T 44: Eingeladene Vorträge (Invited Topical Talks) I

Time: Wednesday 14:00–16:00 Location: H-Aula

Invited Topical Talk T 44.1 Wed 14:00 H-Aula
Cosmic Particles at Extreme Energies — •Michael Unger — KIT, Karlsruhe, Germany

Cosmic rays are the highest energy messengers of astrophysical phenomena in the Universe. The sources of these particles are unknown and it is one of the great puzzles of modern astrophysics how they are accelerated to macroscopic energies of >10^20 eV. In this talk I will highlight recent experimental results on ultrahigh-energy cosmic rays and discuss their implications on our understanding of the physics and astrophysics at extreme energies.

Invited Topical Talk T 44.2 Wed 14:30 H-Aula
IceCube Upgrade - The next level in precision neutrino physics at the South Pole — •Lew Classen for the IceCube-Collaboration — Institut für Kernphysik, WWU Münster, Münster, Germany

Following the discovery of cosmic high energy neutrinos, a competitive measurement of neutrino oscillation parameters and a strong indiction for the first neutrino point source, plans for extensions of the IceCube neutrino telescope have matured. IceCube Upgrade, a next-generation low-energy neutrino detector, will be installed in the 2022/23 Antarctic summer season and consist of about 700 novel optical sensors as well as state-of-the-art calibration devices distributed along seven strings located in the central region of the existing array. This upgrade will significantly enhance IceCube's capabilities to measure oscillation parameters. In particular, it will allow for measuring tau neutrino appearance in the atmospheric neutrino flux to unprecedented precision. Providing a test for the unitarity of the neutrino mixing matrix, this result will be a sensitive probe for physics beyond the standard model. The enhanced understanding of the detection medium and sensor response will also reduce IceCube's systematic uncertainties, allowing to revisit more than ten years of archival data with an improved directional and spatial resolution. In addition to its compelling science case, IceCube Upgrade will also pave the path towards IceCube-Gen2, the upcoming next-generation high-energy neutrino telescope at the South Pole. The presentation will address the R&D activities towards the Upgrade as well as the resulting physics potential.

Invited Topical Talk T 44.3 Wed 15:00 H-Aula
Exploring coherent neutrino-nucleus scattering with the NUCLEUS experiment — •Raimund Strauss — Technische Universität München

The detection of coherent-neutrino nucleus scattering (CEvNS) opens a new window to study the fundamental properties of neutrinos and to probe physics beyond the Standard Model of Particle Physics. NUCLEUS is a novel cryogenic neutrino experiment at a nuclear power reactor which allows for precision measurements of CEvNS at unprecedentedly low energies. It is based on recently demonstrated ultra-low threshold cryogenic detectors with nuclear-recoil energy thresholds in the 10eV regime. Accessing these energies enables to fully exploit the strongly enhanced cross section of CEvNS which leads to a miniaturization of neutrino detectors. NUCLEUS is fully funded and will be installed at a new experimental site in between the two 4GW reactor cores of the CHOOZ nuclear power plant in France. In this talk I will present recent results from a prototype detector and discuss the experimental strategy as well as the extensive physics program of NUCLEUS.

Invited Topical Talk T 44.4 Wed 15:30 H-Aula
Can beam-dump experiments uncover the hidden sector? — •Markus Cristinziani — Physikalisches Institut, Nussallee 12, Universität Bonn

More than ten years after the first collisions no clear sign for new physics beyond the Standard Model has been revealed at the LHC. However, there are convincing astrophysical and cosmological arguments for the existence of an additional hidden sector, possibly not yet found in laboratory experiments because of their feeble interaction. A promising class of future experiments to probe new particles in the MeV–GeV range are those at beam dumps, characterized by high-intensity beams and long decay lengths, using either protons (such as SHiP at the CERN BDF, NA62 in beam-dump mode and MiniBooNE-DM) or electrons (such as NA64 and BDX). In this talk I will discuss the features, the physics reach and the current status of the planned beam-dump facilities and proposed experiments.