

SCOPE OF THE MEETING:

The purpose and scope of this *Physical Sciences Symposia-2013* is to provide a forum for the discussion of the current state of the art of rapidly evolving Crystal & Graphene Science, Quantum Science and New Particle Science highly interdisciplinary fields.

Physical Sciences Symposia-2013 will have three parallel theme meetings:

1. Crystal & Graphene Science Symposium (CGSS)-2013:

This is our Second international theme conference, the first one held at this same location on September 5-6, 2012, which was inaugurated by Paul Steinhardt of Princeton, Antonio Castro Neto of National University of Singapore and Charles Lieber of Harvard University.

Graphene is the basic structural element of some carbon allotropes including graphite, charcoal, carbon nanotubes and fullerenes. Buckyball is a spherical fullerene molecule (C_{60}) with a cage-like fused-ring structure which resembles a soccer ball (this discovery brought 1996 Nobel prize in chemistry to Kroto, Curl and Smalley). Carbon nanotubes (CNTs) are allotropes of carbon with a cylindrical nanostructure. These cylindrical carbon molecules have unusual properties, which are valuable for nanotechnology, electronics, optics, and material science. The promising properties of the graphene have been extensively demonstrated by Andre Geim and Konstantin Novoselov (2010 Physics Nobel Prize recipients). The graphene (in general nanotechnology) has attracted a much attention these last years from both academic and industry laboratories, so we combined these three (carbon nanotubes, fullerenes and graphenes) areas, grouped in to '*Graphene Science*.'

Study of design/synthesis of functional solid-state structures including organic molecular crystals and metallo-organic-polymers described as 'crystal engineering'. Quasicrystals are unique form of solid; they exist universally in many metallic alloys and some polymers. Discovery of these quasicrystals revealed a new principle for packing of atoms and molecules that led to a paradigm shift within chemistry (Dan Shechtman, discoverer of these new materials won the Chemistry Nobel prize in 2011). Liquid crystals are a state of matter that has properties between those of a conventional liquid and those of a solid crystal; and have analogies between superconductors and magnetic materials. On the other hand, nanocrystals are aggregates of any where from a few hundred to tens of thousands of atoms that combine into a crystalline form of matter known as a 'cluster.' In recent years researchers have grown nanocrystals out of semiconductor powders; those are in sub-10nm size range (called as, quantum dots). Supramolecular chemistry refers to the area of chemistry beyond the molecules and focuses on the chemical systems made up of a discrete number of assembled molecular subunits or components. This field has established links between fabrication and structure on the one hand, and properties of the produced superstructures on the other hand, with an emphasis on energy, life science, and electronics applications. Both crystal and supra molecular chemistry has attracted attention during last few years from both academic and industry laboratories, so we combined these areas, grouped in to 'Crystal Science.'

2. Quantum Science Symposium (QSS) USA-2013:

Quantum Science Symposium (QSS)-2013, is our Third international symposium in the physical sciences series to be held at the Hilton Garden Inn, Waltham, western suburb of Boston, Massachusetts, USA. The first meeting was organized in Cambridge, Massachusetts, USA at the Courtyard Marriot near Harvard University and Massachusetts Institute of Technology on September 26-27, 2011, which was inaugurated by MIT Physics Nobel Laureate Professor Frank Wilczek. The second meeting was held at the prestigious Peterhouse (college) of the University of Cambridge, United Kingdom on November 1-2, 2012, which was presided by Professors David Ritchie and Stephen Blundell of the University of Cambridge and Oxford respectively. The purpose and scope of this symposium is to provide a forum for the discussion of the current state of the art of rapidly evolving Quantum Science field.

Although quantum physics/mechanics was an old topic widely popularized by German Physicist Erwin Schrödinger during 1940's and American Physicist Richard Feynman during 1980's, however, the

progress made over the last decade in quantum science (includes information, computing and communication) has provided groundwork for quantum cryptography and quantum networks to become a reality. In parallel, molecular spintronics, quantum optics, nanophotonics, entanglement to quantum memories also advanced at a rapid speed. The cross-disciplinary merger of quantum physics and nanophotonics with principles of networking in communication opens new perspective for developing modern quantum communication applications with an eye on practical devices. In this theme meeting, we will high light quantum information, quantum computing, quantum communication, quantum plasmonics/spintronics, and quantum biology. Additionally, the applications of graphenes with respect to quantum science will be focused, most importantly: graphene use as a quantum liquid, quantum transport in tri-layered graphenes, graphene transistors and nanoribbons. Quantum repeaters, gates and computation built on a single module will be also addressed using trapped ions, qubits and integrated photonics. Quantum biology refers to the applications of quantum mechanics to biological objects and problems. Especially quantum tunneling, entanglement in biology, and development of a new generation of quantum dots for biological imaging will be addressed. The branch of quantum spintronics and quantum computing has attracted a much attention in recent years from both academic and industry laboratories, so we combined and grouped into 'Quantum Science.'

3. New Particle Physics Symposium (NPPS) USA-2013:

New Particle Physics Symposium (NPPS)-2013, is our first international symposium in the high-energy Particle and Astro Particle Physics sciences series to be held at the Hilton Garden Inn, Waltham, western suburb of Boston, Massachusetts, USA.

Particle physics is the study of the elemental building blocks that make up matter. These particles named such as quark, fermion, lepton and boson cannot be subdivided. These particles exist and interact within several unseen '*fields*' that permeate the universe. The field that generates mass for objects was named for UK Physicist Peter Higgs, who in the 1960s was one of the first scientists to put line a working theory on how elemental particles achieve mass. The existence of Higgs particle was first predicted in 1964 by three groups independently-Francois Englert and Robert Brout, Peter Higgs, and Gerald Guralnik, Carl Hagen, and Tom Kibble. Boson in general was named after the Indian mathematical physicist Satyendra Nath Bose, who together with Einstein, described their behavior. This theme meeting will focus on the fundamental constituents of matter and their interactions most importantly on the Higgs Bosons, Fermions, Leptons, quarks and other super symmetric particles. Both theoretical and experimental framework studies of CERN's Large Hadron Collider and ATLAS studies will also be discussed. Additionally, the importance of these fundamental particles with respect to astro physics and cosmology will be emphasized. The branch of particle physics and astro physics has attracted a much attention in recent years from both academic and industry laboratories, so we combined and grouped into 'New Particle Physics.'

In this international meeting, prominent researchers (theoretical and experimental physicists, organic, inorganic and physical chemists, materials scientists, biologists, electrical, electronic and computer engineers) from both academia and industry will gather and discuss the applications in form of keynote lectures, invited talks, short oral, and poster presentations.

Note: All the members (except keynote speakers) who participate in this symposium have to register for the meeting by paying the appropriate registration fee.

Venue: Hilton Garden Inn (420 Totten Pond Rd, Waltham, Massachusetts, USA), is recently renovated star hotel (with all amenities) near the Rt. 95/128 high-tech corridor. The hotel is well connected to Boston and Cambridge by bus transportation. Waltham is a western suburban city ten miles away from Boston, named after town in England. Waltham is the hub for several information technology, and biotech companies. Waltham also known as a watch-manufacturing city, and home for Brandeis and Bentley Universities.