRNN): learning long time dependencies while improving expressivity with transient dynamics". In: *Advances in Neural Information Processing Systems*. Ed. by H Wallach, H Larochelle, A Beygelzimer, F d'Alche-Buc, E Fox, and R Garnett. Vol. 32. Curran Associates, Inc., 2019. URL: https://proceedings.neurips.cc/paper_files/paper/2019/file/9d7099d87947faa8d07a272dd6954b80-Paper.pdf.

[8] Maximilian Puelma Touzel and Fred Wolf. "Statistical mechanics of spike events underlying phase space partitioning and sequence codes in large-scale models of neural circuits". In: *Phys. Rev. E* 99 (May 2019), p. 52402. DOI: 10.1103/PhysRevE.99.052402. URL: https://link.aps.org/doi/10.1103/PhysRevE.99.052402.

[7] Susana Magadan, Luc Jouneau, Maximilian Puelma Touzel, Simon Marillet, Wahiba Chara, Adrien Six, Edwige Quillet, Thierry Mora, Aleksandra M Walczak, Frederic Cazals, Oriol Sunyer, Simon Fillatreau, and Pierre Boudinot. "Origin of Public Memory B Cell Clones in Fish After Antiviral Vaccination". In: *Frontiers in Immunology* 9 (2018). DOI: 10.3389/fimmu.2018.02115. URL: https://www.frontiersin.org/journals/immunology/articles/10.3389/fimmu.2018.02115.

[6] Mikhail V Pogorelyy, Anastasia A Minervina, Maximilian Puelma Touzel, Anastasiia L Sycheva, Ekaterina A Komech, Elena I Kovalenko, Galina G Karganova, Evgeniy S Egorov, Alexander Yu Komkov, Dmitriy M Chudakov, Ilgar Z Mamedov, Thierry Mora, Aleksandra M Walczak, and Yuri B Lebedev. "Precise tracking of vaccine-responding T cell clones reveals convergent and personalized response in identical twins". In: *Proc. Natl. Acad. Sci. U. S. A.* 115.50 (Dec. 2018), pp. 12704–12709. URL: https://www.pnas.org/doi/full/10.1073/pnas.1809642115.

[5] C L Murall, J L Abbate, M Puelma Touzel, E Allen-Vercoe, S Alizon, R Froissart, and K McCann. "Chapter Five - Invasions of Host-Associated Microbiome Networks". In: *Networks of Invasion: Empirical Evidence and Case Studies*. Ed. by David A Bohan, Alex J Dumbrell, and François Massol. Vol. 57. Advances in Ecological Research. Academic Press, 2017, pp. 201–281. DOI: 10.1016/bs.aecr.2016.11.002. URL: https://www.sciencedirect.com/science/article/pii/S0065250416300605.

[4] Maximilian Puelma Touzel. "Cellular dynamics and stable chaos in balanced networks". PhD thesis. University Goettingen, 2015. URL: http://dx.doi.org/10.53846/goediss-5477.

[3] Maximilian Puelma Touzel and Fred Wolf. "Complete Firing-Rate Response of Neurons with Complex Intrinsic Dynamics". In: *PLoS Computational Biology* 11.12 (2015), pp. 1–43. DOI: 10.1371/journal.pcbi.1004636.

[2] Fred Wolf, Rainer Engelken, Maximilian Puelma Touzel, Juan Daniel Flórez Weidinger, and Andreas Neef. "Dynamical models of cortical circuits". In: *Current Opinion in Neurobiology* 25 (2014), pp. 228–236. DOI: 10.1016/j.conb.2014.01.017. URL: https://www.sciencedirect.com/science/article/pii/S0959438814000324.

[1] M A Puelma Touzel, R B A Adamson, and A M Steinberg. "Optimal bounded-error strategies for projective measurements in nonorthogonal-state discrimination". In: *Phys. Rev. A* 76 (Jan. 2007), p. 62314. DOI: 10.1103/PhysRevA.76.062314.

Awards & Grants

2021 **Team Grant Award**, *Fonds de recherche du Québec NT*, co-PI, 3 years

2019 **Conference Poster Award**, *Montreal AI & Neuroscience Conference*

2018 **Post-doctoral Fellowship Award**, *IVADO*, 2 years

2014 **Summer School Start-up Program grant award**, *Goettingen University*, Lead

2011 **PhD Excellence Fellowship Award**, *IMPRS*, 3 years

2012 **Conference Poster Award**, *ACCN*

Professional Skills

- Python Machine Learning & Data science Stack: scikit-learn; pytorch; pandas; numpy; weights&biases; matplotlib; plotly.
- Cluster Computing (slurm; bash; vim)
- Scientific Writing (latex, tikz)
- Community Organization (Discord Admin)

Languages

- English (Native)
- Spanish (Fluent)
- French (Intermediate)

Event Organization

2023 **Session chair & representative to conference committee**, *Artificial Intelligence and Climate: The Role of AI in a Climate-Smart Sustainable Future*, Association for the Advancement of Artificial Intelligence Fall Symposium, Washington D.C.

