RAUL PENAGUIAO PhD.

Mathematics researcher: optimization, algebra, geometry and combinatorics
Software engineer and UI products developer. Data Analyst. Data-driven decision-making assistant.
Math Olympiad prize winner. Software developer in C#, C++, python and Macaulay2.
Principal instructor in advanced courses in mathematics, organizer of research conferences and workshops

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Contact	OrcID : 0000-0002-0651-9036	Personal website : raulpenaguiao.github.io
	Basel, Switzerland	Mail: rpenaguiao@haeusler.com
	Nationality: Portuguese	Github: raulpenaguiao

Employment

Haeusler AG, Basel, Switzerland. (September 2023 - Today)
Software engineer, UI developer and Data analyst - Link to webpage

Max Planck Institute, Leipzig, Germany. (September 2022 - September 2023)
PostDoc researcher at the Max Planck society
Graphical models in statistics, machine learning, algebraic geometry
Principal instructor in Algebraic Methods in Combinatorics - Link to webpage

San Francisco State University, San Francisco, US. (August 2021 - August 2022)
PostDoc researcher under the Early.Postdoc Swiss National fund grant
Combinatorial optimization, matroid theory, tropical geometry
Principal instructor in MATH 226 - Link to webpage

other employment:
PostDoc researcher under a Swiss National fund grant at TU Berlin (2021)
Teaching assistant and doctoral student at University of Zürich (2016 - 2020)
Teaching assistant at ETH Zürich (2015 - 2016)
Technical assistant at Novabase (2013 - 2014)

Education

Doctoral studies in mathematics - Degree (PhD) in Pure Mathematics
University of Zürich, Switzerland (October 2016 - May 2020)
on *Algebraic and geometric studies of combinatorial substructures and chromatic invariants* PhD thesis Advisor: Prof. Dr. Valentin Féray

Masters of Science in Mathematics - Degree (MSc) in Pure Mathematics
ETH Zürich, Switzerland (September 2014 - September 2016)
The Chromatic Symmetric Function on Random Graphs
Master thesis advisors: Prof. Dr. Valentin Féray and Prof. Dr. Angelika Steger

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Programming skills

- General-purpose: C++, C#, julia and python
- Technical computing systems: Mathematica, MatLab, SAGEmath, Macaulay-2
- Markup languages: HTML and LaTeX

Institutional responsibilities	Organizer of research seminar in the Fall semester 2021-2022, *AGC*, at San Francisco State University - Web.
	Organizer of AMS Spring Western Virtual Sectional Meeting at San Francisco State University, Sprint 2021 - Web.
	Co-organizer of research Workshop in *Permutation Patterns 2019*, at Zürich University - Web.
	Representative of the teaching assistants in the committee of Mathematics department from 2017 January to 2017 June, University of Zürich.

Selected scientific publications	• *The kernel of chromatic invariants on graphs and hypergraphical polytopes*, **Raul Penaguiao**, Journal of Combinatorial Theory, Series A, 175, 105258.
	• *The tropical critical points of an affine matroid*, Federico Ardila-Mantila, Christopher Eur and **Raul Penaguiao**, SIAM Journal on Discrete Mathematics 38.2 (2024): 1930-1942.
	• *Pattern Hopf algebras*, **Raul Penaguiao** Annals of Combinatorics volume 26, pages 405–451 (2022).
	• *The feasible regions for consecutive patterns of pattern avoiding permutations*, Jacopo Borga and **Raul Penaguiao**, Volume 346, Issue 2, February 2023, 113219.

Organization of conferences and leadership	Mentoring of three projects with junior students and PhDs
	Organizer of the "NMath workshop for computer science and algorithms in 2021"
	Organizer of the "Student workshop for permutation patterns in 2019" : Webpage.
	Organizer of "Mathematics, Statistics and Computation Journeys" (JMEC 1), main organizer of the Math exposition in 2014 : Webpage

Awards and Fellowships	*Fellowships*
	• Swiss national science foundation - PostDoc.Mobility grant 2020 - 2022
	• Calouste Gulbenkian foundation - New talents fellowship. 2011-2012 and 2013-2014
	Mathematical Olympiads
	• Bronze medal in the International Mathematical Olympiad. 2011
	• Silver medal in the Ibero-American Mathematical Olympiad for University Students. 2011
	• Silver medal in the Ibero-American Mathematical Olympiad. 2011
	• Three Gold medals in the Portuguese Mathematical Olympiad. 2008, 2010 and 2011
	Programming Team Olympiads
	• Bronze medal in South-West European Regional Contest. 2011, 2012, 2013
	• Gold medal in the Portuguese Inter-Universitary Marathon. 2011

Hobbies	• Coded a browser password manager and a browser clicker game here and here.
	• Took part of the scouting movement since five years old, still a volunteer
	• Enjoy regular hiking and camping (I have camped above 3200m altitude!)
	• Participate regularly on online programming competitions (> 390 problems solved in Project Euler!)