

Francesco Boccardo

Researcher in physics and AI

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Education

- Oct. 2018 – Mar. 2022 **PhD in physics**, *Institut Lumière Matière, CNRS - Université Lyon 1, France*
Thesis topic: “Model-based and model-free macroscopic control of the shape of low-dimensional systems with stochastic and deterministic dynamics”. Advisor: Olivier Pierre-Louis.
- 2015 – 2018 **Master in physics**, *Università di Milano-Bicocca, Italy* (grade: 110/110 *cum laude*)
Final dissertation: “Dewetting-induced pinching of strained solid films at the nanoscale”.
- 2012 – 2015 **Bachelor in materials science**, *Università di Milano-Bicocca, Italy* (grade: 108/110)
Final dissertation: “Study and implementation of the diffusion limited aggregation growth model”.
- 2008 – 2011 **Bachelor in industrial design**, *Politecnico di Milano, Italy* (grade: 106/110)
Final dissertation: “Ciclovatrice Bernardo: a portable washing machine for bike travel”.
Six months spent in **Erasmus** at *Universitat Politècnica de València, School of Design Engineering, Spain*.

Professional experience

- Dec. 2022 – Present **Postdoctoral researcher**, *MaLGa - Machine Learning Genoa Center, Italy*
I currently work in the PiMLB (Physics informed Machine Learning for Biological Behaviour) unit, where I apply artificial intelligence (AI) methods to biophysics, in order to model the behaviour of animals such as octopuses, sea robins and moths.
- Sept. 2021 – Jan. 2022 **Teacher of statistical analysis**, *Université Lyon 1 (École Polytechnique), France*
- Sept. 2020 – Jan. 2021 Together with another PhD student, I taught a 30-hour course on statistical analysis and probability theory for third-year materials engineering students. The course was structured in lectures, exercises and a final test consisting of a written exam and project presentations.
- Nov. 2017 – July 2018 **Internship**, *Institut Lumière Matière, CNRS - Université Lyon 1, France*
I did an internship in computational physics, in the MMCI group (Modelling of Condensed Matter and Interfaces), under the supervision of Olivier Pierre-Louis. Our work focused on the numerical modelling of solid-state dewetting.
- Oct. – Nov. 2018 **Scientific communicator**, *Festival della Scienza, Genoa, Italy*
- Oct. – Nov. 2017 During two editions of the Science Festival in Genoa, I held two workshops, in which I explained different physics concepts to groups of people of various ages.
- Sept. 2016 – Apr. 2017 **Robotics teacher**, *Istituto Comprensivo Statale di Bernareggio, Italy*
I designed and taught 10 lessons for middle school classes, where I gave a theoretical and practical introduction to robotics. In each lesson we built a project based on the open-source Arduino platform. The course was repeated twice, during the first and second school semesters.
- Mar. – June 2012 **Industrial designer**, *SGB Architects, Hangzhou, China*
My work focused mainly on interior design and rendering. I was also often responsible for project presentations to clients.
- Mar. – June 2012 **English teacher**, *Key English School, Hangzhou, China*
Alone or assisted by a Chinese interpreter, I taught English to classes of up to 20 Chinese children.
- Sept. – Oct. 2012 **Volunteering experience**, *Architecture for Humanity, Ropi and Awassa, Ethiopia*
Living in rural areas, I helped local communities in the construction of buildings and the development of services.

Language skills

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| Native Speaker | Italian |
| Fluent | English, French |
| Intermediate | Spanish |

Computer skills

Programming, scripting and markup

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| Advanced | Python, \LaTeX , Arduino |
| Intermediate | C, Bash, MATLAB |
| Beginner | CSS, HTML |

3D modeling and rendering

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| Advanced | Autodesk Inventor, McNeel Rhinoceros, Luxion KeyShot |
| Beginner | Blender |

Vector graphics, photo and video editing

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| Advanced | Adobe Photoshop, Illustrator, InDesign |
| Beginner | Adobe After Effects, Premiere |

Publications

- Oct. 2022 **Temperature transitions and degeneracy in the control of small clusters with a macroscopic field**, *Journal of Statistical Mechanics Theory and Experiment* 2022(10):103205
DOI: 10.1088/1742-5468/ac9616
- Aug. 2022 **Equilibrium return times of small fluctuating clusters and vacancies**, *Physical Review E* 106(2)
DOI: 10.1103/PhysRevE.106.024120
- June 2022 **Controlling the shape of small clusters with and without macroscopic fields**, *Physical Review Letters* 128(25)
DOI: 10.1103/PhysRevLett.128.256102
- Jan. 2022 **Stress-induced acceleration and ordering in solid-state dewetting**, *Physical Review Letters* 128(2)
DOI: 10.1103/PhysRevLett.128.026101

Personal interests

Bicycle repair and touring

I enjoy repairing bicycles and traveling on them. Since 2009 I own an old tandem bike together with a friend, and we have traveled a lot on it across Europe and beyond. We keep a blog about the trips we do, at the address onceuponatandem.wordpress.com.

Juggling

I have been training for many years and I can juggle up to 7 balls. Every now and then I work as an animator at parties and events.