2022–2024 **School Co-organizer/Content creator**, *ClimateMatchAcademy*, Virtual

2022 **Workshop Co-organizer**, *Social alignment in humans and machines*, Reinforcment Learning & Decision-Making Conference, Providence, USA

2021 **Symposium Co-organizer**, *Symposium on Explanation in Neuroscience & Artificial Intelligence*, Montréal, Canada

2020–2022 **Reading group Co-organizer**, *Mila NeuroAI reading group*, Montréal, Canada

2020 **Discussion session facilitator**, *UNIQUE Student Symposium 2020*, Montréal, Canada
Higher-order cognition session

2019 **Workshop co-organizer**, *NeurIPS NeuroAI Workshop*, Montréal, Canada
Real neurons & hidden units Workshop. Comprehensive 1-day event, including ¿50 double-blind review processed papers, live video feed, panel, etc.

2019 **Workshop group discussion activity organizer**, *Mathematics of Vision Workshop, Fields Institute*, Toronto, Canada

2019 **Conference co-organizer**, *Montreal Physics and AI Workshop*, Montréal, Canada
200 participants, lectures, and beginner and advanced workshops

2017 **Symposium co-organizer**, *Paris Biological Physics Community Day*, Paris, France

2012–2015 **Summer school lead organizer**, *Goettingen Advanced Course in Computational Neuroscience*, Goettingen, Germany
Managed team, facilitated the event. Initiated, acquired funding for, and oversaw a transition to a novel, advanced-content format

2011–2015 **Course co-coordinator/content manager**, *Seminar in Biophysics, Seminar in Theoretical Neuroscience*, Goettingen, Germany

2014 **Summer school co-coordinator**, *Latin American Summer School in Computational Neuroscience*, Valparaiso, Chile
Week 2: Network Neurodynamics at Instituto de Sistemas Complejos Valparaiso

Research Talks

2024 **Speaker**, *AI & Climate: Role of AI in a Climate-Smart Sustainable Future AAAI Workshop*, Washington, DC

2023 **Speaker**, *Lab Talk, Google Deepmind*, Virtual
Joel Leibo's research group

2022 **Invited Speaker**, *BIRS Workshop on Dynamical Principles of Bio. & Artificial Neural Nets*, Banff, Canada

2021 **Speaker**, *Neural Scaling Laws Workshop*, Tremblant, Canada

2021 **Speaker**, *Reinforcement learning Reading Group (Mila)*, Virtual

2020 **Speaker**, *Ross Otto Lab, McGill Psychology*, Virtual
Urgency as the opportunity cost of time

2020 **Speaker**, *Neural AI Reading Group (Mila)*, Montreal, Canada
Inverse Rational Control

2019 **Invited Speaker**, *Soft Matter & Biophysics Seminar, Simon Fraser University*, Vancouver, Canada
An inference take on urgency in decision-making

2019 **Invited Speaker**, *Computational Neuroscience Seminar, University of Ottawa*, Ottawa, Canada
An inference take on urgency in decision-making

2019 **Invited Speaker**, *Quantitative & Computational Biology Seminar, UdeM*, Montreal, Canada
Inferring repertoire dynamics from repertoire sequencing

2018 **Spotlight Speaker**, *q-bio Conference, Rice University*, Houston, USA
Ensemble response of immune repertoires to vaccination

2018 **Invited Speaker**, *Friday seminar, UCL Gatsby Theoretical Neuroscience Unit*, London, UK
Understanding the shape of high-dimensional activity in cortex-inspired neural circuits

2018 **Invited Speaker**, *Biophysics seminar, Emory University, Dept. Physics*, Atlanta, USA

2018 **Speaker**, *APS March Meeting*, Los Angeles, USA
Repertoire-based approach to identifying sequence motifs specific to an effective vaccine

2018 **Invited Speaker**, *Biophysics seminar, McGill University, Dept. Physics*, Montréal, Canada
Inferring contributions of recombination and selection to singly-perturbed repertoires

2018 **Invited Speaker**, *Tea talk, Montreal Institute for Learning Algorithms*, Montréal, Canada
Don't paint the box black: Using dynamical systems to explain complex phase space geometry

