MARCO LORUSSO

CURRICULUM VITAE

dal 1994 Consorzio Interuniversitario AlmaLaurea
Un ponte fra Università e mondo del lavoro e delle professioni

Date of birth / **22/06/1996** Age / **27**
Place of birth / **PUTIGNANO (BA)**
Nationality/ citizenship / **Italy**
Via Francesco Todaro, 3, 40126 BOLOGNA (BO)
Via Turi, 71, 70017 PUTIGNANO (BA)
Driving licence / **B**

ID / **4827390** updated on **02/04/24**

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3204012114
https://github.com/DrWatt

FOREIGN LANGUAGE SKILLS

europass

MOTHER TONGUE(S): **Italian**

ENGLISH	**EXCELLENT**	C2	C2	C1	C1	C1

DIGITAL COMPETENCES

DigComp
Information and data literacy Proficient user
Communication and collaboration Proficient user
Digital content creation Independent user
Safety Proficient user
Problem solving Proficient user

EXPECTATIONS AND FEATURES OF THE DESIRED JOB

INTENTION TO CONTINUE STUDIES: **Yes** / Doctoral studies

ECONOMIC SECTOR: **1.** education, training, research and development / **2.** computer science, data processing and acquisition

CAREER FIELD: **1.** R&D and patents / **2.** Engineering and design

DESIRED JOB:
Subnuclear physics researcher

PREFERRED DISTRICT TO WORK IN: **1. BOLOGNA**

AVAILABILITY FOR BUSINESS TRAVELS:
Yes, including relocation

AVAILABILITY TO RELOCATE ABROAD:
Yes, even in non-European countries

Career Goal

I would like to use the knowledge and methods I have acquired thanks to my studies in Nuclear and Subnuclear physics to develop software and/or hardware dedicated to scientific research. I am especially interested in the High Energy Physics field.

ACADEMIC STUDIES

PH.D.
2021 - 2025
ONGOING STUDIES

ALMA MATER STUDIORUM UNIVERSITÀ DI BOLOGNA

Alma Mater Studiorum - Università di Bologna
Fisica
Expected graduation date: 2025

MASTER'S DEGREE
2018 - 2021
CERTIFIED TITLE

ALMA MATER STUDIORUM UNIVERSITÀ DI BOLOGNA

Alma Mater Studiorum - Università di Bologna
Scuola di Scienze
Physics
specific field of the degree course: nuclear and subnuclear physics
LM-17 - 2nd level degree in Physics
Dissertation/thesis title: FPGA implementation of muon momentum assignment with Machine Learning at the CMS Level-1 Trigger | Thesis supervisor: BONACORSI DANIELE
Age at graduation: 24 | Official duration: 2 years
Final degree mark: **110/110 cum laude**
Graduation date: 26/03/2021

BACHELOR'S DEGREE
2015 - 2018
CERTIFIED TITLE

ALMA MATER STUDIORUM UNIVERSITÀ DI BOLOGNA

Alma Mater Studiorum - Università di Bologna
Scuola di Scienze
Physics
L-30 - 1st level degree in Physics
Dissertation/thesis title: Combined use of Drift Tubes and Resistive Plate Chambers information in the CMS Muon Barrel Trigger | Thesis supervisor: GUIDUCCI LUIGI
Age at graduation: 22 | Official duration: 3 years
Final degree mark: **109/110**
Graduation date: 06/12/2018

WORK EXPERIENCES

other information

Currently employed: Yes

FOREIGN LANGUAGE SKILLS

English Cambridge english level 2 certificate in ESOL international (advanced), Cambridge english language assessment, 07 Nov 2014 , **Europass level C1**

English Ielts Academic, British Council, 12 Dec 2020 , **Europass level C1**

INFORMATION TECHNOLOGY SKILLS

OFFICE AUTOMATION

Office Suite: (Highly Specialised) | **Spreadsheets:** (Highly Specialised) | **Web Browser:** (Highly Specialised) | **Word Processors:** (Highly Specialised)

