T 508 Kosmische Strahlung X

Zeit: Donnerstag 16:20–18:50 Raum: HG2-HS1

T 508.1 Do 16:20 HG2-HS1

Der hypothetische Anteil von Annihilationsstrahlung dunkler Materie am hochenergetischen γ-Signal aus der Richtung des galaktischen Zentrums — •Joachim Ripken für die H.E.S.S.-Kollaboration — Institut für Experimentalphysik, Universität Hamburg, Luruper Chaussee 149, 22761 Hamburg

In den letzten Jahren wurde von verschiedenen Experimenten TeV-γ-Strahlung aus der Richtung des galaktischen Zentrums beobachtet; so wurde vom H.E.S.S. Experiment in Namibia mit sehr guter Orts- und Energieauflösung ein Energiespektrum im Bereich von 100 GeV bis 10 TeV gemessen. H.E.S.S. ist ein Experiment der neuen Generation zur GeV/TeV-γ-Astronomie mit Cherenkovteleskopen in stereoskopischer Beobachtung. Durch die Annihilation von hypothetischen Teilchen der dunklen Materie (WIMPS) kann hochenergetische γ-Strahlung aus Bereichen erwartet werden, in denen eine erhöhte Dichte an dunkler Materie vermutet wird, wie z.B. dem galaktischen Zentrum. Es werden die neuesten Ergebnisse vorgestellt, die aus den H.E.S.S.-Daten des galaktischen Zentrums der Jahre 2003 und 2004 abgeleitet werden können.

T 508.2 Do 16:35 HG2-HS1

From the Scattering Spectrum of Dark Matter Direct Detection to Velocity Distribution Function of WIMPs — •CHUNG-LIN SHAN — Physikalisches Institut der Universitaet Bonn, Nussallee 12, D-53115, Bonn

Weakly interacting massive particles (WIMPs) are one of the leading candidates for dark matter. Currently, the most promising method to detect many different WIMP candidates is the direct detection of the recoil energy deposited in a low-background laboratory detector due to elastic WIMP-nucleus scattering. So far the usual research has been to built some models of the Galactic halo and then predict the event rate of direct detection of WIMPs. The aim of our work is to invert this process. That is, we study what future direct detection experiment can teach us about the WIMP halo. As a first step we used time-averaged recoil spectra, assuming that no directional information exists. We develop a method to reconstruct the (time averaged) one-dimensional velocity distribution.

T 508.3 Do 16:50 HG2-HS1

Search for Dark Matter with AMS-02 — •Chan Hoon Chung for the AMS collaboration — I. Physikalishces Institut B, RWTH-Aachen, D-52074, Aachen, Germany

The dark matter constitutes 85% of the matter density in the Universe and the investigation of its nature is one of the most important goals in astroparticle physics. The Alpha Magnetic Spectrometer(AMS-02) is a particle physics detector designed to measure charged cosmic rays spectra up to TV region on the International Space Station(ISS) for at least three years. The observation of cosmic positrons and antiprotons spectra offers an attractive way to search for supersymmetric dark matter candidates through annihilations in the galactic halo as well as study of galactic comsic-ray propagation models. In this presentaion, we would review the present situations and show the performance of AMS-02 detector for dark matter searches in space.

T 508.4 Do 17:05 HG2-HS1

CRESST Dark Matter search — •Emilija Pantić for the CRESST collaboration — Max-Planck-Institut für Physik

CRESST is a cryogenic Dark Matter search experiment located at Gran Sasso underground laboratory. It is presently being upgraded for its second phase to run a modular detector with a total mass of 10 kg. The detector modules developed for CRESST-II consist of a 300 g $CaWO_4$ scintillating 'target' crystal and a smaller cryogenic light detector, both read out by tungsten superconducting phase transition thermometers. Combined phonon and light signals from such scintillating cryogenic detectors are used to suppress the non-nuclear recoil background. We present first significant limits on WIMP dark matter by the phonon-light technique from data collected with two prototype modules in a short run with a net exposure of 20.5 kg days.