2017 **Speaker**, *Systems Immunology and Vaccine Design Workshop*, Heidelberg, Germany
Repertoire-based approach to identifying sequence motifs specific to an effective vaccine

2017 **Speaker**, *Biophysics Seminar, U of T Dept. Physics*, Toronto, Canada
Inferring contributions of recombination and selection to singly-perturbed repertoires

2016 **Speaker**, *PhD & PostDoc Seminar, ENS Dept. Physics*, Paris, France
The statistical mechanics of phase space partitioning in large scale neuronal circuits

2015 **Speaker**, *Swartz Foundation Meeting*, Janelia Research Campus, USA
A theory for the balanced state that keeps track of each and every spike

2015 **Speaker**, *Neuronal Circuits and Computations Group Seminar, Friedrich Miescher Institute*, Basel, Switzerland
A theory of precise spike timing in cortical circuits

2015 **Speaker**, *American Physical Society March Meeting*, San Antonio, USA
Elements of a finite-size ergodic theory for stable chaos

2015 **Speaker**, *ENS Theoretical Neuroscience Seminar*, Paris, France
A theory of precise spike timing in cortical circuits

2014 **Speaker**, *American Physical Society March Meeting*, Denver, USA
Microstate description of stable chaos in networks of spiking neurons

2014 **Tutorial Lecturer**, *Summer School in Computational Neuroscience*, Valparaiso, Chile
Theory and modelling methodology in biophysics through case studies in computational neuroscience

Research Posters

2022 **Presenter**, *NeurIPS Workshop on Tackling Climate Change with Machine Learning*, Virtual

2022 **Presenter**, *Montreal AI Symposium*, Montreal, Canada

2022 **Presenter**, *RLDM*, Rhode Island, USA

2022 **Presenter**, *COSYNE*, Lisbon, Portugal

2021 **Presenter**, *NeurIPS EcoRL Workshop*, Virtual

2021 **Presenter**, *MAIS*, Virtual

2021 **Presenter**, *COSYNE*, Virtual
Urgency as the opportunity cost of commitment

2020 **Presenter**, *Biological and Artificial Reinforcement Learning Workshop, NeurIPS*, Virtual
Urgency as the opportunity cost of commitment

2020 **Presenter**, *Neuroscience and Artificial Intelligent Systems, Cold Spring Harbor Labs*, Virtual
Urgency as the opportunity cost of commitment

2020 **Presenter**, *COSYNE*, Denver, USA
An inference perspective on urgency in decision-making

2019 **Presenter**, *Montréal AI & Neuroscience Conference*, Montréal, Canada, Poster Prize Winner
An inference take on urgency in decision-making

2019 **Presenter**, *Physics & AI Workshop*, Montréal, Canada
Stochastic thermodynamics of aggregate-label learning

2018 **Presenter**, *Montréal AI & Neuroscience Conference*, Montréal, Canada
Transfer properties of multi-spike tempotrons

2018 **Presenter**, *q-bio Conference*, Houston, USA
Ensemble response of immune repertoires to vaccination

2018 **Presenter**, *Curie-Weizmann Meeting*, Paris, France
Inferring perturbations to immune repertoires using clone size statistics

2017 **Presenter**, *Beg Rohu Summer School on Statistical Physics*, Beg Rohu, France
Inferring perturbations to immune repertoire dynamics

2016 **Presenter**, *Statistical physics methods in biology and computer science*, Paris, France
Antibody repertoires in fish

2016 **Presenter**, *Dynamics and Information in Cells and Tissues Workshop*, Les Houches, France
Inferring antibody generation: VDJ recombination in multiply infected fish

2015 **Presenter**, *International Conference in Mathematical Neuroscience*, Antibes, France
How entropy-producing networks can have precise spike times

2015 **Presenter**, *COSYNE*, Salt Lake City, USA
How entropy-producing networks can have precise spike times

2014 **Presenter**, *Bernstein Conference*, Goettingen, Germany
Stable chaos in balanced networks of spiking neurons with synaptic filtering

2013 **Presenter**, *German Neuroscience Society*, Goettingen, Germany
Instability and partial synchrony in a balanced network of resonator neurons

2013 **Presenter**, *COSYNE*, Salt Lake City, USA
Controlling the trade-off between categorization and separation via resonance

2013 **Presenter**, *Bernstein Conference*, Tuebingen, Germany
Microstate description of stable chaos in balanced spiking networks

2013 **Presenter**, *Computational Neuroscience Society meeting*, Paris, France
Olfactory bulb network dynamics as a pattern reservoir for adaptive cortical representations