APPLICATION SOFTWARE

CAD - Assisted Design: AutoCAD (Intermediate) | **Statistical analysis:** ROOT (Highly Specialised)

COMPUTER PROGRAMMING

Build Automation: Docker | **Firmware and software for the industial electronics:** Vivado (Highly Specialised) | **Integrated development environments (IDE):** Spyder (Highly Specialised) | **Markup languages:** CSS (Intermediate) , HTML (Advanced) , LaTeX (Highly Specialised) | **Programming languages:** Bash (Advanced) , C (Advanced) , C++ (Highly Specialised) , Python (Highly Specialised) , VHDL (Advanced) | **Software modeling languages:** LabVIEW (Advanced) | **Web Programming:** (Advanced)

SYSTEMS AND NETWORKS MANAGEMENT

Network architecture: (Intermediate) | **Operating systems:** Linux (Highly Specialised) , MacOS (Highly Specialised) , Microsoft Windows (Highly Specialised)

DATA MANAGEMENT

Data modeling tools: Keras (Highly Specialised) , XGBoost (Advanced) | **DBMS:** (Foundation)

GRAPHICS AND MULTIMEDIA

Audio Editing and Processing: Audacity (Advanced) | **Video Editing and Processing:** Vegas PRO (Intermediate)

ICT CERTIFICATES

Attendee of the Third International School on Open Science Cloud SOSC Program Committee, 20/09/2019
Participation at the iTHEPHY Project Alma Mater Studiorum - University of Bologna, 2020
Attendee of Summer School 'Physical Sensing and Processing' Alma Mater Studiorum - University of Bologna, 24/07/2020
Attendee of the International Conference on High Energy Physics ICHEP 2022 Chairs, 06/07/2022

STUDIES AND EXPERIENCES ABROAD

SWITZERLAND
2023

Other experience acknowledged by the course of study (CERN Doctoral Student Programme)
At: CERN
Place: **Geneve (Switzerland)** | Language: English | Duration: 12 (months)

PROFESSIONAL ACCOLADES AND AWARDS

PRIZE
27/05/2022

Best poster award at the Workshop sul Calcolo nell'I.N.F.N
The poster with the title 'Accelerazione di algoritmi di Machine Learning con FPGA su INFN Cloud e su Cloud pubbliche' was awarded the best poster award.
Grading in list: 1
agenda.infn.it/event/30202/contributions/169683/

CONFERENCES AND SEMINARS

CONFERENCES
11/03/2024

22nd International Workshop on Advanced Computing and Analysis Techniques in Physics Research , Stony Brook, USA
The 22nd edition of ACAT brought together computational experts from a wide range of disciplines, including particle-, nuclear-, astro-, and accelerator-physics as well as high performance computing. Through this unique forum, we explored the areas where these disciplines overlap with computer science, fostering the exchange of ideas related to cutting-edge computing, data-analysis, and theoretical-calculation technologies.

Character: Speaker
indico.cern.ch/event/1330797

CONFERENCES
08/05/2023

International Conference on Computing in High Energy & Nuclear Physics , Jefferson Lab , Norfolk, Virginia
The CHEP conferences address the computing, networking and software issues for the world's leading data-intensive science experiments that currently analyze hundreds of petabytes of data using worldwide computing resources. The Conference provides a unique opportunity for computing experts across Particle and Nuclear Physics to come together to learn from each other and typically attracts over 500 participants.
Character: Speaker
indico.jlab.org/event/459/contributions/11699/

CONFERENCES
19/03/2023

International Symposium on Grids & Clouds (ISGC) 2023 , Academia Sinica , Taiwan
The main theme of ISGC 2023 was "accelerating time-to-science through computing". Promoting the open data/open science collaboration between Asia Pacific region and the world, the Symposium offered an excellent opportunity to learn from the latest achievement from Europe, America and Asia. The goal of ISGC was to create a face-to-face venue where individual communities and national representatives can present and share their contributions to the solutions of global challenges.
Character: Speaker
indico4.twgrid.org/event/25/

