

# Niccolò Laurenti

PH.D. RESEARCHER IN PARTICLE PHYSICS · SCIENTIFIC SOFTWARE DEVELOPER

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## Summary

Ph.D. researcher at the University of Milan specialised in applying artificial intelligence to particle physics. I have experience working with different programming languages, in particular with C++ and Python. I have hands-on experience with various machine learning tools like Keras and Tensorflow. Passionate about the field of computer science and open to opportunities in industry to further improve my skills.

## Personal Informations

**Birth** 1997, Rome, Italy  
**Citizenship** Italian  
**Languages** Italian (native language), English (fluent)

## Experience

### Ph.D. Researcher

Milan, Italy

RESEARCHER IN THEORETICAL PARTICLE PHYSICS AT THE UNIVERSITY OF MILAN AND INFN

Oct. 2021 - current

- Worked under the supervision of Prof. Stefano Forte in the **NNPDF** collaboration as a developer of the **NNPDF** code 📄.
- Developed techniques and computational programs applied to particle physics, that utilize artificial intelligence for investigating the internal structure of the proton with high precision using experimental data collected at **CERN**.
- Published research results in various papers and presented them in conferences.

### Undergraduate Researcher

Rome, Italy

RESEARCHER IN THEORETICAL PARTICLE PHYSICS AT THE UNIVERSITY OF ROME "LA SAPIENZA"

Mar. 2021 - Oct. 2021

- Worked under the supervision of Dr. Marco Bonvini with another Master student to develop theoretical methods and computational programs for producing high-precision theoretical predictions in particle physics.
- Focused on describing experimental data collected at the particle accelerator **HERA**.
- Developed two programs, **Adani** 📄 and **DIS\_TP** 📄, resulting in a published paper and presentations at conferences.

## Skills

**Programming** C, C++, Python, Fortran, Bash, Git, VS Code, Docker  
**Operating systems** Linux, MacOS, Windows  
**Scientific packages** GSL, Numpy, Scipy, Matplotlib, Pandas, Keras, Tensorflow, SQLite  
**Scientific programs** Matlab, Mathematica  
**Writing** Latex, Markdown, Microsoft Office

## Education

### Ph.D. in Physics

Milan, Italy

UNIVERSITY OF MILAN

Oct. 2021 - Nov. 2024

- Field of study: Theoretical Particle Physics, Computational Physics.
- Thesis: *Advancements in PDFs determination: Incorporation of QED effects and new theoretical improvements in a modern deep learning fitting framework.*

### M.S. in Physics

Rome, Italy

UNIVERSITY OF ROME "LA SAPIENZA"

Sep. 2019 - Oct. 2021

- Field of study: Theoretical Particle Physics.
- Grade: 110/110 (cum laude).
- Thesis: *Construction of a next-to-next-to-next-to-leading order approximation for heavy flavour production in deep inelastic scattering with quark masses.* 📄

### B.S. in Physics








Rome, Italy

UNIVERSITY OF ROME "LA SAPIENZA"

Sep. 2016 - Nov. 2019

- Grade: 110/110 (cum laude).
- Thesis: *Particle identification with the time of flight method and applications to the CMS experiment.*

## Publications

2024	<b>LO, NLO, and NNLO Parton Distributions for LHC Event Generators</b> , J. Cruz-Martinez, S. Forte, N. Laurenti, T. R. Rabemananjara, J. Rojo, <i>JHEP</i>	
2024	<b>NNPDF4.0 at N<sup>3</sup>LO PDFs with QED corrections</b> , A. Barontini, N. Laurenti, J. Rojo, <i>Contribution to DIS2024</i>	
2024	<b>The Path to N<sup>3</sup>LO Parton Distributions</b> , The NNPDF Collaboration, R. D. Ball et al., <i>Eur. Phys. J. C</i>	
2024	<b>Determination of the theory uncertainties from missing higher orders on NNLO parton distributions with percent accuracy</b> , The NNPDF Collaboration, R. D. Ball et al., <i>Eur. Phys. J. C</i>	
2024	<b>Photons in the proton: implications for the LHC</b> , The NNPDF Collaboration, R. D. Ball et al., <i>Eur. Phys. J. C</i>	
2023	<b>Inclusion of QED corrections in PDFs fits</b> , N. Laurenti, <i>Nucl. Part. Phys. Proc.</i>	
2022	<b>Approximating missing higher-orders in transverse momentum distributions using resummations</b> , N. Laurenti, T. R. Rabemananjara, and R. Stegeman, <i>Contribution to DIS2022</i>	

## Talks

2024	<b>The inclusion of QED corrections in the NNPDF4.0 fitting framework</b> , Prague, Czech Republic	ICHEP2024
2024	<b>The inclusion of QED corrections in the NNPDF4.0 fitting framework</b> , National Laboratory of Frascati, Italy	IRN Terascale@LNF
2023	<b>Evidence of intrinsic charm quarks in the proton</b> , Mainz, Germany	MENU23
2023	<b>Including QED corrections in PDF fits: The NNPDF4.0QED PDF set</b> , Durham, UK	QCD@LHC23
2023	<b>Inclusion of QED corrections in PDFs: The NNPDF4.0QED PDF set</b> , Montpellier, France	QCD23
2021	<b>Construction of a third order approximation for heavy flavour production in deep inelastic scattering</b> , Milan, Italy	MCM 2021

## Teaching activity

2024	<b>TA for the course of Quantum Physics I</b> , Introduction to Quantum Mechanics	University of Milan
2024	<b>TA for the course of Physics</b> , Basics of Classical Mechanics and Thermodynamics	University of Milan
2024	<b>TA for the course of Quantum Physics II</b> , Advanced course on Quantum Mechanics	University of Milan
2023	<b>TA for the course of Theoretical Physics I</b> , Introduction to Quantum Field Theory	University of Milan
2023	<b>TA for the course of Physics</b> , Basics of Classical Mechanics and Thermodynamics	University of Milan
2023	<b>TA for the course of Quantum Physics II</b> , Advanced course on Quantum Mechanics	University of Milan
2023	<b>Exercise classes for the course of Quantum Physics II</b> , Advanced course on Quantum Mechanics	University of Milan
2022	<b>TA for the course of Quantum Physics I</b> , Introduction to Quantum Mechanics	University of Milan