Guglielmo Grillo

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ABOUT ME

I am a recently graduated Physicist (MSc, University of Trento), with a strong passion for computer science, data analysis, and machine learning. This passion led me to choose a computational path both for my curricular and extracurricular classes and to work on personal projects in my free time. I am a founding member of Progetto Apollo, a scientific divulgation group operating at the University of Trento in collaboration with Arditodesìo. Since 2019 I've been a tutor for the University of Trento. My hobbies include video games and parkour.

WORK EXPERIENCE

09/2019 – 12/2022 Trento, Italy

CLASSROOM TUTOR UNIVERSITY OF TRENTO

In the in-class courses, my task as a tutor was to prepare ad-hoc exercises beforehand and then follow the students in their reasoning by providing hints and guidance toward the solution. In the laboratory courses, our job was to explain the lab experiences to the students and assist them in the data collection and analysis ensuring that they understood the underlying reasoning and scientific approach.

I was assigned to the following courses:

- Sep 2022 - Dec 2022: Introductory Physics Laboratory (DII), Mathematical Basis for Cognitive Sciences (CIMEC), Mathematics and Statistics I (CIBIO);
- Mar 2022 - June 2022: Laboratory of Physics I with Matlab (DF), Introductory Physics Laboratory (DICAM);
- Set 2021 - Dec 2021: Introductory Physics Laboratory (DII);
- Set 2020 - Dec 2020: Mathematics and Statistics (A3C);
- Set 2019 - Jan 2020: Calculus I (DICAM), Calculus I (DIPSCO), Quantitative Methods for life-sciences (DIPSCO).

The underlined courses represent the courses for which I was the only tutor. In all other courses, I was part of a team of 2 to 4 tutors.

2017 – 10/2022 Trento, Italy

STORYTELLER ARDITODESÌO / UNIVERSITY OF TRENTO

I'm one of the founding members of Progetto Apollo, a scientific divulgation group operating at the University of Trento in collaboration with Arditodesìo. Some of our activities include research on a key topic or an interview with a Professor at the University of Trento to write narratives with the principles of storytelling. The plays were then performed in the course of various editions of Teatro della Meraviglia, EIT RAW Materials 2021, CO.SCIENZA Festival 2019, Focus Days 2019 and Fisicittà 2017. In 2022 we partnered with Caltech for the event "La Terra fatta dagli umani" (Earth made by humans) about the beginning of the Anthropocene. The resulting performances were presented both in Trento and at Caltech.

06/07/2015 – 31/07/2015 Trento, Italy

INTERNSHIP FBK - FONDAZIONE BRUNO KESSLER

The task of our two-student team was to study the effects of different NaCl concentrations on the contact angle between water droplets and various substrates (Borosilicate, Aluminium, and Soda-Lime Glass). The analysis was conducted both in the static regime where droplets were studied at deposition and in the dynamic regime where we analyzed the contact angle as a function of time. The experience ended with a presentation held in the context of "Notte dei Ricercatori 2015".

EDUCATION AND TRAINING

09/2020 – 03/2023 Trento, Italy

MASTER'S DEGREE IN PHYSICS Università degli Studi di Trento

Path: Statistical Biophysics with a focus on computational methods
Thesis: Computational Models Of Astrocyte-Neuron Dynamics To Explain The Formation Of Working Memory
Supervisor: prof. L. Tubiana

The thesis aimed to explore the characteristics of various effective models for neurons with the purpose of finding an effective representation compatible with a description of memory formation via the coupling between neurons and astrocytes. All the models were implemented in Python from scratch.

Relevant courses:

- Quantum Computing and Quantum Machine Learning;
- Advanced Computational Physics;
- Experimental Methods;
- Laboratory of Advanced Electronics (signal processing via FPGA);
- Multi-Scale Methods in Soft Matter Physics;
- Statistical Mechanics and Statistical Field Theory.

Field of study Physics | **Final grade** 110/110 | **Level in EQF** EQF level 7 |

National classification Laurea Magistrale | **Type of credits** CFU | **Number of credits** 120

09/2016 – 03/2020 Trento, Italy

BACHELOR'S DEGREE Università degli Studi di Trento

Thesis: Emergent features: from renormalization group to artificial intelligence
Supervisor: prof. R. Potestio

The thesis focussed on a possible explanation behind the efficiency of machine learning models. In particular, the link between Restricted Boltzmann Machines applied to the Ising Model and a renormalization procedure was examined.

Free choice classes:

- Scientific Computing (fka Computer Science)
- Introduction to Machine Learning (fka Advanced Algorithms);
- Linear Algebra I, Analysis I, II, III, and Complex Analysis;
- Physics I, II, and III, Analytical Mechanics, Quantum Mechanics;
- Physics Laboratory I (measures), II (analogue electronics and optics), and III (digital electronics);
- Chemistry with Laboratory Sessions.

