

Plenary Talk PV I Mon 14:00 Geb. 30.95: Audimax
Overview and perspectives in LHC physics — ●MARUMI KADO
— Max Planck Institute for Physics, Munich, Germany

After nearly 15 years of operations, the LHC is midway of its third run at the energy frontier. Meanwhile the LHC machine and experiments are also preparing in full steam for major upgrades to operate in the high luminosity phase projected to start in 2029. During this phase the LHC is expected to deliver approximately 15 times its current integrated luminosity. In this talk an overview of the main LHC pp collision results and achievements will be given through selected highlights. Challenges and opportunities at Run 3 and beyond at the High Luminosity LHC will be discussed.

Plenary Talk PV II Tue 11:00 Geb. 30.95: Audimax
Twenty years of ultra-high-energy cosmic-ray physics with the Pierre Auger Observatory — ●RALPH ENGEL for the Pierre Auger-Collaboration — Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany

Since the discovery of the first cosmic particle with an energy of about 10^{20} eV, more than one Joule, in the 1960ies, understanding the origin and nature of these particles has been a central goal in astro- and particle physics. The extremely small flux of these particles, which can only be observed indirectly through their gigantic cascades of secondary particles they produce when entering the Earth's atmosphere, has made progress in this field very difficult. With the Pierre Auger Observatory, an detector installation covering an area of 3000 km^2 in Argentina, the so-far largest number of these particles has been detected in unprecedented quality. The Auger Observatory began taking data in 2004 and has since revolutionized our understanding of ultra-high energy cosmic rays. In this talk, we will review the main results of the Auger Observatory and discuss their implications in the context of astroparticle physics.

Evening Talk PV III Tue 19:30 Geb. 30.95: Audimax
Dem unsichtbaren Universum auf der Spur: Neutrinos und Dunkle Materie — ●KATHRIN VALERIUS — Institut für Astroteilchenphysik, Karlsruher Institut für Technologie

Moderne Teleskope gewähren uns heute immer tiefere und immer schärfere Einblicke in den faszinierenden Kosmos. Dennoch bleiben wesentliche Bestandteile des Universums für sie unsichtbar: Die Natur der Dunklen Materie, die den überwiegenden Teil der kosmischen Masse ausmacht, bildet eine der großen ungelösten Fragen der modernen Physik. Ebenso geheimnisvoll sind bis heute die „geisterhaf-

ten“ Neutrinos – subatomare Teilchen mit extrem geringer Masse und nahezu ohne Wechselwirkung mit Materie, die mit ca. 340 Teilchen pro Kubikzentimeter im Universum omnipräsent sind. Beide Elemente des unsichtbaren Universums spielen Schlüsselrollen für die Struktur des Kosmos und im Erkenntnisgewinn an der Schnittstelle von Astrophysik, Teilchenphysik und Kosmologie. Der Vortrag stellt innovative Experimente vor, mit denen Forscherinnen und Forscher vor Ort in Karlsruhe und an einzigartigen Laborstandorten weltweit den Rätseln der Neutrinos und der Dunklen Materie nachgehen, und beleuchtet den aktuellen Stand der Forschung.

Ceremonial Talk PV IV Wed 11:00 Geb. 30.95: Audimax
Particle Physics Through the Ages: A Century of Discoveries and the Road Ahead — ●BEATE HEINEMANN — Deutsches Elektronen-Synchrotron DESY — Universität Hamburg

Particle Physics has made tremendous progress during the past 100 years due to major technological advances in the areas of accelerators, detectors and computing. We have discovered the fundamental constituents of matter, and understood what forces interact between them, and how these forces work in detail. I will present the key scientific advances that led to the current status of particle physics. I will also discuss the important open questions in our understanding of fundamental particles and their role in the early Universe, and how we might be able to get answers to those through future experiments. Throughout the talk I will highlight the breakthroughs that were enabled by Herwig Schopper.

Plenary Talk PV V Fri 11:00 Geb. 30.95: Audimax
Highlights of Neutrino Physics — ●SUSANNE MERTENS — Technical University Munich, Munich, Germany

Neutrinos are one of the most fascinating particles of the Standard Model. Despite major discovery in the last decades, many of their fundamental properties are still unknown. What is their absolute mass, how are the three neutrino masses ordered, is the neutrino its own anti-particle, is CP violated in the neutrino sector, are there more than three neutrino species? Answering these questions would not only deepen our understanding of Particle Physics, but may reveal physics beyond the Standard Model, and play a key role in cosmology. Beyond studying neutrinos themselves, they are also ideal messenger particles to learn about the most violent processes in our cosmos with the help of neutrino telescopes. In this talk, the current and future neutrino experiments will be reviewed and their perspective to unravel some of the most interesting open questions in physics will be highlighted.