

# PAULA GARCÍA MOLINA

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## WORK EXPERIENCE

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October 2020 - Now | PhD Student at the QUINFOG group of the Institute of Fundamental Physics (IFF-CSIC)

## EDUCATION

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Sept. 2019 - Sep. 2020 | MSc QUANTUM SCIENCE AND TECHNOLOGY,  
University of the Basque Country  
*Thesis:* Noise in Digital and Digital-Analog Quantum Computation.

Sept. 2015 - July 2019 | BSc IN PHYSICS,  
University of Córdoba  
*Thesis:* Introducción a la computación cuántica: Implementación básica y aplicaciones (Introduction to quantum computation: Basic implementation and applications).

## PUBLICATIONS AND PREPRINTS

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P. García-Molina, L. Tagliacozzo, and J. J. García-Ripoll. Global optimization of MPS in quantum-inspired numerical analysis [arXiv:2303.09430](https://arxiv.org/abs/2303.09430) [quant-ph] (2023)

P. García-Molina, J. Rodríguez-Mediavilla, and J. J. García-Ripoll. Quantum Fourier analysis for multivariate functions and applications to a class of Schrödinger-type partial differential equations, *Phys. Rev. A* **105**, 012433 (2022).

P. García-Molina, A. Martin, and M. Sanz. Noise in Digital and Digital-Analog Quantum Computation, [arXiv:2107.12969](https://arxiv.org/abs/2107.12969) [quant-ph] (2021).

## GRANTS AND SCHOLARSHIPS

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Sept. 2022  
- Dec. 2022 | AYUDAS COMPLEMENTARIAS DE MOVILIDAD DESTINADAS A BENEFICIARIOS DEL PROGRAMA DE FORMACIÓN DEL PROFESORADO UNIVERSITARIO (FPU),  
Ministerio de Educación y Formación Profesional  
Financial aid for a 3-month stay at a foreign investigation center during the PhD.

Oct. 2020  
- Now | FPU GRANT,  
Ministerio de Educación y Formación Profesional  
*Thesis:* Métodos cuánticos para análisis numérico (Quantum methods for numerical analysis).

Sept. 2019  
- Sept. 2020 | MSc SCHOLARSHIP,  
University of the Basque Country  
Financial aid for the realization of a MSc. which is awarded based on the academic record.

Nov. 2018  
- July 2019 | BECA DE COLABORACIÓN,  
Ministerio de Educación y Formación Profesional  
*Project:* Introducción a la computación cuántica: Implementación básica y aplicaciones (Introduction to quantum computation: Basic implementation and applications).

July 2018	UCOGLOBAL SUMMER SCHOLARSHIP, University of Córdoba Scholarship to assist to the “International summer academy in engineering for women (ISAEW4)” at the University of Applied Sciences FHOÖ UPPER AUSTRIA (WELS, AUSTRIA).
July 2014	PAD (PÄDAGOGISCHER AUSTAUSCHDIENST) SCHOLARSHIP, Pädagogischer Austauschdienst Scholarship granted by the German Government due to the excellence in the academic records for a month-long stay to enhance the knowledge of the German language and its culture, together with the socialization with multicultural groups formed by students of different nationalities.
August 2012	PROGRAMA “RECUPERACIÓN Y UTILIZACIÓN EDUCATIVA DE PUEBLOS ABANDONADOS, Ministerio de Educación y Formación Profesional Scholarship granted due to the excellence in the academic records for the rehabilitation of abandoned towns promoting the respect of the environment and the social harmony.

## AWARDS

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Dec. 2019	HONOURABLE MENTION “DEEP IN QUANTUM” IN BILBAO’S QUANTUM COMPUTING HACKATHON, University of the Basque Country, Innolab, IBM Honourable mention in the category “Deep in Quantum” in Bilbao’s Quantum Computing Hackathon for the project Quantum Artificial Life.
Dec. 2019	PREMIO EXTRAORDINARIO DE FIN DE GRADO, University of Córdoba Award to the best academic record of the class of 2019 of the Physics Degree at the University of Córdoba.
April 2019	SECOND PLACE AT THE CONTEST “MI FÍSICA FAVORITA”, University of Córdoba Initiative of the group FQM-378 funded by “Plan Propio de Investigación de la Universidad de Córdoba” to draw attention to the role of the women in the development of important advances in Physics.

