

T 24: Eingeladene Vorträge (Invited Topical Talks) I

Time: Tuesday 14:00–15:30

Location: Tc

Invited Topical Talk T 24.1 Tue 14:00 Tc
Cosmic Particles at Extreme Energies — ●MICHAEL UNGER — Karlsruhe Institute of Technology, 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 24.2 Tue 14:30 Tc
IceCube Upgrade - The next level in precision neutrino physics at the South Pole — ●LEW CLASSEN — WWU Münster, Münster, Germany

Following the discovery of cosmic high energy neutrinos, a competitive measurement of neutrino oscillation parameters and a strong indication 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 24.3 Tue 15:00 Tc
The NUCLEUS experiment - New physics with coherent neutrino-nucleus scattering — ●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 as well as the physics program of NUCLEUS, and give an overview of the growing field of CEvNS.