Université Paris Cité

Master project in "Data Intensive Astroparticle Physics"

Astroparticule et Cosmologie (APC)

Data Intelligence Institute of Paris (diiP)

The University of Paris Cité is welcoming a student for a Master project in Data Intensive Astroparticle Physics to work under the supervision of Prof. Yvonne Becherini.

Context and Goal of the research project

Astroparticle physics is a sub-branch of Physics dealing with the understanding of the Universe through the detection of gamma rays, neutrinos, gravitational waves and cosmic rays.

The data analysis chain for Astroparticle Physics experiments consists of several CPU-consuming steps: signals detected in the devices need to be calibrated, event parameters need to be reconstructed, then a final selection of the signal event candidates is made with different analysis cuts following different approaches. Usually, the reconstruction procedure is carried out on all calibrated events seen in the devices, though the rate of detected events is always dominated by background events.
This research project proposes a new way of handling the dataflow: instead of processing all signals seen in the detectors, we will instead concentrate on the most probable candidate signals from the beginning of the offline analysis chain, through a classification procedure using Deep Learning.
A successful implementation of the project will translate to a significant saving of computing time, it will speed up the entire analysis procedure, and will significantly reduce the amount of real data to be analysed.

In the framework of the larger FIBER project, the Master student will perform a preliminary study ("Proof of Concept") using Deep Learning on existing Monte Carlo simulations of gamma rays and protons developed for the ALTO/CoMET R&D project.

The research project will benefit both from the Astroparticule et Cosmologie laboratory (APC) and from the Data Intelligence Institute of Paris (diiP) environments.

Project's acronym: FIBER
Placement: Université Paris Cité, Astroparticule et Cosmologie laboratory (APC) and Data Intelligence Institute of Paris (diiP)

Description of Group/Laboratory/Supervision

This Master project will be supervised by Yvonne Becherini, Professor at the University of Paris Cité, and will take place within the High-Energy Astrophysics (AHE) group of the AstroParticule and Cosmologie Laboratory and the Data Intelligence Institute of Paris (diiP).

Training and skills required

- Being enrolled in Master education in Physics or Astronomy
- Python programming
- Good command of English

Contact

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