Sebastià Agramunt Puig

Interests & Contact Information

As a Software and Artificial Intelligence Engineer with a PhD in Theoretical Physics, I bring eight years of diverse industry experience. My academic endeavors are detailed in my ORCID profile, illustrating a deep-seated foundation in scientific research, analysis, and innovative problem-solving. I specialize in tackling sophisticated challenges using advanced mathematical techniques and the integrated application of software engineering, machine learning, and artificial intelligence principles. I thrive in collaborative settings, preferring to work within small to mid-sized teams, yet I am equally adept at navigating projects independently. In leadership roles, such as Tech Lead, I have directed small teams towards achieving collective objectives and ensuring the successful completion of projects. For more information about my professional journey, personal projects and interests, or to get in touch, please visit my website at agramunt.me or email me at contact[at]agramunt[dot]me.

Education

2010-203 **PhD in Physics** *Universitat Autònoma de Barcelona (UAB)*, Bellaterra, Barcelona, Catalonia, Spain.
Developed novel algorithms and made numerical simulations for two applications: Magnetic levitation with superconductors and magnetic recording with magnets at the nanoscale. Graduated with highest distinction *Cum Laude*. For further details download the dissertation from the public repository TDX.

2009-2010 **M.S. Science and Technology of Materials.** *UAB.*

2005-2009 **B.S. in Physics.** *UAB.*

Experience

Mar 2025. Present **Staff Software Engineer** *Eikon Therapeutics*, Hayward, California, US.
Eikon Therapeutics, a drug discovery firm, utilizes advanced single molecule tracking technology developed by Nobel Laureate Prof. Eric Betzig and collaborates closely with the University of Berkeley. Having a production capacity of more than one terabyte of data per day, the company is at the forefront of high-throughput compound screening.
Focused on high-performance computing for drug discovery. Lead a team of two. Implemented software for detection and localization (DL) of proteins in images using GPU hardware (C++ and CUDA) and created Python bindings to run in production. Achieved 1000x speedup in particle detection. Build tools to compare and benchmark DL algorithms with ground-truth simulated data (previous role).

Jan 2021. Feb 2025 **Senior Software Engineer** *Eikon Therapeutics*, Hayward, California, US.
As an early member of the software team, my roles have been diverse: analyzing cell imagery from experiments, enhancing our software pipeline for high-throughput analysis, standardizing tests, dockerizing projects, and automating private PyPI deployments. I've implemented a comprehensive MLOps platform for model training, testing, and deployment, developed software for simulating protein Brownian motion, and ported functionalities to C++ for efficiency.

Jan 2021. June 2021 **Privacy Preserving AI Researcher Contractor (Remote)** *Neurocat*, Berlin, Germany.
Co-authored a comprehensive report on the current state of the art in privacy-preserving machine learning as a contractor for Neurocat. This collaboration was with the Federal Office for Information Security, the primary public institution regulating IT security in Germany. The research primarily focused on threats associated with transfer learning, specifically investigating poisoning methods such as backdoor and adversarial attacks.

Nov.2018 Aug. 2020 **AI Engineer and Privacy Preserving Machine Learning Lead** *Telefónica Alpha*, Barcelona, Spain.

Initiated and led the company's Privacy Preserving Machine Learning (PPML) initiative from scratch. Acquired a deep understanding of the mathematics behind techniques such as Differential Privacy, Secure Multi-Party Computation (SMPC), and Fully Homomorphic Encryption (FHE). Developed a proof of concept for Federated Learning with Secure Aggregation (a SMPC technique) and guided a small team to evolve this concept into a functional product for mobile phones. In addition to these responsibilities, I performed other duties including refactoring code to transition a neural collaborative filtering recommender system into production.

March.2020 Aug. 2020 **Research Scientist** *OpenMined*, Remote.

Contributed to privacy-preserving machine learning research for the OpenMined community. Developed an "Introduction to Cryptography" MOOC, focusing on mathematical foundations and Python implementations, attracting over 7,000 students worldwide. Research also encompassed secure inference on secretly shared machine learning models, with a particular focus on activation function approximation within algebraic rings.

Jul.2016 Oct.2018 **Artificial Intelligence and Algorithmics** *Shotl*, Barcelona, Spain.

