

Patricia Sorya

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Education

- 2021 – 2025 **Doctor of Philosophy (candidate)**, *Pure mathematics*, Université du Québec à Montréal (UQAM), Montreal.
- 2019 – 2021 **Master of Science**, *Pure mathematics*, UQAM, Montreal.
- 2016 – 2019 **Bachelor of Science**, *Pure mathematics*, UQAM, Montreal.
- 2005 – 2010 **Doctor of Optometry**, Université de Montreal (UdeM), Montreal.

Research interests

Low dimensional topology
Knot theory
Topological data analysis

Publications

- Sorya, Patricia.** *Characterizing slopes for satellite knots.* Advances in Mathematics, vol. 450 (2024) <https://doi.org/10.1016/j.aim.2024.109746>
- Nissan R, Chevrefils C, **Sorya P**, and al. *Retinal phenotyping using spatial-spectral features derived from hyperspectral imaging.* Invest. Ophthalmol. Vis. Sci., vol. 65, 5953 (2024)
- Sylvestre JP, Arbour JD, Rhéaume MA, Nissan R, Rojewski A, **Sorya P**, and al. *Evaluation of geographic atrophy, nascent geographic atrophy, and hyperreflective foci with hyperspectral retinal imaging.* Invest. Ophthalmol. Vis. Sci., vol. 65, 5953 (2024)
- Nassar K, Niessen H, Arbour JD, Rhéaume MA, Nissan R, Rojewski A, **Sorya P**, and al. *Spatial-spectral characterization and mapping of labeled drusenoid deposits in non-neovascular age-related macular degeneration.* Invest. Ophthalmol. Vis. Sci., vol. 65, 5953 (2024)
- Submitted Romano F, Overbey K, Durocher-Jean A, Rojewski A, St-Hilaire F, Ding X, Vingopoulos F, Stettler I, Arbour JD, Rhéaume MA, Nissan R, **Sorya P**, et al. *Geographic Atrophy Assessment Using a Novel Hyperspectral Fundus Camera.* (2024) (submitted to Ophthalmology)

Talks and conferences

- Invited speaker **Non-integral Dehn surgeries characterize composite knots**, *Topology seminar, Max Planck Institute for Mathematics*, Bonn, June 2023.
- Characterizing slopes : Explicit bounds for satellite knots**, *Summer meeting of the Canadian Mathematical Society*, Ottawa, June 2023.
- Topological data analysis for data scientists: homology**, *Journal club of the Artificial Intelligence team, Optina Diagnostics*, Montreal, June 2023.

- Characterizing slopes for satellite knots**, *Winter meeting of the Canadian Mathematical Society*, Toronto, december 2022.
- Obstructions to the triangulation of manifolds**, *Geometric Topology Grad and Postdoc Seminar*, Standford University (online), February 2022.
- Speaker **Knot Floer complex and characterizing Dehn surgeries of knots of thickness ≤ 2** , *New structures in low-dimensional topology*, Budapest, juillet 2024.
- Classification of hyperspectral image data using persistence landscapes**, *Applications of Representation Theory in Topological Data Analysis & Geometric Invariant Theory*, Montreal, June 2024.
- Characterizing Dehn surgeries and composite knots**, *Colloque panquébécois de l'Institut des sciences mathématiques*, Sherbrooke, June 2023.
- Small hyperbolic links?**, *Groups Around 3-Manifolds*, Montreal, June 2023.
- Characterizing slopes for satellite knots**, *Winter school in singularities and low dimensional topology*, Budapest, January 2023.
- Working groups **Speaker and attendee**, *Low dimensional topology working group of the CIRGET*, Montreal, 2019 – current.
- Talks given:
- Intersection graphs and reducible fillings, February 2024
 - Characterizing slopes for satellite knots, May 2023
 - Signature of knots, April 2022
 - A cross homomorphism for the Laudénbach exact sequence, February 2021
 - Cyclic covers of knot complements, September 2020
- Speaker, attendee and organizer (rotating)**, *CIRGET Topology students reading group*, Montreal, 2021 – current.
- Talks given:
- Knot Floer homology, October 2023
 - Dehn surgery, the fundamental group and $SU(2)$, after Kronheimer and Mrowka, June 2023
 - A-polynomial: examples and properties, April 2023
 - Character varieties: Culler-Shalen seminorms, February 2023
 - Character varieties: ideal points and valuations, November 2022
 - Character varieties: tree graphs and surfaces in 3-manifolds, October 2022
 - Bordered Heegaard Floer homology (continued), October 2022
 - Bordered Heegaard diagrams and their associated strands algebra, August 2022
 - Twisted Alexander invariants, July 2022
 - Heegaard Floer homology, fall 2021
- Speaker and attendee**, *Topological data analysis working group*, UQAM and Université de Sherbrooke, online, 2021 – 2023.
- Talks given:
- Persistence modules as sheaves, May 2022
 - Topological data analysis to vectorize fMRI and hyperspectral scans, March 2022
 - 2-parameter persistent homology, January 2022
- Organizer **Member of the organizing committee**, *Colloque panquébécois de l'Institut des sciences mathématiques*, Montreal, May 2024.
- Member of the organizing committee**, *UQAM Graduate Students in Mathematics Seminar*, Montreal, 2019 – 2021.
- Attendee **New structures in low-dimensional topology**, *Rényi Institute, Erdős Center*, Budapest, July 2024.

