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# Marco Rossi

## Research Interests

Broad interest in deep learning techniques.

PhD research fields: machine learning and AI applications to particle physics, especially high-energy and neutrino physics. Computational tools in high-energy physics.

## Education

- 2019 → 2023 **Doctoral Student**, *Università degli Studi di Milano*, Milan, Italy.  
Applications of ML and DL techniques to physics.
- 2016 → 2019 **M.Sc in Physics**, *Università degli Studi di Milano*, Milan, Italy.  
Particle physics and quantum field theory
- 2012 → 2016 **B.Sc in Physics**, *Università degli Studi di Milano*, Milan, Italy.  
Physics and matter sciences.

## Professional Experience

- 2019 → 2023 **Doctoral Student**, *CERN*, Geneva, Switzerland.  
Applications of ML and DL techniques to physics.
- May-Jun 2019 **Internship and master thesis**, *CERN*, Geneva.  
Thesis Investigating Anomaly Effects in HEP with GANs.  
Supervisors Dr. Stefano Carrazza, Dr. Maurizio Pierini, Dr. Andrea Wulzer.
- Jan-Mar 2016 **Bachelor thesis**, *Università degli Studi di Milano*, Milan, Italy.  
Thesis Struttura Analitica della Distribuzione in Rapidità per la Produzione di un Bosone di Higgs.  
Supervisors Prof. Stefano Forte.

## Teaching

- 2020 → 2022 **Corso di Informatica**, *Università degli Studi di Milano*.  
Teaching assistant for the course

## Partecipation in Conferences and Workshops

- Nov 2021 **ACAT 2021**, Daejeon (virtual).
- Jul 2021 **Offshell-2021**, CERN (virtual).
- May 2021 **vCHEP2020**, CERN (virtual).
- Oct 2020 **IML2020**, CERN (virtual).
- Sep 2020 **iSCS-2020**, CERN (virtual).
- Sep 2020 **OpenPOWER**, North America (virtual).
- Sep 2020 **SIF2020**, Italy (virtual).
- Aug 2020 **SSI2020**, Los Angeles (virtual).
- Aug 2020 **ICHEP2020**, Prague (virtual).

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## Talks

- Nov 2021 **ACAT 2021**, Slicing with DL models at ProtoDUNE-SP.
- Jul 2021 **Offshell-2021**, MadFlow: automating Monte Carlo simulation on GPU for particle physics processes.
- May 2021 **vCHEP2021**, Deep Learning strategies for ProtoDUNE raw data denoising.
- Oct 2020 **IML2020**, Hit-reco: ProtoDUNE denoising with DL models.
- Sep 2020 **OpenPOWER**, Hit-reco: ProtoDUNE denoising with DL models.
- Sep 2020 **SIF2020**, PDFFlow: parton distribution functions on GPU.
- Aug 2020 **ICHEP2020**, PDFFlow: hardware accelerating parton density access.

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## Research Outcome

### Articles

- [1] Stefano Carrazza, Juan M. Cruz-Martinez, and Marco Rossi. "PDFFlow: Parton distribution functions on GPU". In: *Computer Physics Communications* (Apr. 2021), p. 107995. DOI: 10.1016/j.cpc.2021.107995. URL: <https://doi.org/10.1016/j.cpc.2021.107995>.
- [2] Stefano Carrazza et al. "MadFlow: automating Monte Carlo simulation on GPU for particle physics processes". In: *Eur. Phys. J. C* 81.7 (July 2021), p. 656. DOI: 10.1140/epjc/s10052-021-09443-8. arXiv: 2106.10279 [physics.comp-ph].
- [7] Marco Rossi and Sofia Vallecorsa. "Deep Learning Strategies for ProtoDUNE Raw Data Denoising". In: *Computing and Software for Big Science* 6.1 (Jan. 2022). ISSN: 2510-2044. DOI: 10.1007/s41781-021-00077-9. URL: <https://doi.org/10.1007/s41781-021-00077-9>.

### Miscellanea Papers

- [3] Stefano Carrazza et al. *Towards the automation of Monte Carlo simulation on GPU for particle physics processes*. May 2021. arXiv: 2105.10529 [physics.comp-ph].

### Proceedings

- [6] Marco Rossi, Stefano Carrazza, and Juan Cruz-Martinez. "PDFflow: hardware accelerating parton density access". In: *Proceedings of 40th International Conference on High Energy physics — PoS(ICHEP2020)*. Vol. 390. Apr. 2021, p. 921. DOI: 10.22323/1.390.0921.

### Software

- [4] Juan Cruz-Martinez, Marco Rossi, and Stefano Carrazza. *N3PDF/pdfflow*. Version v0.0.1b1. July 2020. DOI: 10.5281/zenodo.3964191. URL: <https://doi.org/10.5281/zenodo.3964191>.
- [5] Marco Rossi. *marcorossi5/DUNEdn: 1.0.1*. Version 1.0.1. Jan. 2022. DOI: 10.5281/zenodo.5841986. URL: <https://doi.org/10.5281/zenodo.5841986>.

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## Computer Skills

- Computing
  - Operating Systems: Linux, Windows, MacOS.
  - Versioning-control: Git, GitHub.
  - Languages: Python, C++, BASH,  $\LaTeX$ , HTML5, CSS, PHP
  - Data libraries: NumPy, SciPy, Pandas, Scikit-learn, Matplotlib.
  - ML Libraries: TensorFlow, PyTorch
- Deep Learning
  - Computer vision: image classification, image denoising.
  - Clustering techniques.
  - Reinforcement Learning.

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## Languages

- Italian Mother tongue.

English IELTS Academic Proficiency Test, CEFR level equivalent: C1.

French Basic understanding and spoken production.