

HK 44: Plenary VI

Time: Wednesday 11:00–13:00

Location: Audi-Max

Invited Plenary Talk HK 44.1 We 11:00 Audi-Max
Symmetries and phase transitions in nuclei — ●FRANCESCO IACHELLO — Yale University, New Haven, CT, USA

Quantum Phase Transitions (QPT) are phase transitions that occur as a function of a coupling constant in the quantum Hamiltonian describing the system. Atomic nuclei provide examples of quantum shape phase transitions. The phases of the system are different geometric structures of nuclei characterized by different dynamic symmetries, $U(5)$, $U(3)$ and $SO(6)$, corresponding to spherical, axially deformed and so-called γ -unstable shapes. The shape phase diagram of nuclei will be discussed. It will be shown that the transition from spherical, $U(5)$, to axially deformed, $U(3)$, is first order, between spherical and γ -unstable, $SO(6)$, is second order, and between axially deformed and γ -unstable is a crossover. Critical exponents and scaling behavior, i.e. dependence on the number of particles, N , will also be discussed. Recently, it has been found that at the critical value of a QPT, a new symmetry emerges, called "critical symmetry", and related to scale invariance. In the second part of this talk, this (unexpected) symmetry will be discussed and experimental examples shown. Finally, the role of supersymmetry in phase transitions in mixed systems of bosons and fermions will be mentioned. QPT in nuclei provide one of the best experimentally verified examples of phase transitions in physics.

Invited Plenary Talk HK 44.2 We 11:45 Audi-Max
ALICE at the dawn of LHC — ●KAI SCHWEDA for the ALICE-Collaboration — Physikalisches Institut, University of Heidelberg, Germany

A Large Ion Collider Experiment (ALICE) will study QCD-matter under extreme conditions of temperature and energy density. The current status of the experiment, its instrumentation and performance capabilities are presented. The ALICE physics potential is highlighted by discussing a few selected measurements scheduled for first proton collisions expected in the second half of 2009 and subsequent collisions of lead nuclei at LHC.

Invited Talk HK 44.3 We 12:30 Audi-Max
NuPECC: A New Long Range Plan for Nuclear Physics in Europe — ●GUNTHER ROSNER — Physics Dept., Univ. of Glasgow, Glasgow G12 8QQ, UK

A brief account will be given of the current activities of the Nuclear Physics European Collaboration Committee, NuPECC, which is the Nuclear Physics expert board of the European Science Foundation, ESF. The talk will concentrate on initiating the process of writing a new Long Range Plan for Nuclear Physics in the next decade by discussing procedures, content and timelines.