Fourth Annual APCTP-WCU Focus Program: "From Dense Matter to Compact Stars in QCD and hQCD"

The fourth annual APCTP-WCU Focus Program was held at the Asia Pacific Center for Theoretical Physics (APCTP), Pohang, Korea from April 14 - 24, 2013. This was a part of a long-term program which was proposed as one of the co-operative activities between the 5-year WCU -Hanyang program on 'Hadronic Matter under Extreme Conditions' and the APCTP Focus Program to enhance scientific activities on a global standard. The organizing body consists of Mannque Rho (CEA / Hanyang, principal organizer), Sang-Jin Sin (Hanyang), Hyun Kyu Lee (Hanyang) and Youngman Kim (IBS).

Since the first session of this program was held in August 2010, the program has continued successfully with main topics that have included a general overview of the phase structure of hadronic matter in both temperature and density from quantum chromodynamics (QCD) and holographic QCD (2010), the high density EoS relevant to compact stars (2011) and EFT approaches to EoS (2012). This year, the fourth session was focused on large N_c QCD and dense compact-star matter. Particular emphasis was placed on the role of topology in baryonic matter that figures when the baryons are described as skyrmions and put on the lattice to simulate dense matter. This is a unconventional approach that is just beginning to be explored. The core participants included M. Harada (Nagoya), D.-K. Hong (Pusan), S. P. Kim (Kunsan), Y. Kim (IBS), C.-H. Lee (Pusan), H.K. Lee (Hanyang), Y.-L. Ma (Nagoya), L. McLerran (BNL), Y. Oh (Kyungpook), B.-Y. Park (Chungnam), M. Rho (CEA Saclay/Hanyang), C. Sasaki (FIAS), S.-J. Sin (Hanyang), P.M. Sutcliffe (Durham), and I. Zahed (Stony Brook). The traditionally "free-style" structure of this program consisted of one or two talks/lectures in the morning and free or organized discussions and/or research work in the afternoon.

The primary objective of the APCTP-WCU focus program was to explore the structure of hadronic matter that has defied theoretical efforts to date; namely, cold compressed baryonic matter that is currently inaccessible by lattice QCD theoretically and unexplored experimentally. For this objective, leading experts in particle/hadron/nuclear physics, astrophysics and string theory (gauge/gravity duality) were brought in from abroad to help confront the common theme of dense matter relevant to the interior of compact star matter. The lectures, talks and discussions, which were conducted in an informal and spontaneous atmosphere, led to success in charting a direction to meet the challenge posited by the problem and a possible avenue to confront not only the compact-star observables, present and up-coming, but also and perhaps more poignantly, the experimental data that will be made available in the near future from various accelerators under construction, including the RIB-machine in Korea "RAON."

Hyun Kyu Lee earned his B.S. from Seoul National University in 1973 and his M.S. and Ph.D. from KAIST in 1975 and in 1979, respectively. Before joining Hanyang University, he was at CEA Saclay in France, ICTP in Italy and taught at SUNY, Stony Brook in the United States and University of Alberta in Canada. Professor Hyun Kyu Lee is presently engaged in the researches in Astrophysics and Particle Physics.