Recent Advances in perturbative Quantum Chromodynamics

Overview

Quantum Chromodynamics (QCD), which is the well-established theory of strong interactions, is a non-abelian gauge theory based on symmetry group SU(3). A central idea in the theory is that of asymptotic freedom which enables us to describe hard scattering processes at high energy colliders like the Large Hadron Collider (LHC) using QCD perturbation theory. Current and future research in high energy physics (HEP) is focused on the searches for indications of New Physics (NP) in the experiments. Perturbative QCD (pQCD) has an important role to play there as it forms the background which needs to be well understood and separated from the NP signal. Moreover, understanding the fundamental dynamics of a non-abelian gauge theory at the perturbative level has clear intrinsic interest. For these reasons, QCD continues to be at the centre of HEP research providing many effective theoretical and computational tools.

The course shall introduce the students to recent developments in the area of pQCD. This is an advanced course in continuation of the introductory QCD GIAN course taught by Prof. Eric Laenen in 2016. The course shall begin with an introduction to QCD for the benefit of new participants and will then focus on advanced topics and thus will be useful both for a beginning Ph.D. student as well as senior research students and advanced researchers.

Dates	**3nd November, 2020- 11th November, 2020**
Host Institution	**University of Mumbai**
Topics	*1 .Review of basics of QCD and infrared aspects* *2. .Factorization and Resummation* *3. Next to soft corrections* *4. Helicity amplitude methods and recursion relations* *5. Introduction to soft-collinear effective theory* *6. Brief introduction to recent techniques for loop integrations*
You should attend If…	• You are a *Ph. D. students working in the area of theoretical and experimental High Energy Physics (HEP)* • You are a post-doctoral fellow or young researchers in HEP • You are senior colleague in a university or national institute and find the course useful due to specialized topics
Registration Fees	*The participation fees for taking the course is as follows:* ***Ph. D. Students : Rs . 2000.00*** ***M.Sc, Students : NIL*** ***Participants from abroad : US 200.00*** ***Senior Faculty from Academic Institutions : Rs. 5000.00*** *The above fee include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.* ***Mode of payment: Demand draft in favour of "Finance & Accounts Officer, University of Mumbai" payable at Mumbai*** ***The demand draft is to be sent to the Course Coordinator at the address given below.***
Accommodation	***The participants may be provided with hostel accommodation depending on the availability, on payment basis.*** ***Request for hostel accommodation may be submitted by sending a mail at GIAN_QCD@mu.ac.in***

The Faculty

Prof. Eric Laenen
Professor in Theoretical Physics,
University of Amsterdam Research Interest: High Energy Collider Phenomenology and QCD

Prof. Eric Laenen is an internationally renowned expert in the area of high energy collider phenomenology and Quantum Chromodynamics. He received his Ph.D. from Stony Brook University, and held postdoctoral positions at Fermilab and CERN. Prof. Laenen is the head of the theory group at Nikhef, Amsterdam, Netherlands since 2005. He is also Professor of Theoretical Physics at the University of Amsterdam and at Utrecht University.

Prof. Eric Laenen has wide teaching experience and has given lectures at more than 15 international schools in HEP including the prestigious CTEQ school and the European CERN School in High Energy Physics.

Prof. Anuradha Misra
Professor and Head of the Department,
University Department of Physics, Mumbai University
Research Interest: Quantum Chromodynamics and Light-front field theory

Prof. Anuradha Misra works in the area of Quantum Chromodynamics and Light Front Field Theory. She received her Ph.D. from I.I.T., Kanpur. After teaching for a year at Stony Brook University as a guest lecturer, she has been teaching at the University of Mumbai for last 25 years.

Prof. Anuradha Misra has long experience of teaching at M.Sc. and Ph.D. levels and has taught at a number of SERC THEP schools and other advanced national and international schools and workshops in India.

Course Co-ordinator

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[Under the aegis of MHRD- Global Initiative of Academic Network (GIAN)]

(November 3- 11, 2020)

Registration Form

Title (Mr./Ms./Mrs./Dr./Prof.):

Full Name:

Designation:

(For students, name of the course and the year are to be mentioned clearly)

Name of the Institution:

Address for Correspondence:

E-mail:

Phone:

Accommodation Required: **YES/NO**

Exemption from Registration Fee Required **YES/NO**

(If yes, give reason within 50 words on a separate sheet)

Reason for Participation:

(Within 150 words on a separate sheet)

Place: **(Signature of the Applicant)**

Date:

Forwarded by HOD/Supervisor

Note: Duly filled-up signed and scanned registration form should be sent to the e-mail id: ***GIAN_QCD@mu.ac.in*** before August 17, 2020.