JULIÁN GARCÍA PARDIÑAS

Senior Researcher | Research and Development | Machine Learning | Computer science | Address complex challenges

+41 79 596 24 90 julian.garcia.pardinas@gmail.com
https://www.linkedin.com/in/julian-garcia-pardinas
https://www.juliangarciapardinas.com Geneva

SUMMARY

As an AI Research Scientist and Machine Learning expert with over a decade of experience at CERN, I specialize in analyzing and designing complex systems, driven by a passion for solving challenging problems. I have led pioneering research within a large-scale collaboration of 1,000+ international researchers and played a leading role in ML initiatives at CERN, including Reinforcement Learning with human-in-the-loop for task automation and Graph Neural Networks for high-dimensional event reconstruction. With a PhD in Particle Physics, I bring top-level expertise in big data mining, statistical data analysis, and software R&D, having contributed to 400+ publications in top-tier journals. My technical knowledge spans sensor technology, kinematics, dynamics, electromagnetism and electronics, providing a comprehensive foundation for AI-driven innovation. Additionally, my deep interest in human cognition enriches both my AI research and my approach to mentoring and guiding multidisciplinary research teams.

Seeking a full-time position where I can apply my expertise in ML and complex systems modeling to develop large-scale AI solutions that enhance human interaction with technology. My focus is on augmented intelligence, cognitive AI, and seamless human-AI integration, applied to fields like robotics, augmented reality, and smart wearable devices. I am committed to ensuring the responsible development of AI, with a strong emphasis on bias understanding and mitigation, contributing to innovations that enhance human capabilities and societal well-being.

AWARDS

Earned 3 prestigious research grants via competitive tendering processes, funding novel research projects that I had designed:

- Senior Research Fellowship, awarded by CERN: CHF200K for 2 years.
- Marie Curie Fellowship, awarded by the European Commission of Research: €170K for 2 years.
- FPU Fellowship, awarded by the Government of Spain: €70K for 4 years.

EXPERIENCE

Senior Researcher
10/2022 - Present

Cern
Geneva, Switzerland

- ***Multi-Agent Systems:*** Spearheaded a multi-agent reinforcement learning project with a human-in-the-loop approach to optimize data quality monitoring tasks in dynamic regimes at the Large Hadron Collider (LHC).
- ***Interdisciplinary Collaboration:*** Initiated and coordinated research groups of ~70 physicists, 2 computer scientists, 1 data scientist, 1 ML engineer and 2 mathematicians to develop innovative solutions to complex problems.
- ***Leadership in ML***: Co-coordinator of the CERN Inter-Experimental ML Working Group (IML), overseeing ML initiatives across 4 experiments and involving a community of 10K researchers. Role details here. Steering-board member of the European Coalition for AI in Fundamental Physics (EuCAIF), helping create a quickly evolving network of 200+ ML multi-disciplinary researchers across Europe.
- ***AI and Physics Conferences:*** Co-organized 4 international conferences and workshops with 200+ participants each. This includes the EUCAIFCon conference, that fostered interdisciplinary collaboration between AI and physics communities at the European level.
- ***Research Presentations:*** Delivered 18 public seminars and research talks and 400+ internal/private talks within LHCb to diverse audiences at CERN and international conferences, including a well-received seminar on ML advancements at the LHCb CERN experiment. Seminar recording.

Marie Curie Research Fellow
10/2020 - 09/2022

University of Milano-Bicocca
Milan, Italy

- ***Independent Research***: Conducted independent research on the application of ML to fundamental physics, with a focus on graph neural networks for event reconstruction.
- ***Prototyping and Experimentation***: Developed 2 algorithm prototypes and 2 open source software packages, besides having contributed significantly to the internal software of the LHCb experiment. Designed a new type of physics simulation, created open datasets with it, and conducted experiments to simulate real-world scenarios.
- ***Funding and Project Management***: Secured €170K funding through competitive European Commission grants, managing all aspects of research projects, including resource planning, timeline management, and milestone setting. Grant details.
- ***Graph Neural Networks***: Led the development of graph neural network-based algorithms for high-dimensional event reconstruction in particle physics, pushing the boundaries of existing methodologies.

