# Jaume de Dios Pont

*Curriculum Vitae & Publication List*

*Rämistrasse 101*
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## Employement

Sept 2023 –
Aug 2026
(Expected)
**ETH Postdoctoral researcher.**, *Under the mentorship of Svitlana Mayboroda.*, Funded by the Simons collaboration on the Localization of Waves.

May 2023 –
Sept 2023
**Microsoft Research**, Physics of AGI *group. Designed data generation pipelines for Large language models, and devised novel algorithms in quantum property testing.*, Mentored by Adil Salim.

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## Education

May. 2023 **Ph.D. in Mathematics**, *University of California, Los Angeles*, Part I: Uniform Estimates for Operators Involving Polynomial Curves. Part II: Decoupling Estimates for Fractal and Product Sets , Supervised by T. Tao.

Sept. 2018 **MS. Mathematics**, *Eidgenössiche Tecnische Hochschule Zürich*, .
Master Thesis: Quantum Loewner Evolution, *supervised by E. Powell and W. Werner*

Sept. 2017 **BS. Mathematics**, *Autonomous University of Barcelona*, (#1 Rank).
Bachelor Thesis: Oscillatory integrals and the Kakeya Conjecture, *supervised by J. Garnett, J. Verdera*

Sept. 2017 **BS. Physics**, *Autonomous University of Barcelona*, (#1 Rank).
Bachelor Thesis: Design of KCM-related experiments, *supervised by F. X. Álvarez, A. Lopeandía*

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## Posgraduate awards and scholarships

2022–2023 **UCLA Dissertation Year Fellowship award**.
Granted the UCLA Dissertation fellowship, providing tuition and stipend during the last year of the PhD program.

2018–2020 **Beca 'La Caixa'** .
Granted the 'La Caixa' scholarship to pursue graduate studies in the US starting August 2018. The scholarship covers full tuition and a stipend for the first two years of the graduate program. Obtained the highest score given by the selection committee.

2017 - 2018 **Excellence Scolarship**, *ETH Zurich*.
Granted the Excellence scolarship for the Master in Mathematics, covering tuition, living costs, and a mentorship program.

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## Papers and preprints

[1] **Query lower bounds for log-concave sampling**, *Sinho Chewi, de Dios Pont, J., Jerry Li, Chen Lu &Shyam Narayanan*, Preprint(2023), Appeared in FOCS 2023., arXiv:2304.02599 .

[2] **Uniform Fourier Restriction Estimate for Simple Curves of Bounded Frequency**, *de Dios Pont, J., Helge Jørgen Samuelsen*, Preprint (2023)., arXiv:2303.11693.

[3] **The convex hull of space curves with totally positive torsion**, *de Dios Pont, J., Ivanisvili, P., & Madrid, J.*, Preprint (2022)., arXiv:2201.12932.

[4] **Additive energies on discrete cubes**, *de Dios Pont, J.*, *Greenfeld, R., Ivanisvili, P., & Madrid, J.*, Preprint (2021)., arXiv:2112.09352.

[5] **A polynomial curve partitioning theorem over local fields with applications to harmonic analysis**, *de Dios Pont, J.*, In preparation.

[6] **Decoupling for fractal subsets of the parabola**, *Chang, A., de Dios Pont, J., Greenfeld, R., Jamneshan, A., Li, Z. K., & Madrid, J.* , Mathematische Zeitschrift, 1-29. (2022).

[7] **On classical inequalities for autocorrelations and autoconvolutions**, *de Dios Pont, J.*, & *Madrid, J.*, Preprint (2021), arXiv:2106.13873.

[8] **A geometric lemma for complex polynomial curves with applications in Fourier restriction theory**, *de Dios Pont, J.*, Preprint (2020), arXiv:2003.14140.

[9] **Role Detection in Bicycle-Sharing Networks Using Multilayer Stochastic Block Models**, *Carlen, J., de Dios Pont, J., Mentus, C., Chang, S., Wang, S., & Porter, M.,*, Accepted in *Network Science (2022)*, arXiv:1908.09440.

[10] **On Sparsity in Overparametrised Shallow ReLU Networks**, *de Dios Pont, J.& Bruna, J.*, Preprint (2020), arXiv:2006.10225.

