Proposition de stage – Année 2022-2023

Niveau du stage : M2

Durée du stage : 4 mois

Ouverture éventuelle vers un sujet de thèse : Oui

Type de financement envisagé : ED PHAST

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Equipe d'encadrement : ALICE

Thématique : Particle physics

Intitulé du stage : Jet-photon correlation measurements with the ALICE3 detector at the CERN LHC

Description du travail demandé : The ALICE3 project is the proposal for a next-generation heavy-ion experiment exploiting the proton-proton, proton-nucleus, and nucleus-nucleus collisions delivered by the CERN LHC starting of Run5 (beyond 2032), to be installed in the cavern currently hosting the ALICE detector. A Letter of Intent has been submitted in 2022, but a number of physics cases still have to be investigated, in order to fully define the potential of the designed detector for the study of the deconfined phase of hadronic matter named quark-gluon-plasma (QGP), where quarks and gluons are not confined anymore inside hadrons. One of the most promising channels is the study of jet-photon correlations, where the measurement of the photon energy (not affected by the hadronic environment) provides a reference for the energy of the reconstructed jet, allowing to estimate its energy loss. The proposed internship will focus of the study of the performance of the ALICE3 detector for the reconstruction of jets and photons, and the estimation of the expected data sample for the jet-photon correlation candidates. The required work will include a review of the physics processes responsible for particle production in a hadron collider at the TeV energy scale, as well as a discussion of the main particle detection techniques and particle reconstruction algorithms, and will mainly consist in an activity of Monte Carlo simulations of the considered process, and interpretation of results.