

Juan Felipe Celis Rojas

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EDUCATION

University of Oxford, United Kingdom

Doctor of Philosophy in Mathematics

Supervised by Prof. Heather Harrington and Prof. Ulrike Tillmann

Research area: topological data analysis and homotopy theory

October 2025 — Expected 2029

University of Copenhagen, Denmark

Master Thesis under the supervision of Prof. Nathalie Wahl, Exchange Semester

February 2025 — July 2025

Ecole Polytechnique Fédérale de Lausanne, Switzerland

MSc Mathematics with Minor in Quantum Science and Engineering

September 2023 — July 2025

Ecole Polytechnique Fédérale de Lausanne, Switzerland

BSc Mathematics

September 2020 — July 2023

PUBLICATIONS

Finite groups as homotopy self-equivalences of finite spaces, *Grad. J. Math.* **9** (2024), no. 2, 15–21

We present a new construction of a finite space whose group of homotopy classes of self-homotopy equivalences is isomorphic to a given finite group G .

RESEARCH PROJECTS

Homology of Sullivan diagrams, Master Thesis

Supervised by Prof. Nathalie Wahl.

We study the homology of the moduli space of Riemann surfaces via Sullivan diagrams. First, we present new computations of the fundamental group of spaces of Sullivan diagrams. Next, we provide a new proof of homological stability for Sullivan diagrams and compute the stable homology.

Homological Stability, Master Semester Project

Supervised by Prof. Jerome Scherer.

Study categorical methods to obtain homological stability for families of automorphism groups, based on the article *Homological stability for automorphism groups* by Oscar Randal-Williams and Nathalie Wahl. I focus on the homological stability for mapping class groups of surfaces.

Riemannian Optimization for Quantum Tasks, Minor Semester Project

Supervised by Dr. Yudai Suzuki and Prof. Zoe Holmes.

Study the mathematical framework of different methods of Variational Quantum Eigensolvers (VQEs). I explain the link between Riemannian Gradient Flow, Double-Bracket Flow and Imaginary Time Evolution.

Homological Stability of Symmetric Groups, Bachelor Project

Supervised by Prof. Jerome Scherer.

Give all details of new techniques used to find stability ranges for symmetric groups with constant and twisted coefficients, based on the article *A new approach to twisted homological stability, with applications to congruence subgroups* by Andrew Putman.

EXPERIENCE

Mathematical Institute, University of Oxford

Teaching Assistant

Oxford, United Kingdom

Hilary Term 2026

- Teaching assistant for algebraic curves.
- Grade homework submitted every two weeks.
- Present exercises with solutions to students.

Laboratory of Topology and Neuroscience, EPFL

Summer in the Lab internship, research intern

Lausanne, Switzerland

Summer 2022

- Research in topology under the supervision of Prof. Kathryn Hess and Prof. Jerome Scherer.
- Develop Python code to perform topological computations: this allows to check hand-made computations.
- Give a new solution to a realization problem of finite groups as homotopy self-equivalences of finite spaces.

Chair of Number Theory, EPFL

Research intern

Lausanne, Switzerland

Summer 2023

- Study a periodic configuration problem under the supervision of Prof. Maryna Viazovska.
- Progress in unsolved optimization problem (related to sphere packing) using analytical and combinatorial tools.

EPFL*Teaching Assistant*Lausanne, Switzerland
February 2022 - January 2025

- Teaching Assistant for first-year and second-year university students.
- Teaching Assistant for Linear Algebra, Analysis, Computer Science, Group Theory, Discrete Mathematics, Algebraic Structures.
- Responsibilities include grading assignments and exams.

EPFL*Group Theory course MOOC developer*Lausanne, Switzerland
September 2022 – July 2024

- Reorganize and cut class videos so that they are compatible with the platform.
- Create quiz questions for all videos of the course.
- Write the final evaluation for all sections of the MOOC.

TALKS AND SEMINARS

- *Model categories* — Dresden–Oxford Reading Group, May 2026
- *Homology of Sullivan Diagrams* — Dresden–Oxford ASB Group Meeting, October 2025
- *Riemannian Geometry of VQA* — QIC Group Meeting EPFL, January 2025
- *Homological stability of mapping class groups* — Topology Workshop EPFL, January 2025
- *Cohomology Ring of Dihedral Groups* — Topology Reading Group EPFL, December 2024
- *Spectral sequences for homological stability* — Topology Reading Group EPFL, November 2024
- *Quillen’s small object argument* — Topology Reading Group EPFL, October 2024

SKILLS

Programming

- Python: intermediate
- MatLab: intermediate
- C++: intermediate
- Qiskit: intermediate

Languages

- Spanish: native
- English: fluent
- French: fluent
- Portuguese: beginner

Transversal workshops

- **Leadership** Summer in the Lab EPFL, Summer 2022
- **Scientific communication** Summer in the Lab EPFL, Summer 2022

AWARDS AND ACHIEVEMENTS

- Colombian Mathematics Olympiads top 10 from 2015 to 2020, 1st place in 2016 semi-final
- Astronomy and astrophysics Colombian Olympiads 9th place 2018
- Marathon finisher: Copenhagen 2025, Lausanne 2023