2013 **Presenter**, *Mathematical Challenges in Neural Network Dynamics*, Columbus, USA
Stability properties of a balanced network of Type II neuronal oscillators

2012 **Presenter**, *Bernstein Conference*, Munich, Germany
Analyzing chaotic activity in a balanced network of Type II neuronal oscillators

2012 **Presenter**, *Computational Neuroscience Society meeting*, Decatur, USA, Poster Prize Winner
Features of Chaotic Activity in a balanced network of Type II neuronal oscillators

2007 **Presenter**, *International Conference on Quantum Information*, Rochester, USA
Optimal bounded-error strategies for projective measurements in non-orthogonal state discrimination

2006 **Presenter**, *Conference on Quantum Information and Quantum Control*, Toronto, Ontario
Non-orthogonal state discrimination in the presence of error using projective strategies

Training Schools

2023 **Participant**, *Mila's TRAIL Course in AI ethics*, Montreal, Canada

2017 **Participant**, *Beg Rohu Summer School on Statistical Physics*, Beg Rohu, France
Out of Equilibrium Dynamics, Evolution and Genetics

2017 **Participant**, *Cargese Summer School Theoretical Biophysics*, Cargese, France

2016 **Participant**, *Course on Multiscale Integration in Biological Systems, Curie Institute*, Paris, France
Physical description of biological systems, from single molecule to organisms

2016 **Participant**, *L'Ecole de Physique des Houches*, Les Houches, France
Dynamics and Information in Cells and Tissues

2016 **Participant**, *Kavli Institute for Theoretical Physics*, Santa Barbara, USA
Quantitative Immunology

2015 **Participant**, *Kavli Institute for Theoretical Physics*, Santa Barbara, USA
Olfaction

2014 **Participant**, *Latin American Summer School in Computational Neuroscience*, Valparaiso, Chile

2013 **Participant**, *Mathematical Biosciences Institute*, Columbus, USA
Mathematical Challenges in Neural Network Dynamics

2012 **Participant**, *Computational Neuroscience Society*, Bedlewo, Poland
Advanced Course in Computational Neuroscience (ACCN)

2009 **Participant**, *Latin American Summer School in Computational Neuroscience*, Valparaiso, Chile

2009 **Participant**, *Center for Neural Dynamics*, Ottawa, Canada
Computational Neuroscience Summer School

2008 **Participant**, *Instituto de Sistemas Complejos*, Valparaiso, Chile
Complex Systems Summer School

2008 **Participant**, *Universidad de Chile*, Santiago, Chile
Mathematical Modeling of Biological Systems using Matlab

2007 **Participant**, *Institute of Physics*, Manchester, England
Conference and Training Course in Emergent Themes in Biophysics

Teaching Experience

2020–present **Substitute Lecturer**, *Graduate-level dynamical systems lectures*, Montreal, Canada

2020–present **PhD Co-supervisor**, *Co-supervision with Dr. Irina Rish*, Montreal, Canada
Supervision of 2 PhD students

2021–present **PhD Co-supervisor**, *Co-supervision with Guillaume Lajoie*, Montreal, Canada
Supervision of 2 PhD students

2019 **Workshop Tutor**, *Physics and AI Workshop*, Montreal, Canada

2018 **Master's Student Co-supervisor**, *Co-supervision with Drs. Aleks Walczak & Thierry Mora*, Paris, France

2015 **Master's Student Co-supervisor**, *Co-supervision with Dr. Fred Wolf*, Goettingen, Germany

2014 **Summer School Tutor**, *Latin American Summer School in Computational Neuroscience*, Valparaiso, Chile
- Supervised group projects
- Lectured on modelling methodology in neuroscience

2012–2015 **Group Work Tutor**, *Goettingen School for Computational Neuroscience & Latin American Summer School in Computational Neuroscience*, Goettingen, Germany
- Group work supervision
- Designed and implemented literature review activity

2008–2009 **Teaching Assistant**, *Department of Physics, University of Toronto*, Toronto, Canada
Designed and delivered inquiry-based tutorials

2006–2007 **Science Educator and Content Programmer**, *Ontario Science Centre*, Toronto, Canada
Developed and performed demonstrations on astronomy, robotics, and resonance

2006 **Science Camp Co-ordinator**, *Activity Science Camp With Hispanic Youth*, Toronto, Canada
Conceived, designed, and implemented activity-focused summer science camp for at-risk youth supported by the Centre for Spanish-Speaking People

2005 **Professional Academic Tutor**, *Independent*, Toronto, Canada
Provided academic (math & science) and language support to newly immigrated youth