Giacomo Bighin

Machine Learning Engineer, Data Scientist

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Italian

About me

Machine learning engineer/Data scientist with a strong background in programming and artificial intelligence, built through a PhD in theoretical/computational quantum physics and further 6 years of experience as an academic researcher.

More recently, I acquired commercial experience through the *Science to Data Science* bootcamp, an intensive program designed to assist academics transfer their skills to data science.

Social

linkedin.com/in/bighin

github.com/bighin

Languages

Italian ●●●●●

English ●●●●●

German ●●○○○

Croatian ●○○○○

Professional experience

March 2023 – April 2023
Data Science/Machine Learning Consultant
Data for Children Collaborative with UNICEF

I worked as a consultant with partners at UNICEF, the Giga Initiative and DFCC on developing a **deep-learning computer vision** model to reconstruct buildings heights from satellite imagery, aiming at connecting schools in remote regions of developing countries to the Internet via radio-link.

November 2022
S2DS (Science to Data Science) Fellow
Pivigo ltd., London, UK

Science to Data Science (S2DS) is an intensive five-week **data science** course, aimed at academics who want to transition to industry, working in a small team with an industry partner on a real commercial data science problem.

November 2020 – October 2022
Research associate
Institute for Theoretical Physics and
STRUCTURES Excellence Cluster
University of Heidelberg, Germany

While in Heidelberg I focused on the statistical mechanics of complex systems. How do collective phenomena and complexity emerge from very simple physical rules? Specifically, I studied by means of Monte Carlo simulations and **machine learning/computer vision** tools critical phenomena on lattices and on complex networks.

September 2016 – October 2020
Research associate and **Lise Meitner Fellow**
Institute of Science and Technology Austria

At ISTA I investigated the quantum properties of a molecule in a solution. How are the molecular energy levels modified by the environment? How will the molecule react to an external perturbation? I developed novel analytical and computational – **Markov chain Monte Carlo** – approaches to answer these questions, that are essential in understanding how molecules can be used as building blocks for **quantum computers**.

Education

2012 – 2016
PhD in Physics
University of Padua, Italy
Awarded on April 4th, 2016. Dissertation topic: *"Mean field and fluctuations for fermionic systems: from ultracold Fermi gases to cuprates"*. Advisor: Luca Salasnich.

2009 – 2012
M.Sc. in Physics
University of Padua, Italy
With highest honors, September 2012.

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Technical skills

Programming languages:

- Excellent knowledge (10+ years): C, Wolfram Mathematica, bash
- Very good knowledge (5+ years): C++, Python
- Beginner knowledge (∼1 year): Haskell, SQL

10+ years experience in **Monte Carlo techniques** and scientific computing.

10+ years experience in **data analysis** and **data visualization**.

Advanced knowledge of standard **data-science** and **machine-learning** libraries and tools for Python: PyTorch, TensorFlow, pandas, scikit-learn, XGBoost, Jupyter Notebook.

Very good knowledge of **distributed/parallel computing interfaces** (OpenMP and MPI), of workload managers for **high-performance computing** clusters (SLURM), as well as of **cloud computing** platforms (AWS).

Very high familiarity with **UNIX**-like operating systems, especially Linux and macOS.

Transferable skills

Extensive experience in **scientific and technical writing** – having 23 published peer-reviewed papers, among which 3 Physical Review Letters – a complete list can be found at my website http://bigh.in

Strategical thinking: very successful track record in **writing proposals** for competitive research funding. Scholarships and individual grants I received sum up to ∼210,000€, including a prestigious Lise Meitner Fellowship of the Austrian Science Fund (FWF).

Excellent **communication skills**: I have given 25 invited or contributed talks at international conferences or at research institutions.

Teaching, supervising, project management: while at ISTA I co-supervised two graduate students and two interns; I have extensive teaching experience, for Bachelor's, Master's and Ph.D. courses.

My research received extensive **media coverage**, including from Der Standard (one of the most widely read Austrian daily newspapers), La Repubblica (one of the most widely read Italian daily newspapers), Le Scienze (the Italian edition of Scientific American), Wired Italy.

Outreach, leadership, service

I regularly volunteer for SAMI (Supporting African Maths Initiative), an NGO promoting mathematical and **scientific education in developing countries**. In this context, in summer 2019 and in summer 2022 I led educational/training projects at the African Institute for Mathematical Sciences on site in Kigali, Rwanda and Musanze, Rwanda.

I am a referee for 13 scientific journals, including Physical Review Letters and Physical Review X.