## RESEARCH VISITS

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Sept. 12 - Dec. 10	MAX PLANCK INSTITUTE FOR QUANTUM OPTICS (MPQ), THEORY DIVISION (GARCHING BEI MÜNCHEN, GERMANY)
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## COURSES

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Sept. 27 - Oct. 1 2021	EUROPEAN TENSOR NETWORK ICCUB SCHOOL 2021, “TENSOR NETWORK BASED APPROACHES TO QUANTUM MANY-BODY SYSTEMS ICCUB SCHOOL 2021” Instituto de Ciencias del Cosmos (ICCUB)
Feb. 4 - June 30. 2021	INTRODUCTION TO DATA MINING AND MACHINE LEARNING FOR DOCTORATE STUDENTS AND FUTURE RESEARCHERS, Autonomous University of Madrid
Oct. 2020 - Dec. 2020	SUPERCONDUCTING CIRCUITS, Quantum Information and Foundations Group (QUINFOG)

Sept. 27 - Oct. 1 2021	EUROPEAN TENSOR NETWORK ICCUB SCHOOL 2021, "TENSOR NETWORK BASED APPROACHES TO QUANTUM MANY-BODY SYSTEMS ICCUB SCHOOL 2021" Instituto de Ciencias del Cosmos (ICCUB)
Feb. 4 - June 30. 2021	INTRODUCTION TO DATA MINING AND MACHINE LEARNING FOR DOCTORATE STUDENTS AND FUTURE RESEARCHERS, Autonomous University of Madrid
Oct. 2020 - Dec. 2020	SUPERCONDUCTING CIRCUITS, Quantum Information and Foundations Group (QUINFOG)
Oct. 2020 - Dec. 2020	MATRIX PRODUCT STATES, Quantum Information and Foundations Group (QUINFOG)
Nov. 30 - Dec. 4 2020	IBM QUANTUM TEACH-THE-RESEARCHER, Quantum Machine Learning: Classification IBM
July 7 - July 25 2018	INTERNATIONAL SUMMER ACADEMY IN ENGINEERING FOR WOMEN (ISAEW4), University of Applied Sciences FHÖÖ UPPER AUSTRIA (WELS, AUSTRIA)

## SEMINARS AND CONFERENCES

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May 29 - June 1 2023	POSTER CONTRIBUTION: "GLOBAL OPTIMIZATION OF MPS IN QUANTUM-INSPIRED NUMERICAL ANALYSIS" Quantum Information in Spain ICE-8, Santiago de Compostela (Spain)
May 23 - May 25 2023	ORAL CONTRIBUTION: "GLOBAL OPTIMIZATION OF MPS IN QUANTUM-INSPIRED NUMERICAL ANALYSIS" Quantum Matter 2023, Madrid (Spain)
May 11 2023	SEMINAR: "GLOBAL OPTIMIZATION OF MPS IN QUANTUM-INSPIRED NUMERICAL ANALYSIS" Seminar of the Quantum Group @ UGent (Department of Physics and Astronomy, Ghent University), Ghent (Belgium) (online)
November 16 2022	SEMINAR: "QUANTUM AND QUANTUM-INSPIRED ALGORITHMS FOR NUMERICAL ANALYSIS" Theory Seminar of the Max Planck Institute for Quantum Optics (MPQ) Theory group, Garching bei München (Germany)
March 6 - March 10 2022	PARTICIPATION IN FOCUS WEEK ON TENSOR NETWORKS AT ICMAT, MADRID, (SPAIN)
October 17 - October 18 2022	PARTICIPATION IN THE WORKSHOP OF THE THEORY DIVISION OF THE MAX PLANCK INSTITUTE OF QUANTUM OPTICS, UMHAUSEN (AUSTRIA)
July 11 - July 15 2022	ORAL CONTRIBUTION: "QUANTUM FOURIER ANALYSIS FOR MULTIVARIATE FUNCTIONS AND APPLICATIONS TO A CLASS OF SCHRÖDINGER-TYPE PARTIAL DIFFERENTIAL EQUATIONS" XXXVIII Biennial of Physics of the RSEF, Murcia (Spain)

