Giacomo Ubaldi

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Education

PhD in Physics **October 2022 - Present**
University of Bologna and INFN
Scholarship in Nuclear and Subnuclear Physics funded by INFN

Master Degree in Physics **September 2019 - October 2022**
University of Bologna
Curriculum of Nuclear and Subnuclear Physics
- Thesis title: "Analysis of fragmentation cross sections of GSI 2021 data for the FOOT experiment"
- Final Mark: 110/110

Bachelor Degree in Physics **September 2016 - October 2019**
University of Bologna
- Thesis title: "Identificazione dei frammenti nucleari nell'esperimento FOOT per lo studio dei trattamenti in adroterapia"
- Final Mark: 108/110

Research Activity

Visiting PhD **February 2024 – present**
Ludwig Maximilian University of Munich (LMU) – SIRMIO Project
- Optimization and evaluation of a single-particle tracking pCT system composed of a hybrid pixel detector Timepix for the SIRMIO Project

PhD **2022 – present**
University of Bologna and INFN – FOOT experiment
- Association to INFN Section of Bologna
- Setup of the architecture and the managing of the TDAQ system during the beam delivery of the FOOT experiment for data taking at CNAO in 2022 and in 2023.
- Study of the impact of out-of-target fragmentation and efficiency for event cuts in global tracking reconstruction (GENFIT toolkit).
- Study of the performance in tracking reconstruction for the Vertex tracker detector of FOOT (4 MIMOSA-28 MAPS pixel sensors).
- Characterization of the Inner tracker detector of FOOT (32 MIMOSA-28 MAPS pixel sensors) at the BTF (LNF) facility and software development.
- Ongoing analysis of double-differential nuclear fragmentation cross section of GSI 2021 data taking.

Master Thesis **2022**
University of Bologna and INFN – FOOT experiment
- Measurement of double-differential nuclear fragmentation cross section with respect to emission angle and kinetic energy of the produced charge fragments, using first dataset collected at the GSI facilities in 2021.
- Optimization of the track reconstruction Kalman filter algorithm for correct hit association and secondary fragmentation recognition.
- Implementation of a Python based software machinery for cross section distributions, designed to be highly adaptable for different and independent configuration dataset.
- Development of VHDL hardware firmware for Altera FPGAs of a system of data acquisition of CMOS sensors for the prototype of a neutron detector to implement in the FOOT experiment.
- Implementation of an algorithm of pile-up removal based on a constant threshold derivative discrimination method.

Bachelor Thesis **2019**
University of Bologna and INFN – FOOT experiment
- Evaluation of the performance of FOOT setup for univocal particle identification using MC simulations.
- Implementation of a C++ ROOT software for charge and mass fragment reconstruction.
- Implementation and optimization of different mass identification algorithms, among which an Augmented Lagrangian method with an improvement in resolution of 10% compared to the other tested methods.

Conferences

56th Zakopane Conference on Nuclear Physics **23 - 27 May 2023**
Zakopane, Poland
Nuclear fragmentation cross section measurements with the FOOT experiment

108th National Conference of Società Italiana di Fisica (SIF) **12 - 16 September 2022**
Milan, Italy
The FOOT experiment: A first measurement of nuclear fragmentation cross-section for hadrontherapy

Schools

7th Seminario Internazionale Rivelatori Innovativi **9 - 13 October 2023**
Turin, Italy
INFN Educational Program for researchers and technologists in novel detection techniques with lectures and hands-on laboratories

5th Physical Sensing and Processing Summer School **17 - 21 July 2023**
Bologna, Italy
Summer school about fundamentals of physics measurements and experiments with lectures and hands-on laboratories

ISOTDAQ 2023 - International School of Trigger and Data Acquisition **13 - 22 June 2023**
Istanbul, Turkey
CERN Summer school about instruments and methodologies used in high energy physics with hands-on laboratories

ONSCI - Officina di Narrazione della Scienza **14 - 18 September 2021**
Bologna, Italy
Summer school about science storytelling and techniques of communication

Achievements

Marco Polo Fellowship for abroad research **February 2024**
University of Bologna

SIF Conference Best Communication **September 2022**
University of Milan

University Scholarship for worthy students **June 2018**
University of Bologna

Outreach Activity

Modena Play **19 - 21 May 2023**
Modena, Italy
Promotion of particle physics via entertainment activities to wide public
Storyteller for HEPscape, INFN project of escape room about high energy physics

INFN-IPPOG 19th International Masterclass on hands-on particle physics **14 March 2023**
Bologna, Italy
Local organizer and tutor for the "Particle Therapy" session for high school students

European Research Night **September 2022, September 2023**
Bologna, Italy
Promoter of research in Hadrontherapy and Space Radioprotection to wide public

Teaching Activity

Thesis Co-supervisor

Master Thesis

- University of Bologna, A.A. 2021-2022
  - *"Study of the impact of out-of-target fragmentation in cross section measurements with the FOOT experiment"*
  - *"Charge identification studies of nuclear fragments in the FOOT experiment"*

Bachelor Thesis

- University of Bologna, A.A. 2022-2023
  - *"Studio di algortimi di tracciamento e ricostruzione di vertici di interazione nell'esperimento FOOT"*
  - *"La teragnostica: una nuova frontiera della medicina"*
  - *"A MicroStrip Detector study on track reconstruction at the FOOT experiment"*
  - *"Adroterapia ed esperimento FOOT: studi MonteCarlo di identificazione della carica di frammenti nucleari"*

Co-supervisor of other thesis that will be discussed in the next Academic Year.

Courses

Teaching tutor

-Elettromagnetismo (Department of Physics, University of Bologna) *A.A. 2023-2024*
-Fisica Generale T-2 (Department of Electrical, Electronic, and Information Engineering, Bologna) *A.A. 2023-2024*

Skills

Programming

C++, Python, Framework ROOT, GEANT4, Bash
VHDL, Quartus for Altera FPGAs, Vivado for Xilinx FPGAs
INFN GRID, CONDOR

Markup Language & Web

HTML, LaTeX, Wordpress

Operating system

UNIX based (Linux), Windows

Toolkit

Office: Word, Excel, PowerPoint, Publisher
Adobe: Photoshop, InDesign

Languages

Italian

Mother tongue

English

Advanced in speaking, writing and reading
IELTS British Council Certificate

German

Elementary speaking and reading

Extracurricular Activities

- Member of SIF - Società Italiana di Fisica
- Member of ADI - Associazione Dottorandi e Dottori di Ricerca in Italia