Veronica Oliviero

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Education

PhD in Physics 38° cycle PNRR — Jan 2023 – On going
Km3NET experiment — *University of Naples "Federico II", Naples*

Master's Degree in Physics — Dec 2019 – Oct 2022
Subnuclear and Astroparticle physics — *University of Naples "Federico II", Naples*

Bachelor's degree in Physics — Sept. 2016 – Dec 2019
University of Naples "Federico II", Naples

Thesis activities

Bachelor Thesis

The title of my Bachelor Thesis is 'Machine Learning Applications in Vector Boson Scattering Processes in the ATLAS Experiment'. In this thesis I studied the Vector Boson Scattering process in the final state with two leptons and two hadronic jets using experimental data collected from the Atlas experimental apparatus at the LHC. The study of this process is made particularly difficult by the small expected value of the VBS cross section and the presence of experimental background processes that are difficult to eliminate. In particular, the thesis work focused on the development of selection criteria for the VBS signal using first a traditional cut-based approach and then a Machine Learning algorithm called Random Forest. The application of the Random Forest algorithm provided an accurate estimate of the relative importance of the kinematic variables used in the analysis in order to optimise the selection of signal events.

Master's degree

My Master's thesis work is currently in progress. My thesis is on the Hyper Kamiokande experiment, located near Kamioka in Japan. Hyper Kamiokande is currently in the planning stage and will start in 2027. The proton decay search was the main aim of this thesis. The channel chosen to study proton decay in Hyper-K experiment was:

$$p \rightarrow e^{+}\pi^{0} \tag{1}$$

In particular, I focused on the optimisation and development of the official reconstruction algorithm, fiTQun. Being at a primordial stage for the project, this is the right time to look for a way to maximise the capabilities of the fiTQqun reconstruction algorithm, which will be fundamental in all studies and analyses to be conducted with Hyper Kamiokande. My thesis work is a key step in defining the optimisation of the algorithm and testing it.

Associations

- **INFN associate**
- **Km3Net experiment Full Member**

Research Experiences

Poster Collaboration Meeting HyperKamiokande experiment — 28-29 June 2022

I presented a poster during the Collaboration Meeting of the HyperKamiokande experiment about my master thesis work.

Academic Experiences

Grant for tutoring activities 2022

University of Naples "Federico II"

I was selected for the award of a tutoring grant for the academic year 2021/2022. I worked as a University Tutor at the Department of Agriculture of the University of Naples "Federico II". My task is to follow and support students, enrolled in the degree course in Agrarian Science and Food Technology, with didactic-integrative activities relating to their Physics course.

Grant for tutoring activities 2021

University of Naples "Federico II"

I was selected for the award of a tutoring grant for the academic year 2020/2021. I worked as a University Tutor at the Department of Biology of the University of Naples "Federico II". My task was to follow and accompany students, enrolled in the degree course in Biology, with didactic-integrative activities related to their Physics course.

Skills and Interests

Programming languages and frameworks for data analysis : C/C++, Python, ROOT, GEANT4, MATLAB

Writing: LaTeX, Office

Languages: Italian (mother tongue), English

Other Skills: Leadership, problem solving, communication, scientific approach, speed of learning, team work

Interests: Literature, Gaming, Digital Electronics, Photography, Graphic design

Other work experiences:I work as a private teacher of science and computer subjects for both high school and university students since 2018.