SEMPARIS – Séminaires en région parisienne

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Cours

Vendredi 24 Janvier 2020, 10 :00
IPHT, Salle Claude Itzykson, Bât. 774(https ://courses.ipht.cnrs.fr/ ?q=en/node/246)
Domaines : hep-ph—hep-th

Titre : *Exploring High-Energy Physics with Jets (3/5)*

Orateur : **Gregory Soyez (IPhT)**

Résumé : *This series of lectures is primarily associated with collider physics where one seeks to learn about fundamental interactions by colliding particles at high energy and by studying the products of these collisions. In this sense, talking about jets is essentially talking about the highly-energetic quarks and gluons produced in these collisions and their dynamics governed by the strong interaction. This is ubiquitous in all recent colliders and jets are (to varying degrees) present in almost all aspects of collider phenomenology. This set of lectures is mostly two-folded : on one side it will try to give a taste of the broad range of aspects and applications of jet physics, on the other side it will show how it is rooted in (perturbative) Quantum Chromodynamics (QCD). Lecture 3/5 - Jet substructure (concepts and applications) :This will introduce the field of jet substructure and cover its broad range of phenomenological applications. In a nutshell, jet substructure was born about 10 years ago realising that looking at the internal structure of jets brought new physics opportunities. This field is now established as a common tool in collider phenomenology. I will introduce the main ideas behind jet substructure techniques, describe a few of them in more details. I will discuss applications to new physics searches, precision calculations, heavy-ion collisions and Deep Learning techniques. Remarks :In terms of reference material, most of material covered in the lectures can be found in the set of Springer Lecture Notes "Looking Inside Jets : an introduction to jet substructure and boosted-object phenomenology" (arXiv :1901.10342). Some of the material covered in the first lecture can also be found in the review "Towards Jetography" (arXiv :0906.1833) as well as in standard QCD textbooks (e.g. "QCD and collider physics" by Keith Ellis, James Stirling and Brian Webber). The first and third lectures will be oriented towards concepts and*

phenomenological aspects. While keeping physics consequences as a target, lectures 2, 4 and 5 will focus more on calculations in the context of perturbative QCD. Note however that this is a tentative plan : I am happy to make adjustments if, in the course of the lectures, it appears that some aspects are worth exploring in more details or some different directions worth being introduced.
