LIGHT CONE 2017
SPECIAL LECTURES

Exciting Odyssey in the Femto-World

By

RAJIV V. GAVAI
TIFR, Mumbai

Prof. Gavai is currently a Senior Professor of the Theoretical Physics department at TIFR. He has distinguished himself in the field of lattice quantum chromo dynamics (QCD) and quark-gluon plasma (QGP). Amongst his many important results on the phase diagram of strongly interacting matter, the chief ones are the existence of a chiral phase transition, the order of this transition and the location of its critical point. His work was the first one to establish the importance of perturbative QCD in evaluating signals of QGP.

The familiar gas–liquid critical point, discovered in the nineteenth century, is not only a rare point in the temperature-density phase diagram but has several remarkable properties. A supercritical fluid, which exists in the region beyond the critical point, can for instance flow like a gas in a solid but act as a solvent like a liquid. Indeed, supercritical fluid extraction is now recognised as a green technology for production of essence from herbs and plants. Strongly interacting matter, which makes up the nuclei of atoms, is described by a theory called quantum chromodynamics (QCD). A critical point in the phase diagram of QCD, if established either theoretically or experimentally, would be at least as profound a discovery as the gas–liquid critical point. Due to the extremely short-lived nature of the concerned phases, novel experimental techniques are needed to search for it. The Relativistic Heavy Ion Collider (RHIC) in USA has an experimental programme which can fit the bill to do so. Theoretical techniques of Lattice QCD, which is QCD defined on a discrete space-time lattice, have provided glimpses into where the QCD critical point may be, and how to search for it in the experimental data. This talk will aim to provide glimpses of this exciting area of research.

TIME : 9:00 am – 10:00 am

Experiments with "Spin": Clever techniques, bizarre results & transformational lesson in QCD & beyond

By

ABHAY DESHPANDE
Stony Brook University &
Brookhaven National Laboratory, USA

In the 1980's and 1990's clever techniques were developed to pursue never before imagined experimental investigations to understand the nucleon's spin. Bizarre results (called the "Spin Crisis") resulted in a lot of attention of physicists to this problem in the following decades. Experiments at BNL, Jefferson Lab, and CERN have further investigated the origin of nucleon spin with complementary experimental approaches, and have led to a complex picture of the quark-gluon collective interactions inside the nucleon, miraculously summing up to the nucleon's spin. This needs to be experimentally confirmed. An Electron Ion Collider currently being designed in the US has the potential to do do just that, and complete the picture of the nucleon as a "3D" object with transverse and longitudinal position & motion of quarks coupled to he gluons. In this talk, I will take you on the journey of the "nucleon spin" investigations in 3-acts: 1st: the discovery of spin crisis with a polarized muon beam at CERN, 2nd, precision experiments with polarized proton beams at RHIC at BNL and polarized electrons at Jefferson Lab and 3rd, the future promise of the Electron Ion Collider. In the end we will speculate about the deeper connection of the nucleon spin to some of the very fundamental properties of QCD.

Prof. Abhay Deshpande works in experimental nuclear physics. His current research includes various exploratory and precision studies in QCD using polarized proton-proton, proton-nucleus and nucleus-nucleus beams of the Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Laboratory on Long Island; and high intensity polarized electron beams of the recently upgraded Continuous Electron Beam Accelerator Facility (CEBAF) at Thomas Jefferson National Laboratory, in Newport News, Virginia.

TIME : 10:00 am – 11:00 am

VENUE: *Green Technology Auditorium, Kalina Campus, University of Mumbai*

DATE : 19th *September 2017, Tuesday*

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LIGHT CONE 2017
SPECIAL LECTURES

Supercomputers And New Paradigms Of Physics

By

JAMES VARY

Iowa State University, USA

Prof. James P. Vary is Professor of Physics and Past Director of the International Institute of Theoretical and Applied Physics (IITAP) at Iowa State University (ISU). He joined the faculty at Iowa State University in 1975 and has fostered the development of a high-energy nuclear theory group. Professor Vary's research activities span strong interaction physics from ab-initio nuclear structure theory to include fundamental tests of nature's symmetries and to nuclear applications of Quantum Chromodynamics (QCD). Computational physics is another major area of emphasis.

Continued growth in supercomputer capabilities and the development of new computational methods are leading to major advances in our understanding of the natural world at the macro and the micro levels. We are witnessing breakthroughs in our knowledge of amazing phenomena ranging from cataclysmic astrophysics events to climate change to collisions in the subatomic world. Physics itself is changing from the traditional dual approach of experiment and theory to an approach that features the addition of knowledge from computer simulations. Speculations abound on where physics is heading especially since the uncharted future includes the emergence of artificial intelligence and quantum computing.

TIME : 3:30 pm – 4:30 pm

Quarks, Gluons, and the Origin of Mass

By

ROBERT MCKEOWN

Jefferson Laboratory &
The College of William and Mary, USA

We have known for decades that the nucleus of the atom is comprised of protons and neutrons which themselves contain quarks and gluons. However, the mechanism of quark and gluon confinement and the origin of emergent properties of nucleons like spin and mass are still poorly understood. New experimental techniques and new theoretical developments promise to shed light on these mysteries of the subatomic world.

Prof. Robert D. McKeown has been the deputy director for science at Jefferson Lab since May 2010. He also serves as a Governor's Distinguished CEBAF Professor at The College of William and Mary. McKeown's research interests include studies of weak interactions in nuclei, neutrino oscillations, parity-violating electron scattering, and the electromagnetic structure of nuclei and nucleons

TIME : 4:30 pm – 5:30 pm

DATE : 19th September 2017, Tuesday

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LIGHT CONE 2017

Frontiers in Light Front Hadron Physics : Theory & Experiment

18 - 22 September 2017 | University of Mumbai, India

PROGRAM SCHEDULE FOR 19TH September 2017

09:00-09:15	Welcome address by Prof. Vaishali Bambole, Head, Department of Physics		
	Chair: Stanley Brodsky		
09:15-10:15	Rajiv Gavai	Tata Institute of Fundamental Research, India	Exciting Odyssey in the Femto-world (Public Lecture)
10:15-11:15	Abhay Deshpande	Stony Brook University, USA	Experiments with "spin": clever techniques, bizarre results and transformational lessons in QCD & beyond (Public Lecture)
11:15-11:45	Tea Break		
	Chair: Robert McKeown		
11:45-12:15	Prolay Kumar Mal	National Institute of Science Education and Research, India	Highlights from the CMS experiment
12:15-12:45	Ivana Hristova	Humboldt University of Berlin, Germany	Future plans of the ATLAS collaboration for the HL-LHC
12:45-14:00	Lunch Break		
	Chair: Carlos Camacho		
14:00-14:30	Seema Bahinipati	Indian Institute Of Technology Bhubaneswar, India	Physics prospects of exotic and conventional bottomoniums at Belle II
14:30-15:00	Abhay Deshpande	Stony Brook University, USA	The Science and Opportunities at the US Electron Ion Collider
15:00-15:15	Tea Break		
15:15-15:30	Address by Hon'ble Vice Chancellor, University of Mumbai Vote of Thanks - Dr. Radha Srinivasan		
	Chair: Piet Mulders		
15:30-16:30	James Vary	Iowa State University, USA	Supercomputers and new paradigms of physics (Public Lecture)
16:30-17:30	Robert McKeown	Thomas Jefferson National Accelerator Facility, USA	Quarks, Gluons, and the Origin of Mass (Public Lecture)
17:30	High Tea		

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