PhD Position ANN4EUROPE in the LHCb experiment @ LPNHE Paris

November 22nd, 2021

The LHCb group of the Laboratoire de Physique Nucléaire et des Hautes Energies (LPNHE) in Paris (France): https://lpnhe.in2p3.fr/ invites applications for a Doctoral Student positions funded by the ANR-BMBF funded project ANN4EUROPE to work on the development of artificial intelligence particle reconstruction algorithms, both for the LHCb experiment and for other high energy physics experiments.

The LHCb experiment at CERN is collecting data from the proton-proton collisions delivered by the Large Hadron Collider. The LPNHE LHCb group consists of seven permanent staff, five PhD students, four research engineers, and two postdocs, and is currently involved in two main domains of data analysis, the study of charmless three body $B$ decays and rare decays. We also participate enthusiastically in detector development, and are heavily involved in the upgrade of LHCb’s real-time analysis (trigger) system and the construction and commissioning of the new Scintillating Fibre tracker for the LHCb upgrade.

The past decade has witnessed a renaissance in artificial intelligence, driven by both algorithmic development and the increased availability of highly parallel computing architectures which are able to efficiently execute these algorithms. At the same time the datasets processed by High Energy Physics experiments have continued to grow, reaching for example 32 Terabits per second for the upgrade of the LHCb experiment which will begin taking data next year. While experiments have traditionally seen efficient computing as a question of financial cost, the coming decade will require an increased focus on energy efficiency in order to reduce the environmental footprint of our research. Traditional particle reconstruction algorithms, most notably the Kalman filter, are inherently sequential and not well suited to efficiently using parallel processing architectures. There is a critical need for novel reconstruction algorithms which are designed from the start to be parallel, efficiently exploit modern architectures, and can scale to the architectures of tomorrow. As a member of the ANN4EUROPE project you will work together with another PhD student based at the FIAS institute in Frankfurt to develop such algorithms in a way which will allow them to be reused across particle physics experiments. The two of you will also be attached to the SMARTHEP (http://www.smarthep.org/) doctoral network which is tackling many of the same problems on a similar timescale. As part of the LHCb group you will also help implement these algorithms within the LHCb experiment codebase and will be given an opportunity to participate in the analysis of physics data according to your and our group’s interests.

To qualify, you should have, or be about to obtain, a Master’s degree in Physics. Please submit a two-page CV, a one-page statement explaining your interest in the position, and arrange for two letters of recommendation to be submitted by email. Applications will be accepted until March 15th 2022. If successful you will be enrolled in the STEP’UP (“Sciences de la Terre et de l’Environnement et Physique de l’Univers, Paris”) doctoral school, and will be funded for exactly three years. You will benefit from a dedicated travel and equipment budget, and have the opportunity to regularly travel to Frankfurt and CERN for meetings and hackathons.

No nationality restrictions apply to this position, and members of historically marginalised groups are particularly encouraged to apply.

For further information contact Vava Gligorov (vgligoro@lpnhe.in2p3.fr). Application documents and references should be sent to the same address.