WORKSHOPS
02/11/2022

Tecniche Di Machine Learning Con Dispositivi FPGA per Gli Esperimenti Di Fisica Delle Particelle , National Institute for Nuclear Physics , Bologna, Italy
The course aims to provide the state of the art on the implementation of Machine Learning (ML) and Deep Learning (DL) techniques in FPGA-type devices in particle physics applications, and to help spread the related know-how within the Italian National Institute for Nuclear Physics (INFN), also contributing to increase it thanks to inputs from experts in the field outside the institution.
Curatorship: Riccardo Travaglini
Character: Program consultant and IT support
agenda.infn.it/event/15116/

CONFERENCES
23/10/2022

21st International Workshop on Advanced Computing and Analysis Techniques in Physics Research , Bari
The 21st edition of ACAT brought together computational experts from a wide range of disciplines, including particle-, nuclear-, astro-, and accelerator-physics as well as high performance computing. Through this unique forum, it was possible to explore the areas where these disciplines overlap with computer science, fostering the exchange of ideas related to cutting-edge computing, data-analysis, and theoretical-calculation technologies.
Character: Speaker
indico.cern.ch/event/1106990

CONFERENCES
08/07/2022

International Conference on High Energy Physics 2022 , IUPAP , Bologna
The conference has been held on July 6th - 13th 2022, and consisted in plenary sessions, parallel sessions, and poster sessions. The Conference has taken place in a hybrid form, with in-person participants at Palazzo della Cultura e dei Congressi in Bologna, Italy, and remote participants via videoconferences.
Curatorship: Paolo Giacomelli - Lorenzo Bellagamba
Character: Speaker
agenda.infn.it/event/28874/contributions/169219/

CONVENTIONS
23/05/2022

Workshop sul Calcolo nell'I.N.F.N. , Istituto Nazionale di Fisica Nucleare , Paestum
Character: Poster
agenda.infn.it/event/30202

CONFERENCES
24/03/2022

International Symposium on Grids & Clouds (ISGC) , Academia Sinica - Taipei , Online
To process vast amounts of data, novel high performance data

analytics methods and tools are needed, combining classical simulation oriented approaches, big data processing and advanced AI methods. Such a combination needs novel insights at all levels of the computing environment to support data oriented research. The goal of ISGC is to offer a platform where individual communities and national representatives can present their contributions.
Character: Speaker
indico4.twgrid.org/event/20/contributions/1119

WORKSHOPS
24/07/2020

Summer School on Physical Sensing and Processing , Alma Mater Studiorum - University of Bologna , Online
This event in the series of DIFA International Schools was aimed to provide a general and broad overview of the various aspects that are involved in the overall pipeline that starts from the collection of complex and big data, and goes thorough data handling/cleaning/curation, data processing, data storage, and data analysis towards the extraction of scientific results and their ultimate communication to the public.
Curatorship: Daniele Bonacorsi
Character: Attendee
site.unibo.it/school-physical-sensing-and-processi…

WORKSHOPS
13/07/2020

PyHEP 2020 (virtual) Workshop , HEP Software Foundation , Online
The PyHEP workshops are a series of workshops initiated and supported by the HEP Software Foundation (HSF) with the aim to provide an environment to discuss and promote the usage of Python in the HEP community at large. Further information is given on the PyHEP WG website.
Curatorship: Eduardo Rodrigues
Character: Student
indico.cern.ch/event/882824/

CONFERENCES
17/06/2020

AWS summit online , Amazon Web Services , Online
AWS Summit Online is a series of free online virtual events that bring the cloud computing community together to connect, collaborate, and learn about AWS. These virtual events are designed to educate about AWS products and services and help develop the skills needed to build, deploy, and operate an infrastructure and applications. Sessions are delivered by AWS subject matter experts and customers who have successfully built solutions on AWS.
Character: Attendee
aws.amazon.com/events/summits/online/

WORKSHOPS
20/09/2019

School on open science cloud , INFN, University of Bologna, University of Perugia , Bologna
The SOSC 2019 school was devoted to Intelligent Systems and, as in previous editions, consisted of a series of lectures, seminars and hands-on sessions.
Featured international speakers discussed Machine Learning Methods and Applications, and Computing Infrastructures.
Curatorship: Daniele Bonacorsi
Character: Student
agenda.infn.it/event/19048/overview