Low Dimensional Topology Summer School, *Institut Fourier, Université Grenoble Alpes*, Grenoble, June 2024.

Applications of Representation Theory in Topological Data Analysis & Geometric Invariant Theory, *UQAM*, Montréal, June 2024.

Cornell Topology Festival, *Cornell University*, Ithaca, May 2024.

2024 Geometry and Topology Workshop, *UCLA*, Los Angeles, January 2024.

Gauge Theory and Topology: in Celebration of Peter Kronheimer's 60th Birthday, *Oxford University*, Oxford, July 2023.

Groups Around 3-Manifolds, *Centre de recherches mathématiques*, Montreal, June 2023.

Summer school and fibering spaces and their connections, *Université de Sherbrooke*, Sherbrooke, June 2023.

Workshop on Interactions of 3- & 4-dimensional Topology, *Northeast University, Tsinghua University and Beijing University*, online, March 2023.

Winter school in singularities and low-dimensional topology, *Rényi Institute, Erdős Center*, Budapest, January 2023.

2nd Canadian Geometry-Topology Seminar, *UQAM*, Montreal, November 2022.

Frontiers in Geometry and Topology Summer School, *International Center for Theoretical Physics*, online, August 2022.

Summer school on Alexander polynomials Knots and complex curves, *Université de Nantes*, Nantes, May 2022.

Braids in Low-Dimensional Topology, *The Institute for Computational and Experimental Research in Mathematics*, Providence, April 2022.

Tech Topology Conference, *Georgia Institute of Technology*, online, December 2021.

Honors and awards

2025 **Scholarship for Outstanding PhD Candidates**, *Institut des sciences mathématiques (ISM)*, 7500\$.

2024 **ISM Graduate Scholarship**, *ISM*, 29000\$.

2021 – 2024 **Doctoral Research Scholarship**, *Fonds de recherche du Québec – Nature et technologies (FRQNT)*, 84000\$.

2020 – 2021 **Master's Research Scholarship**, *FRQNT*, 17500\$.

2019 – 2020 **Canada Graduate Scholarships – Master's Program**, *Natural Sciences and Engineering Research Council of Canada (NSERC)*, 17500\$.

2018 and 2019 **Undergraduate Student Research Award**, *NSERC*, 5625\$ and 6200\$.

Social engagement

- 2020 – **Student council member**, *Graduate Mathematics program committee*, UQAM, Montreal.
- current
 - Define and align curriculum structure of graduate programs in mathematics and their objectives, in collaboration with council faculty members and the administration.

- April 2022 **Invited speaker**, *MAT6221 History of mathematics*, UQAM, Montreal.
 and 2023
 - Talk titled *Women mathematicians in geometry and topology*, highlighting the achievements of three female mathematicians of the 20th century.
 - Conference given as part of a course in the bachelor in mathematics education and the bachelor in mathematics programs.
- 2020 **Organizing committee and editing-revision**, *Project Femmes en maths*, online.
 - Project to promote the contributions of women in mathematics
 - Maintenance of the website (<https://femmesenmaths.org/>), writing and editing-revision of publications, funding applications
- April 2019 **Invited panel member**, *Math Day for CEGEP Girls*, Montreal.

Teaching experience

- 2017 – 2023 **Lecturer and preceptor**, *School of Optometry – UdeM*, Montreal.
 - OPM4801 Specialized clinical internship - Community clinic (2021 – 2023)
 - SCV2152 Vision sciences: Ocular dioptrics (fall 2020)
 - OPM4701, OPM37011 General clinic (2017 – 2021)
 - OPM6052 Advanced clinical optometry (summer 2018)
- 2020 – 2021 **Teaching assistant**, *Département de mathématiques – UQAM*, Montreal.
 - MAT2150 Analysis II (fall 2021)
 - MAT2250 Group theory (fall 2020, fall 2021)
 - MAT2400 Geometry (fall 2020)
 - MAT0339 General mathematics (summer 2020)
 - MAT0344 Integral calculus (winter 2020)

Professional experience

- 2021 – 2024 **Consultant, Data Analytics and Optometry**, *Optina Diagnostics*, Montreal.
 - Analysis of clinical data acquired with Optina Diagnostics' ocular imaging technology, aimed at developing machine learning models to aid in the diagnosis of various systemic diseases
 - Designing research protocols and clinical documentation
 - Presenting results to collaborators and investors
 - Training staff at affiliated research sites
- 2017 – 2020 **Research Associate**, *Research Institute - McGill University Health Centre (RI-MUHC)*, Montreal.
 - Oculovisual evaluation, diagnostic monitoring and therapy of patients in Phase II and III clinical studies
 - Development of logistical processes for implementing research protocols, in collaboration with other professionals in the hospital setting
- 2010 – **Optometrist**, *member of the Ordre des optométristes du Québec*, no. 321032.
 current

Languages

French
 English