June 27 - June 29 2022	POSTER PRESENTATION: "QUANTUM AND QUANTUM-INSPIRED ALGORITHMS FOR NUMERICAL ANALYSIS", International Quantum Tensor Network Inaugural Meeting, London (United Kingdom)
May 13 2022	INVITED TALK: "INTRODUCCIÓN A LA COMPUTACIÓN CUÁNTICA. IMPLEMENTACIÓN DE ALGORITMOS CUÁNTICOS Y APLICACIONES", SalmorejoTech, Córdoba (Spain)
Jan. 26 2022	SEMINAR: "QUANTUM FOURIER ANALYSIS FOR MULTIVARIATE FUNCTIONS AND APPLICATIONS TO A CLASS OF SCHRÖDINGER-TYPE PARTIAL DIFFERENTIAL EQUATIONS", University of Salamanca, Salamanca (Spain)
Jan. 26 2022	SEMINAR (TEACHING COLLABORATION): "RESOLVIENDO ECUACIONES DIFERENCIALES EN ORDENADORES CUÁNTICOS", University of Salamanca, Salamanca (Spain)
Nov. 29 - Dec. 3 2021	POSTER PRESENTATION: "VARIATIONAL QUANTUM ALGORITHM FOR EIGENVALUE PROBLEMS OF A CLASS OF SCHRÖDINGER-TYPE PARTIAL DIFFERENTIAL EQUATIONS", European Quantum Technologies Conference (EQTC) (online)
Oct. 17 - Oct. 22 2021	POSTER PRESENTATION: "VARIATIONAL QUANTUM ALGORITHM FOR EIGENVALUE PROBLEMS OF A CLASS OF SCHRÖDINGER-TYPE PARTIAL DIFFERENTIAL EQUATIONS", IEEE Quantum Week 2021 (QCE21) (online)
Sept. 27 - Oct. 2 2021	POSTER PRESENTATION: "QUANTUM FOURIER ANALYSIS FOR MULTIVARIATE FUNCTIONS AND APPLICATIONS TO A CLASS OF SCHRÖDINGER-TYPE PARTIAL DIFFERENTIAL EQUATIONS", European Tensor Network ICCUB School 2021, "Tensor network based approaches to quantum many-body systems ICCUB school 2021", Barcelona (Spain)
July 19 - July 23 2021	POSTER PRESENTATION: "VARIATIONAL QUANTUM ALGORITHM FOR EIGENVALUE PROBLEMS OF A CLASS OF SCHRÖDINGER-TYPE PARTIAL DIFFERENTIAL EQUATIONS", Munich Conference on Quantum Science and Technology (MCQST2021) (online)
July 15 2021	SEMINAR: "VARIATIONAL QUANTUM ALGORITHM FOR EIGENVALUE PROBLEMS OF A CLASS OF SCHRÖDINGER-TYPE PARTIAL DIFFERENTIAL EQUATIONS", Quantum science seminar 56: hot topics
July 5 - July 9 2021	ORAL CONTRIBUTION: "VARIATIONAL QUANTUM ALGORITHM FOR EIGENVALUE PROBLEMS OF A CLASS OF SCHRÖDINGER-TYPE PARTIAL DIFFERENTIAL EQUATIONS", Machine Learning for Quantum X (MLQX) 2021 (online)
May 10 - May 14 2021	ORAL CONTRIBUTION: "SOLVING PARTIAL DIFFERENTIAL EQUATIONS IN QUANTUM COMPUTERS", Quantum Information in Spain ICE 6 (online)
May 3 2021	SEMINAR: "SOLVING PARTIAL DIFFERENTIAL EQUATIONS IN QUANTUM COMPUTERS", IQM Germany GmbH (online)
April 20 2021	SEMINAR: "SOLVING PARTIAL DIFFERENTIAL EQUATIONS IN QUANTUM COMPUTERS", Quantum Information and Foundations Group (QUINFOG)

