Plenarvortrag PV I Di 11:00 HS Chemie

Teilchenphysik - ubi es, cui prodes, quo vadis? — •Siegfried Bethke — Max-Planck-Institut für Physik, Föhringer Ring 6, 80805 München

Mit Abschluss der gegenwärtigen Generation von Grossprojekten in der Teilchenphysik, speziell von LEP, HERA und dem Tevatron, sind Messungen und theoretische Vorhersagen bis weit unter das Prozent- und Promille-Niveau getestet und abgeglichen worden. Das "Standardmodell" der Teilchenphysik, das sind die Eichfeldtheorien der elektroschwachen und der starken Wechselwirkung zusammen mit den bekannten 3 Familien aus Quarks und Leptonen, beschreibt erfolgreich alle derzeit experimentell zugänglichen Prozesse und Phänomene. Dennoch verbleiben grundlegende Fragen, z.B. nach dem Ursprung der Teilchenmassen, der Symmetriebrechungen im frühen Universum, der Natur und der Eigenschaften der unbekannten Dunklen Materie, der Frage nach höheren Raumdimensionen, der Vereinheitlichung zu einer universellen Kraft, sowie die Erkenntnis, dass das Standardmodell nicht wirklich die ultimative Theorie der Materie und der Kräfte sein kann. Eine neue Generation von Projekten bei höchsten Kollisionsenergien, allen voran an dem 2007 in Betrieb gehenden Large Hadron Collider (LHC), wird Aufschluss geben über die "neue" Physik jenseits des Standardmodells. Stand, Sinn und Perspektiven der Teilchenphysik im Lichte von LHC und weiterer Projekte werden aufgezeigt und diskutiert.

Plenarvortrag PV II Di 11:45 HS Chemie

The universe seen in VHE gamma rays — •Thomas Schweizer — MPI für Physik, Föhringer Ring 6, 80805 München

Very high energy gamma ray astronomy is a very fast evolving branch of astroparticle physics. It has the potential to shed light on many questions in the exploration of the nonthermal phenomena in our universe, the search for the origin of cosmic rays, the study of particle acceleration and the history of star formation. Gamma rays are emitted by the most energetic and violent cosmic processes. To be named are phenomena related to supermassive black holes, galactic sources as supernova remnants, pulsars and many more. The Cherenkov telescope imaging technique has proven to be very successful in the detection of VHE gamma rays. Starting from pioneering experiments as WHIPPLE and HEGRA a new generation of Cherenkov telescope experiments such as H.E.S.S., MAGIC, CANGAROO and VERITAS has been launched with a highly improved sensitivity. Many new galactic sources have been detected mainly by the scan of the galactic plane performed by the H.E.S.S. experiment revealing a rich plethora of phenomena. In addition, several very distant extragalctic sources have been detected by both H.E.S.S. and MAGIC. In this talk an overview over this interesting field will be given. An outlook to future projects will be presented.

Plenarvortrag PV III Mi 10:30 HS Chemie

The controversial universe: A historical perspective on the scientific status of cosmology — •Helge Kragh — History of Science Department, University of Aarhus,*Building 1521, 8000 Aarhus, Denmark

Cosmology is a peculiar science which has evolved in a peculiar manner. Indeed, for a long time it has been a matter of debate if cosmology can claim to be a science at all, a question which has not been finally resolved and perhaps never will. One way of dealing with the question is by adopting a historical perspective. For more than a century there have been scientists and philosophers who have denied cosmology a place among the physical sciences, primarily because of its unique domain – the universe. If cosmology is granted the status of a science, what kind of science is it? What are the criteria of truth? Do the laws of nature apply to the universe as a whole? How sound is the conceptual basis of cosmology? Such questions have repeatedly been asked, especially in periods of crisis or when one view of the cosmos has been challenged by another. One such period, which is particularly instructive from a philosophical point of view, was the controversy in the 1950s between the big bang theory and the rival steady state model. One may believe that this discussion is of historical interest only, but I will argue that it is relevant also to the situation in contemporary cosmology.

Preisträgervortrag PV IV Mi 11:15 HS Chemie

Partons and Higgs Detection — •Alan Martin — Physics Department, University Durham — Träger des Max-Born-Preises

A brief graphical explanation of scaling, and its violation, in high energy particle scattering. Why Bjorken x is the appropriate variable. A survey of the determination of the partonic structure of the proton using all available relevant data, including especially those from the HERA experiments at DESY.

Examples of the use of partons for predictions for the forthcoming Large Hadron Collider (LHC) at CERN. A brief motivation for the existence of a Higgs boson. A discussion of the ways to detect the Higgs boson,emphasizing the potential value of the exclusive signal if proton taggers are installed in the extreme forward directions in the LHC experiments. If supersymmetry exists, then, for some ranges of the SUSY parameters, the exclusive Higgs signal could be the discovery channel.

Plenarvortrag PV V Do 11:45 HS Chemie

Quantengravitation: Fragen, Ansätze, Herausforderungen — •Hermann Nicolai — Max-Plnck-Institut für Gravitationsphysik, Potsdam

Die Vereinigung von Quantentheorie und allgemeiner Relativitätstheorie zu einer konsistenten Theorie der Quantengravitation ist eine zentrale Herausforderung der theoretischen Physik in diesem Jahrhundert. Ziel dieses Vortrags ist es, die Fragestellungen und möglichen Lösungsansaetze in moeglichst allgemeinverständlicher und einführender Form zu erklären.