

Felipe Espreadico Guelerman Ramos

— Curriculum Vitae —

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Research Interests

My research interests center around enumerative aspects of Algebraic Geometry, Hodge theory and its relations with Physics. Lately, I've been working in the field of \mathbb{A}^1 -enumerative geometry, which concerns solving enumerative problems over any field. I'm interested in understanding how Physical invariants can be realized in this context, but also on more general enumerative problems. On a different direction, I've also been working on understanding modularity properties of certain Gromov-Witten invariants and on its Hodge theoretical properties. My other interests include Singularity Theory and Symplectic Geometry.

Education

PhD in Mathematics

Institute of Pure and Applied Mathematics, with a year (2022-2023) spent at University of Heidelberg

Supervisors: Hossein Movasati and Johannes Walcher

Rio de Janeiro

2020–2024

BSc in Mathematics

University of São Paulo, Final Grade 9.6/10

with a semester (2018-2019) spent at Leibniz University Hannover

São Carlos

2016–2019

High School Degree

Foundation Armando Álvares Penteado

Ribeirão Preto

2013–2015

Research Experience and Grants Awarded

Undergraduate Level

Transcendental Methods of algebraic/complex geometry in hyperbolic geometry

FAPESP Undergraduate Research Grant, São Carlos

In this research project I studied selected topics in measure theory, complex analysis, Riemann surfaces and algebraic geometry in order to apply it in hyperbolic geometry. I even had some contact with Gromov-Lawson-Thurston conjecture. I was advised by Prof Alexandre Ananin.

University of São Paulo

2016–2017

Introduction to Analytic Geometry

FAPESP Undergraduate Research Grant, São Carlos

In this research project I studied some basics of complex analytic geometry and started applying it on Singularity Theory, specially on determinantal singularities, having contact with some research papers in the area. I was advised by Prof Nivaldo Grulha and Prof Dr Maria Aparecida Soares Ruas.

University of São Paulo

2017–2018

Tjurina Transform and Determinantal Singularities.

FAPESP Research Internship Abroad Grant, Hannover

This grant allowed me to spend a semester in Hannover to develop a research project. This project consisted in studying two research papers on determinantal singularities. I was advised by Prof Anne Frühbis-Krüger.

Leibniz Universität Hannover

2018–2019

Intersection Homology and Applications to Singularity Theory

FAPESP Undergraduate Research Grant, São Carlos

In this project I studied Intersection (co)homology Theory: an important set of invariants which substitute the usual homology in the study of singular varieties. I was advised by Prof Nivaldo Grulha.

University of São Paulo

2019–2019

Graduate Level

Open Gromov-Witten invariants and moduli of enhanced Calabi-Yau threefolds

CNPq PhD Fellowship, Rio de Janeiro

This grant is a 4-year PhD fellowship. My project is centered on computing Open Gromov Witten invariants and on defining a moduli space of enhanced Calabi Yau threefolds in this open case. I am currently under supervision of Prof Hossein Movasati.

Inst. Pure and Appl. Mathematics

2020–2024

Refinements of Enumerative Invariants in Physics

CAPES PhD Internship Abroad Grant, Heidelberg

This grant is a complementary grant to my PhD fellowship. It allowed me to spend the 2022-2023 academic year in Heidelberg to develop a research project under supervision of Prof Johannes Walcher. The project consisted in understand better the refinements of enumerative geometry that recover real and complex Physical invariants.

University of Heidelberg

2022–2023

Prizes and Awards

Bronze Medal

Brazilian Physics Olympiad (high school level)

2015

Silver Medal

São Paulo's Chemistry Olympiad (high school level)

2015

Bronze Medal

Brazilian Chemistry Olympiad (high school level)

2015

Honorable mention

Brazilian Mathematics Olympiad (undergraduate level)

2017

Outstanding Academic Performance as Undergraduate student

University of São Paulo

2019

Teaching and Organizational Experience

High School teaching

Voluntary teacher at a preparatory course for High School Students

São Carlos

2017–2019

Free course on Category Theory

Instructor for short course on Category Theory, Univeristy of São Paulo

São Carlos

Mar, 2017

Teaching Assistant for Differential Toplogy

Inst. of Pure and Appl. Math.

Rio de Janeiro

Jan - Mar, 2022

Teaching Assistant for Riemann Surfaces

Inst. of Pure and Appl. Math.

Rio de Janeiro

Aug-Dez, 2023

Coorganizer of the IMPA Student Seminar

Inst. of Pure and Appl. Math.

Rio de Janeiro

Aug-Dez, 2023

Selected Conferences

International School on Singularities and Lipschitz Geometry

Autonomous National University of Mexico

Cuernavaca

2018

15th International Workshop on Real and Complex Singularities

University of São Paulo

São Carlos

2018

6th Heidelberg Laureate Forum

University of Heidelberg

Heidelberg

2018

Géométrie Algébrique en Liberté XXIX

Paris-Saclay University

Paris

2022

Structures in Enumerative Geometry

University of Sheffield

Sheffield

2023

Quadratic Forms and Applications in Algebraic Geometry

Aachen University

Aachen

2023

Hodge theory, Mirror Symmetry, and Physics of Calabi-Yau Moduli

University of Heidelberg

Heidelberg

2023

Lectures and Posters

Ultrametric Spaces and the Płoski Theorem for plane curves

Talk at 21st Undergraduate Symposium of Mathematics, São Carlos

University of São Paulo

2018

Bouquet Decomposition for Determinantal Milnor Fibers

Poster at University of São Paulo's International Scientific Initiation Symposium, São Carlos

University of São Paulo

2019

The Fukaya Category and Kontsevich's HMS conjecture

Online lecture given at the Masters Level Geometry Seminar by invitation, Campinas

University of Campinas

2021

Gauss-Manin Connection in Disguise: How to generalize modular forms

Poster at the Géométrie Algébrique en Liberté conference, Paris

Paris-Saclay University

2022

Gauss–Manin Connection in Disguise and Mirror Symmetry

Online lecture given at the Online Algebraic Geometry Seminar, Nottingham

Nottingham University

2022

Atyah-Bott formula and Refined Enumerative Geometry

Online lecture at the GADEPs Seminar, Rio de Janeiro

Inst. of Pure and Appl. Math.

2022

Arithmetic and motivic definements of degree zero DT invariants of \mathbb{A}^3

Lecture at the conference Hodge theory, Mirror Symmetry, and Physics of Calabi-Yau Moduli, Heidelberg

University of Heidelberg

2023

Publications and Preprints

1. F. Espreafico and J. Walcher, **On Motivic and Arithmetic Refinements of Donaldson-Thomas Invariants**, 2023
 - arXiv:2307.03655
 - Submitted to *Communications in Number Theory and Physics*
2. F. Espreafico, **Gauss-Manin Connection in Disguise: Open Gromov-Witten Invariants**, 2022
 - arXiv:2205.08302
 - Submitted to *Communications in Mathematical Physics*

Languages

Portuguese: Native

English: Fluent

German: Intermediate

Spanish: Intermediate