

Doctoral School Course 2021

Title: Quarkonium-Production Phenomenology

Teacher :

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Duration : 30h overs 5 days.

Langue du cours: English

Prerequisite: Elementary particle physics

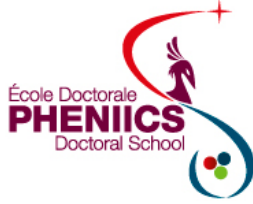
Summary

This course will introduce the students to the different models used to describe quarkonium production in different collision systems both in the inclusive and exclusive cases. Then we will address how they can be used to learn about the nucleon and nucleus structure including their spin content, about the strongly interacting matter produced in ultra-relativistic nucleus-nucleus collisions and more generally about the interface between the perturbative and non-perturbative aspects of QCD. The course will cover the corresponding relevant theoretical, experimental and phenomenological aspects.

Provisional Program

Day 1 – Introduction to heavy-quark and quarkonium production

- The November Revolution and the discovery of the charm quark
- What is a quarkonium ?
- Introduction to heavy-quark production
- Introduction to the quarkonium-production models
- Excited states, production modes and decay channels
- A word on the importance of radiative corrections



Day 2 – Applications I (e.g. nucleon & nuclear structure)

- Introducing GPDs & TMDs
- Quarkonia, Parton Distribution Functions and Generalised Parton Distributions
- More on TMD studies in inclusive quarkonium production
- More on GPD studies in exclusive quarkonium production
- Double Parton Scattering studies in quarkonium production
- Nuclear effects involved in hard scatterings in proton-nucleus collisions

Day 3 – Application II (e.g. nucleus-nucleus collisions)

- Introduction to the Quark-Gluon Plasma
- “QGP studies” with quarkonia
- Back to proton-nucleus and proton-proton collisions
- Quarkonium studies in (ultra) peripheral collisions (incl. GPDs)

Day 4 – Hands on

- Hands on MG5aNLO & HELAC-Onia Web via NLOAccess

Day 5 – Hands on

- Hands on MG5aNLO & HELAC-Onia Web via NLOAccess

Schedule

		9:30 – 12:30	14:00 - 17:00
Monday	5/7/2021		
Tuesday	6/7/2021		
Wednesday	7/7/2021		
Thursday	8/7/2021		
Friday	9/7/2021		

Location :

IJCLab – Orsay
Building 100
Room to be fixed