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Proposition de stage – Année 2020-2021

Niveau du stage : M2

Durée du stage : 4 Mois

Ouverture éventuelle vers un sujet de thèse : Oui/Non

Type de financement envisagé : Ecole Doctorale

Responsable du stage : Ece Asilar

Téléphone :

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Adresse : IP2I Lyon – Bureau XXX

Domaine Scientifique de la Doua – Bât. Paul Dirac

4 rue Enrico Fermi – 69622 Villeurbanne Cedex - France

Equipe d'encadrement : CMS

Thématique : Experimental high energy particle physics – CMS experiment

Intitulé du stage : Classification of gamma + b jet events and QCD multi jets events using deep neural networks

Description du travail demandé :

The proposed stage topic is directly contributing to the just started first measurement of differential cross section of photon production in association with b quarks in hard parton-parton interaction at 13 TeV using the data provided by CMS experiment in Run 2. Measuring the cross section ratio of events with 2 b quarks to 1 b quarks provides an important test of perturbative QCD predictions additionally the parton density functions of b quarks and gluons. Having the last cross section measurement of this process from ATLAS experiment at 8 TeV leading CMS physicists to perform the analysis urgently but at the same time in a robust way. The largest background for this process is composed of QCD multi jet events. It is crucial to obtain a reliable separation of signal and background events. Therefore, we propose to use deep learning classification.

Currently, the ongoing analysis has been performed by 1 post-doc and 1 PhD student. Even though the high level experience of the post-doc in deep learning techniques is promising for the analysis, it is crucial for the group to have a student that will build deep learning models while the other group members are overcoming the various other investigations for the final measurement.

Besides being very enthusiastic about Standard Model physics and Artificial intelligence, having good python programming skills will be favourable. Knowledge on Keras and Tensorflow is a bonus.

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Internship offer – Year 2020-2021

Internship level: M2

Duration: 4 mois

Possible PhD follow up: Yes/No

Proposed PhD funding type: Ecole Doctorale

Supervisor: Ece Asilar

Phone:

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Address: IP2I Lyon – Bureau XXX

Domaine Scientifique de la Doua – Bât. Paul Dirac

4 rue Enrico Fermi – 69622 Villeurbanne Cedex - France

Mentoring team: CMS

Research field: Experimental high energy particle physics – CMS experiment

Internship title: Classification of gamma + b jet events and QCD multi jets events using deep neural networks

Work description:

The proposed stage topic is directly contributing to the just started first measurement of differential cross section of photon production in association with b quarks in hard parton-parton interaction at 13 TeV using the data provided by CMS experiment in Run 2. Measuring the cross section ratio of events with 2 b quarks to 1 b quarks provides an important test of perturbative QCD predictions additionally the parton density functions of b quarks and gluons. Having the last cross section measurement of this process from ATLAS experiment at 8 TeV leading CMS physicists to perform the analysis urgently but at the same time in a robust way. The largest background for this process is composed of QCD multi jet events. It is crucial to obtain a reliable separation of signal and background events. Therefore, we propose to use deep learning classification.

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