Maria Prat Colomer

PhD student in Mathematics

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RESEARCH INTERESTS Partial Differential Equations, Computer-Assisted Proofs and Machine Learning.

EDUCATION

PhD in Mathematics *Brown University, US*

SEPT 2024 - Current

Advisor: Prof. Javier Gómez-Serrano

Master's degree in Advanced Mathematics and Mathematical Engineering *UPC, Spain*

SEPT 2023 - JUNE 2024

Advisor: Prof. Javier Gómez-Serrano and Prof. Tere M-Seara.

Master thesis (with honors): Machine learning methods in incompressible fluid dynamics.

Visiting student *NYU, US*

SEPT 2022 - JUNE 2023

Advisor: Prof. Joan Bruna.

Bachelor thesis (with honors): Multiscale modeling of a closure problem using the scattering transform.

Bachelor's degree in Mathematics *CFIS-UPC, Spain*

SEPT 2018 - JUNE 2023

Bachelor's degree in Informatics Engineering *CFIS-UPC, Spain*

SEPT 2018 - JUNE 2023

RESEARCH EXPERIENCE

Polytechnic University of Catalonia *Research Assistant*

SEPTEMBER 2023 - AUGUST 2024 Barcelona, Spain

Physics-Informed Neural Networks (PINNs) for computer-assisted proofs in partial differential equations, with Prof. Tere M. Seara and Prof. Javier Gómez-Serrano (Brown University)

New York University *Visiting Student*

SEPTEMBER 2022 - JUNE 2023 New York, United States of America

Scattering representations to develop subgrid parametrizations in climate and turbulence models, with Prof. Joan Bruna. Affiliated to M2LInES project led by Prof. Laure Zanna

Barcelona Introduction to Mathematical Research 2022 Summer Program *Student*

JULY 2022 Barcelona, Spain

Physics-Informed Neural Networks (PINNs) for computer-assisted proofs in partial differential equations, with Prof. Javier Gómez-Serrano (Brown University)

ICFO - The Institute of Photonic Sciences *Research Assistant*

MARCH 2021 - JUNE 2021 Castelldefels, Spain

Monte Carlo methods for the Zauner's Conjecture, in the Quantum Information Theory group led by Prof. Antonio Acín

Centro de Astrofísica da Universidade do Porto *Research Assistant*

JULY 2017, JULY 2018 Porto, Portugal

Statistical and astronomical tests for class of models of the dark energy equation of state, with Prof. Carlos Martins

PUBLICATIONS

Google Scholar

2022 **M. Prat Colomer**, L. Mortimer, I. Frérot, M. Farkas and A. Acín. *Three variational approaches to find sets of mutually-unbiased bases.* In Quantum 6, 778

2019 Martins, C. J.A.P. and **M. Prat Colomer**. *Fine-structure constant constraints on late-time dark energy transitions.* In Physics Letters B 791, pp. 230-235

2018 Martins, C. J.A.P. and **M. Prat Colomer**. *Constraining late-time transitions in the dark energy equation of state.* In Astronomy & Astrophysics (A&A) 616, A32

INVITED SEMINAR TALKS

Brown, GLESPA seminar. *Computer-assisted proofs in ODEs and PDEs.* October 2024.

UChicago, Prof. Hassanzadeh's group seminar. *Multiscale modeling of a closure problem using the scattering transform.* February 2024.

NYU, Prof. Joan Bruna's group seminar. *Multiscale modeling of a closure problem using the scattering transform.* May 2023.

WORKSHOPS

Mathematics and Machine Learning Program *October 21-25, 2024 at CMSA - Harvard*
Computer-Assisted Proofs in Nonlinear Analysis *September 5-13, 2024 at CRM - Université de Montréal*

WORK EXPERIENCE

Google *SRE Intern*
JULY 2021 - SEPTEMBER 2021 Remote - Dublin, Ireland
Feature extraction from generic datasets to obtain relevant features for anomaly detection ML models

Google *STEP Intern*
JULY 2020 - SEPTEMBER 2020 Remote - Zurich, Switzerland
Open-source tool to replace resource-intensive components without compromising test integrity and validity

ACCOMPLISHMENTS

CFIS Scholarship *2018 - 2023*
Tuition and residence scholarship to simultaneously study two Bachelor's degrees

Maria Yzuel Fellowship Award - *SPIE@ICFO* *2021*

Bronze medal and First Girl Prize - *Catalan Olympiad in Informatics* *2018*

Bronze medal - *Iberoamerican Olympiad in Informatics* *2018*

Recognition for the university entrance exams - *Catalan Government* *2018*

Youth and Science Program - *Catalunya La Pedrera Foundation* *2016-2018*

CiMs+CELLEX Scholarship - *Cellex Foundation* *2016-2018*

Tuition and residence scholarship to simultaneously study the Spanish and the International Baccalaureates

International Baccalaureate Diploma Programme (IB) *2016-2018*
Scored 44 out of 45 points with High Level in Mathematics and Physics (top 1.23% of candidates worldwide)

LANGUAGES Catalan (native), Spanish (native), English

PROGRAMMING LANGUAGES Python (JAX, Pytorch, Tensorflow), C/C++, Java, GoLang, R, MATLAB, SQL