## Talks

### Research talks (grouped by topic)

**Sampling from Log-Concave distributions**

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|---|---|
| Jan 2024 | HCM Bonn |
| May 2023 | Rochester |
| Feb 2023 | NYU Courant (Mathematics) |
| Dec 2022 | Microsoft Research Theory Seminar |
| Nov 2022 | NYU Courant (Computer Science) |

**Interactions between decoupling, fractals sets, and additive combinatorics**

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| Nov 2023 | NTNU Analysis and PDE seminar |
| Oct 2022 | Stanford Universitym Analysis and PDE Seminar |
| Sep 2022 | University of Minnesota PDE Seminar |
| Mar 2022 | Bilbao Analysis and PDE |
| Mar 2022 | UAB Analysis Seminar |
| Feb 2022 | University of Bristol's Analysis and Geometry Seminar |
| Oct 2021 | UK Virtual Harmonic Analysis Seminar |

**Decoupling for Cantor sets on the parabola**

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| Feb 2022 | Workshop on Harmonic analysis, Singular Integrals and PDEs (HIM, Bonn) |
| Mar 2021 | Fourier restriction online 2021 |

**Uniformly bounding operators defined by polynomial curves**

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| Mar 2022 | ETHZ Analysis Seminar |
| Aug 2021 | Probability and analysis webinar |
| Feb 2021 | UC Davis Student-Run Analysis and PDE |
| Dec 2020 | Online Analysis Research Seminar |
| Nov 2020 | Seminari d'Anàlisi UB-UAB |

**Sparsity in Overparametrised Shallow ReLU Networks**

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| Oct 2020 | NYU, Math and Data Group Meeting |

### Expository talks

**The sensitivity theorem**

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| Oct 2022 | Stanford Kiddie Colloquium |
| Jun 2022 | AIM Workshow Talk |

Nov 2021   UCLA Participating Analysis Seminar
**Decoupling with applications from PDEs to Number Theory.**
Jun 2023   Microsoft Research Foundations Seminar
Oct 2020   SIMBa seminar, UB / Barcelona graduate school of mathematics
*Talks are grouped by topic, even when the covered material changed between instances.*

## Research Visits

Oct. 2022   **Stanford University**, *Visiting Eugenia Malinnikova*, October 17-28 2022.

Sept. 2022   **University of Minnesota**, *Visiting Svitlana Mayboroda*, September 7-28 2022.

March 2022   **ETHZ**, *Visiting Joao P. Ramos*, (March 14th - 19th 2022).

March 2022   **Basque Center for Applied Mathematics**, *Visiting Mateus Costa da Sousa.*, (March 8th - 14th 2022).

Jan.- March 2022   **Hausdorff Research Institute for Mathematics (Bonn)**, *Interactions between Geometric measure theory, Singular integrals, and PDE*, (January 23rd - March 5th).

May-August 2021   **Hausdorff Research Institute for Mathematics (Bonn)**, *Harmonic Analysis and Analytic Number Theory Trimester Program*, (May 5th – June 26th and August 1st - August 20th).

Aug-Sept 2019   **NYU Center for Data Science**, *Visiting Joan Bruna..*

## Teaching assistant duties

*Teaching assistant duties correspond to 1-2 hours per class per week, plus grading part of the homework.*

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| ○ **Math 32A** | Fall '20, Winter '21 | | ○ **Math 131A** | Fall '20, Spring '22 (2x) |
| ○ **Math 32B** | Winter '21 | | ○ **Math 134** | Fall '21 |
| ○ **Math 33B** | Spring '21 | | ○ **Math 135** | Fall '21 |

## Undergraduate research experience

2017   **GNAM**, *Grup de Nanomaterials, UAB*.
Research on the GNAM phyisics Group. Designed experiments to measure heat conduction beyond the scope of the Fourier equations at the Nanoscale, with a focus on the KCM diffusion model. At the moment the designed experiments are being performed in GNAM.

2016   **ICFO**, *Summer Fellowship of the Institute of Photonic Sciences*.
Research fellow in the group of Antonio Acín (Quantum Information). The main focus of my research was the creation of supperpositions of unknown quantum states. I proved that such creation is impossible even under more general circumstances that it was previously known, and studied the situation where more than one copy is given. Supervisor: Dr. Michal Oszmaniec

2015   **The Dark Energy Survey Project**, *IFAE- Institute for High Energy Physics*.
Short time intern in the Dark Energy Survey Project. My main goal was to perform numerical computations in python, in order to study the soundness of theoretical models regarding the harmonic spectrum of galaxy density distributions. Supervisor: Dr. Ramon Miquel