Introduction to Light-Front Hadron Physics

Overview

In the past few years, there has been enormous progress in the area of perturbative Quantum Chromodynamics (pQCD) - the successful theory of strong interaction, leading to new theoretical tools and increasingly precise predictions of cross sections and decay widths, etc. Theoretically predicted quantities are studied by experimentalists at facilities like Large Hadron Collider at CERN and Continuous Electron Beam Accelerator Facility at JLab with 12 GeV upgrade for an understanding of the fundamental constituents of matter and the forces amongst them.

One of the challenges in strong interaction physics is to provide consistent descriptions of the structure of mesons, baryons and also particles beyond the constituent quark model, which require solving bound state problems arising in quantum chromodynamics (QCD). QCD bound states are strong coupling nonperturbative solutions that cannot be generated from perturbation theory.

The quantization of QCD at equal light-front (LF) time provides a first-principle method for solving nonperturbative QCD. Light-Front Hamiltonian quantization promises to provide a nonperturbative framework for calculating important observables such as scattering amplitudes, decay rates, spin effects, parton distributions, and other hadronic observables. Indirectly, the comparison of these calculations to experimental data can illuminate novel QCD effects.

The aim of the present course is to introduce students to the basics of Light-Front Field Theory, in particular Light-Front QCD, and to prepare them with some useful theoretical tools for the research in hadron physics.

The course will be followed by the International Light Cone Conference, Light Cone 2017 (LC 2017): Frontiers in Light-Front Hadron Physics: Theory and Experiment.

Dates	**11th September- 16th September, 2017**
Host Institution	**University of Mumbai**
Topics	• *Introduction to QCD and Light-Front Field Theory* • *Light- Front QCD : Theory and applications* • *Light-Front Holography* • *Superconformal Algebra and QCD* • *Principle of Maximum Conformality and Perturbative QCD* • *Novel QCD Physics*
You should attend If…	• You are a *Ph. D. student working in the area of theoretical and experimental High Energy Physics (HEP)* • You are a post-doctoral fellow or young researcher in HEP

	• You are a 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 . 1200.00*** ***M.Sc, Students : NIL*** ***Participants from abroad : US $100.00*** ***Senior Faculty from Academic Institutions: Rs. 2500.00*** *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.*** ***Overseas applicants should contact the course coordinator for information about the mode of payment.***
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***

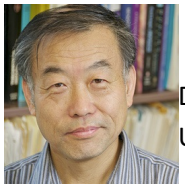
The Faculty

Stanley J. Brodsky , Professor

Theoretical Physics, SLAC National Accelerator Laboratory, Stanford University, USA.

Area of Research: High-energy theoretical physics, light-cone quantization, perturbative and non-perturbative quantum chromodynamics (QCD); especially exclusive processes and the quark-gluon structure of hadrons in QCD; fundamental problems in atomic and nuclear physics.

Prof. Stanely J. Brodsky is an internationally acclaimed theoretical physicist and professor at the SLAC National Accelerator Laboratory at Stanford University, USA. Brodsky obtained Ph.D. in 1964 from University of Minesota, where his advisor was Donald Yennie. After two years of post-doctoral studies (1964-66) at Columbia University, he joined SLAC in 1966 and became a Professor in 1976. He directed SLAC's Theory Group from 1996 to 2002. Professor Brodsky's research has been focused mainly in the area of perturbative and non-perturbative quantum chromodynamics along with the light cone quantization. He was the 2007 recipient of the Sakurai Prize for Theoretical Particle Physics, for "applications of perturbative quantum field theory to critical questions of elementary particle physics, in particular , to the analysis of hard exclusive strong interaction processes." In 2015, he received the Pomeranchuk Prize, an international award for theoretical physics. He has also received the U.S.Distinguished Scientist Award from the Alexander von Humboldt Foundation.



Chueng R. Ji, Professor

Department of Physics, North Carolina State University, USA.

Area of Research: Quantum Chromodynamics, Light-cone physics , Hadron Phenomenology.

Professor Ji received his Ph.D. in 1982 from Korea Advanced Institute of Science and Technology (KAIST), where his advisor was Professor Jae Kwan Kim. He has worked at SLAC, USA, as a visiting scholar and as a postdoc at Stanford University and at Brooklyn College of the city university of New York as a postdoctoral research associate. He is a Professor at North Carolina State University, Raleigh, USA. Professor Ji has developed a relativistic quark model motivated by quantum chromodynamics (QCD) to describe hadron structure and spectrum. He has pioneered the idea of connecting the instant form dynamics and light front dynamics. He has contributed immensely to the idea of utilizing the light cone in solving relativistic bound state and scattering problems. He is the fellow of American Physical Society and the Chair of the International Light Cone Advisory Committee.

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

Course Co-ordinator

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

(September 11-16, 2017)

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 July 31, 2017.