## MANAGEMENT AND CONFERENCE ORGANIZATION

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July 4- July 7 2023		QUANTUM TECHNOLOGIES FOR YOUNG RESEARCHERS (QTYR) WORKSHOP
May Today		INSTITUTE OF FUNDAMENTAL PHYSICS' COORDINATOR OF CSIC'S PHD NETWORK
2022-Today		MEMBER OF THE ORGANIZATION OF THE PHD AND YOUNG RESEARCHERS IN QUANTUM TECHNOLOGIES (PYSQT) NETWORK

## SKILLS

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**Operating Systems:** Windows, Linux.

**Programming languages:** Python, Matlab, Fortran90.

**Office Software:** Latex, Microsoft Office, LibreOffice.

**Languages:** Spanish (mother tongue), English (advanced), German (intermediate), Chinese (elementary).

**Oral skills:** Debate.

## CERTIFICATES

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IBM Certified Associate Developer - Quantum Computation using Qiskit v0.2X.

Certificate in Advanced English (CAE).

Goethe-Zertifikat B2.

Hanyu Shuiping Kaoshi (HSK) 2.

## SCIENTIFIC DISSEMINATION

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April 20 2023	PARTICIPATION IN "DESAYUNA CON EL CSIC" AT THE EMPLOYMENT FORUM AT THE COMPLUTENSE UNIVERSITY OF MADRID, MADRID (SPAIN),
March 29 2023	DISSEMINATION TALK AT 4 <sup>o</sup> E.S.O. + EMPRESA AT IFF-CSIC, MADRID (SPAIN), Program for high school students to get to know a real work environment.
February 11 2023	PARTICIPATION IN CSIC'S VIDEO FOR THE INTERNATIONAL DAY OF WOMEN AND GIRLS IN SCIENCE,
July 23 2022	TALK: "COMPUTACIÓN CUÁNTICA. UN PARADIGMA REVOLUCIONARIO", II Ciclo de Conferencias Científicas de Peñarroya-Pueblonuevo, Peñarroya-Pueblonuevo (Spain) Scientific dissemination about the basis of quantum computing.
March 9 2022	TALK: "MUJERES EN CIENCIA", I. E. S. Nicolás Copérnico, Écija (Spain) Talk about the role of women in science and my personal experience as a women in STEM.
Feb. 25 2022	WOMEN IN SCIENCE (WINS) 2022, I. E. S. La Caleta, Cádiz (Spain) Q& A about quantum computing and my personal experience as a women in STEM.
2022-2023	"APRENDIENDO COMPUTACIÓN CUÁNTICA JUGANDO CON QISKITBLOCKS", Spanish high schools Activity of CSIC's catalogue aimed to high school students to learn quantum computing through the game QiskitBlocks.
Nov. 10 2021	WEEK OF SCIENCE OF MADRID, Fundación para el conocimiento Madrid, Madrid (Spain) Activities "Aprendiendo computación cuántica jugando con QiskitBlocks" and "Toda información es física. De la computación clásica a la cuántica".
April 2018, April 2019	PASEO POR LA CIENCIA, Asociación Profesorado de Córdoba por la Cultura Científica (APCCC), Córdoba (Spain) Activity to promote the scientific dissemination in the city of Córdoba by means of accessible experiments and explanations provided by students of different levels.

## OTHER MERITS

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Mentor at the IBM quantum challenge fall 2022.

Qiskit advocate (2022-2023).

Teaching of 120 hours in the subjects "Técnicas experimentales I" of the Bachelor in Physics at the Autonomous University of Madrid (Spain).

Presenter at the CSIC's iMOVE launching (24th January 2023).

## OTHER INTERESTS

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Basketball playing (2002-2019).