Postdoctoral Researcher / Research Assistant
02/2018 - 09/2020

University of Zürich
Zürich, Switzerland

- ***Algorithm Development:*** Developed advanced statistical tools and machine learning algorithms to enhance research procedures within the LHCb experiment.
- ***Teaching and Supervision***: Co-supervised 1 PhD thesis, 3 MSc theses and 2 student projects. Guided the work of 13 students up to the PhD level and 8 postdoctoral researchers. Accumulated 100+ hours of teaching and coordinated exercise classes and exams for 3 B.Sc. courses on Physics.
- ***International Research:*** Collaborated with international teams on high-impact research, advancing particle physics and ML. Attended 2,300+ research-related meetings, organizing or chairing 900+ of them. Worked with researchers from 20+ universities and 14+ nationalities.

PUBLICATIONS

Human-in-the-loop Reinforcement Learning for Data Quality Monitoring in Particle Physics Experiments
2024

Under review

O. Jullian Parra, J. García Pardiñas, L. Del Pianta Pérez, M. Janisch, S. Klaver, T. Lehéricy, N. Serra.

https://arxiv.org/abs/2405.15508

AWARDS

- **Selected as co-coordinator of the CERN Inter-experiment Machine Learning Working Group**
  Recognized by the LHCb collaboration management as the leading expert on ML/AI within the LHCb collaboration at CERN, which comprises over 1,000+ international researchers.
- **National Prize for Best Thesis in Experimental Particle Physics**

SKILLS

Adaptability
Continuous learning, staying updated with advancements in ML, AI, and Physics.

Research Methodology
Designing and conducting experiments, developing prototypes, implementing state-of-the-art techniques.

Problem-Solving
Tackling complex technical problems, developing innovative solutions, applying ML to real-world challenges.

Mathematics and Optimization
Advanced statistics, linear algebra, calculus, optimization methods.

Communication
Clear and effective presentation of complex concepts, interdisciplinary collaboration, public speaking.

Leadership
Project management, leading international and multi-disciplinary research teams, mentoring students and early-career researchers.

Machine Learning
Deep Learning, Computer Vision, Reinforcement Learning, Representational Learning, Supervised and Unsupervised Learning, Hyperparameter Optimisation.

Data Science
Statistical Data Analysis, Big Data, Data Mining, Feature Engineering, Pattern recognition.

Software Development
Python, C++, Tensorflow, PyTorch, Cuda, Docker, Git, Cloud Computing.

PUBLICATIONS

GNN for Deep Full Event Interpretation and hierarchical reconstruction of heavy-hadron decays in proton-proton collisions — 2023

Comput Softw Big Sci

J. García Pardiñas, M. Calvi, J. Eschle, A. Mauri, S. Meloni, M. Mozzanica, N. Serra.

https://link.springer.com/article/10.1007/s41781-023-00107-8

RooHammerModel: interfacing the HAMMER software tool with the HistFactory package — 2022

Journal of Instrumentation

J. García Pardiñas, S. Meloni, L. Grillo, P. Owen, M. Calvi, N. Serra.

https://iopscience.iop.org/article/10.1088/1748-0221/17/04/T04006

Full List of 400+ Publications

https://orcid.org/0000-0003-2316-8829

EDUCATION

PhD in Nuclear and Particle Physics — 06/2018
Universidade de Santiago de Compostela — Spain

- Thesis: *Search for flavour anomalies at LHCb: decay-time-dependent CP violation in Bs0 → (K+π−)(K−π+) and Lepton Universality in B0 → D(*)+l−ν.* Awarded the National Prize for Best Thesis.

MSc in Nuclear and Particle Physics — 07/2014
Universidade de Santiago de Compostela — Spain

- Graduated top of the class

B.Sc. in Physics — 08/2013
Universidade de Santiago de Compostela — Spain

- Graduated top of the class

CERTIFICATIONS AND QUALIFICATIONS

Microsoft Azure
Cloud Computing Fundamentals, 2024

Inclusive Teamwork Management
Thriving talent company in collaboration with the IHCB experiment management, *CERN, Switzerland, 2021*

6th Machine Learning in High Energy Physics (MLHEP) Summer School
Yandex School of Data Analysis in collaboration with EPFL, 2020

LANGUAGES

Spanish	Native	Galician	Native
English	Proficient	French	Advanced
Italian	Intermediate	German	Beginner