

EP 18: 100 Jahre Hess

Time: Thursday 16:30–19:00

Location: V55.02

Invited Talk EP 18.1 Thu 16:30 V55.02**Origin of cosmic rays: still a mystery** — ●FELIX AHARONIAN — DIAS, 31 Fitzwilliam Place, Dublin 2, Ireland — MPIK, Saupfercheckweg 1, 69117 Heidelberg, Germany

Despite the remarkable achievements in cosmic ray studies via direct measurements of charge relativistic particles, as well as through the probes of cosmic ray densities in different astrophysical environments using high and very high energy gamma-rays, the origin of cosmic rays remains highly uncertain. This concerns both the galactic and extragalactic components of cosmic rays. I will briefly highlight the status of the field, critically review the current models, and discuss the possible breakthroughs in the field expected in the context of future major space and ground-based projects.

Invited Talk EP 18.2 Thu 17:00 V55.02**The Pierre Auger Observatory** — ●MARKUS RISSE — University of Siegen

One century after the seminal balloon flights of Victor Hess, the Pierre Auger Observatory aims at unveiling some of the mysteries of the highest-energy cosmic rays: what are their sources? Is there an end to the spectrum? What kind of particles are they?

The Auger Observatory measures cosmic rays with energies of 10^{20} eV or more by observing the giant air showers created when the particles hit the atmosphere. Located in Argentina, two complementary detector systems are used: an array of 1600 water-Cherenkov detectors distributed over 3000 km², and fluorescence telescopes which monitor the atmosphere above the array in clear nights.

Since 2005, data of unprecedented quantity and quality could be taken. Current, partly surprising results as well as perspectives are discussed within the historical context of cosmic-ray research.

Invited Talk EP 18.3 Thu 17:30 V55.02**Astrophysics with the AMS experiment on the International Space Station** — ●THORSTEN SIEDENBURG — RWTH Aachen, I.Physikalisches Institut B

The Alpha Magnetic Spectrometer (AMS) is a high precision general-purpose particle physics detector that has been constructed in the past twelve years by a group of 600 scientists and engineers from 16 countries for the operation on board of the International Space Station (ISS). In May 2011 AMS was launched with the last flight of the Space Shuttle Endeavour and installed on the ISS. Since the first day AMS is fully operational and delivers high quality measurements of cosmic rays with a precision and a statistical volume never reached before. The status of the experiment and the perspectives for the coming years will be presented.

Invited Talk EP 18.4 Thu 18:00 V55.02**Cosmic ray modulation during the past 10.000 years** — ●FRIEDHELM STEINHILBER and JÜRIG BEER — Swiss Federal Institute of Aquatic Science and Technology, Eawag, Überlandstrasse 133, 8600

Dübendorf, Switzerland

Neutron monitors and ionization chambers have provided a continuous highly resolved record of cosmic ray modulation at Earth for the past about 75 years. To go further back in time one has to rely on cosmogenic radionuclides such as ¹⁰Be and ¹⁴C which provide the unique opportunity to reconstruct the history of cosmic rays over many millennia with relatively high temporal resolution (years to decades). These radionuclides are produced by interactions of cosmic ray particles with the gases of the Earth's atmosphere. After production the radionuclides are distributed in their respective geochemical systems before they get stored in natural archives; polar ice cores in the case of ¹⁰Be and tree rings in the case of ¹⁴C. After presenting similarities and differences between individual records from different locations and of different types, a new reconstruction of cosmic ray modulation over the past 10,000 years will be discussed.

EP 18.5 Thu 18:30 V55.02

Diffusion der kosmischen Strahlung — ●ROBERT C. TAUTZ — Zentrum für Astronomie und Astrophysik, TU Berlin

Das Problem der Streuung der kosmischen Strahlung in turbulenten elektromagnetischen Feldern ist von großer Bedeutung, da die resultierenden Diffusionskoeffizienten für vielerlei Anwendungen wichtig sind. Hierzu zählen z.B. Schockbeschleunigung und die Ausbreitung koronaler Massenauswürfe (CMEs). Im Vortrag wird zunächst ein Überblick über die Ansätze und die Schwierigkeiten bei der vereinfachten analytischen Beschreibung der magnetischen Turbulenz im Vergleich zu In-Situ-Messungen gegeben. Darüber hinaus werden die Herangehensweisen quasi-linearer und nicht-linearer Transporttheorien sowie ihre Ergebnisse im Vergleich mit Monte-Carlo-Simulationen vorgestellt.

EP 18.6 Thu 18:45 V55.02

LOPES - ein Detektor für kosmische Strahlung, Blitze und Solare Eruptionen — ●DANIEL HUBER¹ und DIE LOPES KOLLABORATION² — ¹Karlsruher Institut für Technologie (KIT), IEKP — ²<http://www.astro.ru.nl/lopes/>

Das Radioantennenfeld LOPES wurde errichtet, um hochenergetische galaktische und extragalaktische kosmische Strahlung über die Radioemission ausgedehnter Luftschauer zu vermessen. LOPES ist ein hochsensitives Antennenfeld, es eignet sich daher auch zu Studien anderer, nicht durch Luftschauer ausgelöste, Radiostrahlung emittierender Prozesse, wie Solare Eruptionen oder Entladungsprozesse während Gewittern. Durch die Möglichkeit, Blitze und kosmische Strahlung simultan zu messen kann eine mögliche gegenseitige Beeinflussung dieser beiden Phänomene untersucht werden. Solare Eruptionen können im MHz Bereich beobachtet und beispielsweise zu einer Zeitkalibration großer Radioantennenfelder verwendet werden. Neben einer Zusammenfassung der wichtigsten LOPES-Resultate zur Messung kosmischer Strahlung werden in dem Beitrag auch Ergebnisse aus den Studien zu Blitzen und Sonneneruptionen diskutiert.