I took part in a Scientific Storytelling course twice during my bachelor's degree. This resulted in two 5-minute plays and the creation of the storytelling group Progetto Apollo. After graduating, I enrolled in the course "Introduction to Data Science for Physicists" as a listener (March-June 2020).

Field of study Physics | **Final grade** 94/110 | **Level in EQF** EQF level 6 | **National classification** Laurea Triennale |

Type of credits CFU | **Number of credits** 180

2011 – 2016 Rovereto, Italy

SCIENTIFIC HIGH SCHOOL DIPLOMA Liceo Antonio Rosmini (Rovereto, TN)

Physics, Mathematics, Chemistry, Biology, Italian (Language and Literature), English (Language and Literature), Latin (Language and Literature), History, and Ethics.

Personal accomplishment:

- Qualification to the regional phase of both the Physics Olympics and the Chemistry Olympics.
- I took part in “Insieme per studiare” (tutoring at the high school level) for two years as a tutor.
- Two seven-day language study trips abroad (Liverpool and Broadstairs)

Final grade 95/100 | **Level in EQF** EQF level 4 | **National classification** Diploma Liceo Scientifico |

Thesis La concezione della scienza di Richard Feynman

02/2021 – 03/06/2021 Italy

CYBERCHALLENGE.IT Università degli Studi di Trento in partnership with Laboratorio Nazionale di Cybersecurity (CINI)

CyberChallenge.IT is a course designed to provide the methodological and practical basis to analyze vulnerabilities and possible attacks and identify the most suitable solutions to prevent them. Admission to the course followed the passing of three levels of tests that recorded an admission rate of 13.70%. The total duration of the course was 72 hours (24 hours of lecture and 48 hours of hands-on experiences) followed by a local final competition lasting 7 hours.

Website https://cyberchallenge.it/halloffame/2019 | **Field of study** Information and Communication Technologies

02/2019 – 04/2019

INNOVATION CAMP DIPLOMA University of Trento in partnership with Samsung

The first month was devoted to a 25h online course about the main topics of Industrial Innovation and a two-day intensive training course I was allowed to attend upon ranking among the best in the online test. The following months were used to develop a project work on a real business case.

Website https://webmagazine.unitn.it/evento/ateneo/69296/samsung-innovation-camp |

Field of study Business, administration and law

18/07/2016 – 22/07/2016

SUMMER SCHOOL Ducati Foundation

The summer school consisted of a week-long team project revolving around the theme "Safety on the road". Our group decided to focus on a toy model of braking distance: pebbles, water, sand, or a mixture of those materials were deposited on a straight track following an inclined plane. A cart was placed at the beginning of the inclined plane and left free to accelerate. The time needed for the cart to stop was measured several times for each material.
At the end of the summer school, the project was presented to a committee of the Ducati Foundation.

Website https://www.ducati.com/it/it/fisica-in-moto/scuole/summer-school

LANGUAGE SKILLS

Mother tongue(s): **ITALIAN**

Other language(s):

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken production	Spoken interaction	
ENGLISH	C1	C1	C1	B2	B2

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

ADDITIONAL INFORMATION

CONFERENCES AND SEMINARS

04/05/2023 – 05/05/2023 – University of Trento

Statistical Physics of Living Systems workshop This two-day workshop gathered the members of the SBP group at the University of Trento and the QLS group of ICTP in Trieste to present and discuss the work carried out within both groups intending to foster tighter collaborations, address open problems, and develop strategies for future joint activities. My contribution consisted of a presentation of my master's thesis work.

Link https://sbp.physics.unitn.it/statistical-physics-of-living-systems-workshop/

TECHNICAL SKILLS

Advanced User

I've been using Python 3 since 2018 for all sorts of programming purposes. My main focus is on scientific packages (NumPy and SciPy), Data Science/Machine Learning packages (Pandas, Pytorch, Sklearn), and Data Visualization (Matplotlib both for plotting and animation, Jupyter Notebook with widgets, Quarto) but I also worked on projects requiring non-scientific-oriented packages like image recognition (OpenCV's wrapper opencv-python) and text recognition packages (Tesseract's wrapper py-tesseract).
When possible, I try to implement algorithms from scratch, therefore I'm also capable to avoid the most frequent Python bottlenecks. If needed I can also work with object-oriented Python and type hints.

Intermediate User

Intermediate user refers to programming languages and technologies that I can understand and use but are not my main focus.

- **Programming languages**: C, C++, Matlab, Java, Verilog.
- **Technologies**: Regex, SQL, Git, Linux command line (bash).
- **Markup languages:** LaTeX, Markdown (GitHub syntax).
- **Hardware:** Raspberry Pi, Arduino.

Beginner Users

Beginner user refers to programming languages and technologies that I've been exposed to and I'm confident I can learn in a short amount of time.

- **Programming languages**: Julia, Javascript, Mathematica, C#.
- **Markup languages:** Html, CSS.
- **Miscellanea:** Unity game engine, Gromacs.