Shotl is an application designed for ride-sharing with passengers who have similar travel routes. In my role at Shotl, I was responsible for creating the routing algorithm from scratch, which involved an extensive review of scientific literature and the development of fast, reliable software for the algorithm's deployment. Additionally, I analyzed urban demand patterns using machine learning techniques and developed a simulator to assess the performance of the routing algorithms. As the fourth employee, I played a significant role in the company's growth, contributing to its acquisition by Swvl and its eventual listing as a publicly traded company on NASDAQ in 2022.

Jul.2015 Jul.2016 **Data Science Consultant** *Accenture Digital*, Sant Cugat (Barcelona), Spain.

Utilized ARIMA family models for sales forecasting in various markets for a large cosmetics firm. Created and managed a PostgreSQL database, handling data in various formats such as CSV and Excel. Developed automation scripts in Bash and R, integrated with CRON jobs to streamline data loading processes.

Jan.2015 March.2015 **Fellow Data Science Europe** *(DSE)*, Dublin, Ireland.

Acquired fundamental skills in data science, covering SQL, Hive, R, and various machine learning models. Applied this knowledge to analyze New York City taxi data, aiming to predict pickup probabilities based on time and location within Manhattan. The analysis primarily employed Bayesian statistics and nonlinear models, such as Random Forest.

Nov.2014 Dec.2014 **Postdoctoral Position** *Catalan Institute for Nanoscience and Nanotechnology (CIN2)*, Bellaterra, Barcelona, Catalonia, Spain.

Nov.2013 July.2013 **Postdoctoral Position** *UAB, Physics Department, Group of Smart Nanoengineered materials, Nanomechanics and Nanomagentism (GNM3)*, Bellaterra, Barcelona, Catalonia, Spain.

Others

2009-2013 **Teaching Assistant.** *UAB*, Bellaterra, Barcelona, Catalonia, Spain.

Teach experimental physics to students of second year in physics degree.

Scientific Divulgation..

Always commited to share science and technology advancements: Acitve colaborator of CienciaProp giving talks and writing a paper about levitation. Also collaborated to *Dissabtes de la física*, an initiative from UAB to explain physics to high school students.

Peer-Review.

Actively reviewing papers for Cognitive Systems Research journal.

Tech stack

Languages	C/C++, CUDA, Go
Scripting	Python, BASH, R
Databases	Postgresql, MongoDB, Redis
CI/CD	Github Actions, Atlassian Bamboo, Jenkins
MLOps	Metaflow, Airflow, ZenML
Visualization	Gnuplot, Ggplot, Matplolib

Data	Numpy, scikit-learn, Pandas, Polars, Torch, Keras
Other Tools	Docker, Git, Pybind11

Scientific experience

Selected publications (see full list here)

- **Modeling the collective magnetic behavior of highly-packed arrays of multi-segmented nanowires** S. Agramunt-Puig, N. Del-Valle, E. Pellicer, J. Zhang, J. Nogués, C. Navau, A. Sanchez and J. Sort New J. Physics **18**, 013026 (2016).
- **New Reversal Mode in Exchange Coupled Antiferromagnetic / Ferromagnetic Disks: Distorted Viscous Vortex** D. A. Gilbert, L. Ye, A. Varea, S. Agramunt-Puig, N. Del-Valle, C. Navau, J. F. Lopez-Barbera, K. Buchanan, A. Hoffmann, A. Sanchez, J. Sort, K. Liu and J. Nogués Nanoscale **7**, 9878-9885 (2015).
- **Magnetic vortex evolution in self-assembled $La_{0.7}Sr_{0.3}MnO_3$ nanoislands under in-plane magnetic field** J. Zabaleta, M. Jaafar, A. Asenjo, S. Agramunt-Puig, N. Del-Valle, C. Navau, A. Sanchez, T. Puig, X. Obradors and N. Mestres APL Mater. **2**, 076111 (2014).
- **Imprinting magnetic skyrmions in thin films by ferromagnetic and superconducting templates** N. Del-Valle, S. Agramunt-Puig C. Navau and A. Sanchez. Appl. Phys. Lett. **107**, 133103 (2015).

Patents

- **An Automatic On-Demand Multi-Passenger Ride Sharing Computer-Implemented Method, Computer Program and System** Sebastia Agramunt Puig, Aitor Lagunas Fernandez European Patent Office **EP**3471051A1, (2019).