PUBLICATIONS

CONFERENCE PROCEEDINGS
2023

Marco Lorusso, Daniele Bonacorsi, Riccardo Travaglini, Davide Salomoni, Diego Michelotto, Paolo Veronesi, Doina Cristina Duma,
Accelerating Machine Learning inference using FPGAs: the PYNQ framework tested on an AWS EC2 F1 Instance
Collection: Proceedings of Science
Organization: 41st International Conference on High Energy physics
This paper presents the activity running at the University of Bologna and INFN-Bologna devoted to preliminary studies for the trigger systems of the Compact Muon Solenoid experiment at the CERN LHC accelerator. An open-source project from Xilinx called

PYNQ is being tested combined with the HLS4ML toolkit. The PYNQ purpose is to grant designers the possibility to exploit the benefits of programmable logic and microprocessors using the Python language.
pos.sissa.it/414/243/

CONFERENCE PROCEEDINGS
2022

Dr. Marco Lorusso
Dr. Riccardo Travaglini
Prof. Daniele Bonacorsi, Machine Learning inference using PYNQ environment in an AWS EC2 F1 Instance
Collection: Proceedings of Science
Organization: International Symposium on Grids & Clouds 2022, ISGC2022 21-25 March 2022
This paper presents and discusses the activity started at the Physics and Astronomy department of University of Bologna and INFN-Bologna devoted to preliminary studies for the trigger systems of the CMS experiment at the CERN LHC accelerator. A broader-purpose open-source project from Xilinx called PYNQ is being tested combined with the HLS4ML toolkit. The use of cloud computing in this work allows us to test the capabilities of this workflow.
pos.sissa.it/415/001/

CONFERENCE PROCEEDINGS
2021

Dr. Tommaso Diotalevi
Marco Lorusso
Dr. Riccardo Travaglini
Dr. Carlo Battilana
Prof. Daniele Bonacorsi, Deep Learning fast inference on FPGA for CMS Muon Level-1 Trigger studies
Collection: Proceedings of Science
Organization: International Symposium on Grids & Clouds 2021, ISGC2021 22-26 March 2021
This work aims to implement ML models for transverse momentum (pT) assignment in the context of the muon trigger system of the Compact Muon Solenoid at LHC, onto an FPGA, which promises smaller latency with respect to traditional inference algorithms running on CPU. The analysis carried out
in this work used data obtained through Monte Carlo simulations and compared the results with the pT assigned by the current CMS Level 1 Barrel Muon Track Finder (BMTF) trigger system.
pos.sissa.it/378/005/

DEGREE THESIS
2021

Marco Lorusso, FPGA implementation of Muon Momentum assignment with Machine Learning at the CMS Level-1 Trigger
Institution: Alma Mater Studiorum - University of Bologna
This work aims to implement ML models for transverse momentum (pT) assignment in the context of the muon trigger system of the Compact Muon Solenoid at LHC, onto an FPGA, which promises smaller latency with respect to traditional inference algorithms running on CPU. The analysis carried out
in this work used data obtained through Monte Carlo simulations and compared the results with the pT assigned by the current CMS Level 1 Barrel Muon Track Finder (BMTF) trigger system.
amslaurea.unibo.it/23211

DEGREE THESIS
2018

Marco Lorusso, Combined use of Drift Tubes and Resistive Plate Chambers information in the CMS Muon Barrel Trigger
Institution: Alma Mater Studiorum - University of Bologna
amslaurea.unibo.it/16943

TEACHING ACTIVITIES

LESSONS/LECTURES
2022

Università di Bologna , Bologna
Tutor Didattico Laboratorio di Elettronica
Main Professor: Gilda Scioli
Character: Tutor Didattico

LESSONS/LECTURES
2021

Università di Bologna , Bologna
Tutor Didattico Laboratorio di Meccanica e Termodinamica

Main Professor: Marco Cuffiani
Character: Tutor Didattico