T 508.5 Do 17:20 HG2-HS1

EURECA: The Future of Cryogenic Dark Matter Search in Europe — •Wolfgang Rau for the EURECA collaboration — Physik-Department E15, Technische Universität München, James-Franck-Str., 85748 Garching

Strong observational evidence points towards the existence of large amounts of a so far unknown type of non-baryonic matter, not accessible to direct astronomical observations (hence called Dark Matter), which dominates the matter content in the Universe. Supersymmetric extensions of the Standard Model of Particle Physics predict the existence of Weakly Interacting Massive Particles (WIMPs). These particles are among the best motivated candidates to solve the Dark Matter problem.

Many experiments started to directly search for WIMPs via a possible interaction with nuclei. Cryogenic detectors, measuring the energy deposition via a thermal signal and discriminating ionizing background events via a second, scintillation or ionization signal provide presently the best sensitivity, just entering the parameter range of interest for supersymmetric WIMPs. EURECA is a new project, based on the WIMP search experiments CRESST and EDELWEISS, aiming for a $\sim$1 ton cryogenic detector. This large mass is necessary to fully explore the most interesting parameter region predicted by supersymmetry.

T 508.6 Do 17:35 HG2-HS1

Erste Messungen mit dem EDELWEISS-II Myon-Veto-Zählersystem — •Markus Horn[1], Johannes Blümer[1,2], Klaus Eitel[1] und Astrid Chantelauze[1] für die EDELWEISS-Kollaboration — [1]Forschungszentrum Karlsruhe, Institut für Kernphysik, Postfach 3640, 76021 Karlsruhe — [2]Universität Karlsruhe(TH), Institut für Experimentelle Kernphysik, Gaedestr. 1, 76128 Karlsruhe

EDELWEISS ist ein aus kryogenen Germanium-Halbleiterdetektoren aufgebautes Experiment zum direkten Nachweis schwach wechselwirkender massiver Teilchen (WIMPs), das sich im Fréjus-Untergrundlabor in Frankreich mit einer Abschirmung von $4800 m.w.e.$ befindet. Nach Aufbau der zweiten Ausbaustufe in 2005 wird zunächst mit 28 Bolometern à $320g$ Detektormasse gemessen. Ein neues Myon-Veto-Zählersystem aus 42 Szintillatormodulen mit einer Fläche von $100m^2$ ist in einem nahezu hermetischen Kubus um die Bolometer angeordnet. Monte Carlo Simulationen mit dem Programmpaket *Geant*4 sollen die von hochenergetischen Myonen induzierte Neutronenproduktion innerhalb einer kompletten dreidimensionalen Detektorgeometrie beschreiben. Ergebnisse der Simulationen und erste Messdaten von kosmischen Myonen sowie der Status der Bolometer-Messungen werden vorgestellt und diskutiert.

T 508.7 Do 17:50 HG2-HS1

Investigation of optical scintillation properties for LENA and the detection of supernovae relic neutrinos — •Michael Wurm[1], Franz von Feilitzsch[1], Marianne Goeger-Neff[1], Kathrin Hochmuth[2], Teresa Marrodan Undagoitia[1], Lothar Oberauer[1], and Walter Potzel[1] — [1]Physik-Department E15, Technische Universität München, James-Franck-Str. 85748 Garching bei München — [2]Max Planck Institut für Physik, Föhringer Ring, München

The LENA (Low Energy Neutrino Astronomy) detector is proposed to be a large-volume liquid-scintillator device. The liquid scintillator suggested is about 50kt of PXE. The optical properties of scintillator cocktails based on PXE have been investigated. In addition, the potential of LENA in the detection of supernovae relic neutrinos has been studied. The background due to reactor neutrinos was calculated for different locations of the detector. With LENA the star formation rate can be determined up to a redshift $Z \sim 1$. Different models of gravitational collapse can be distinguished with this measurement.

T 508.8 Do 18:05 HG2-HS1

Potential of the large liquid-scintillation detector LENA in particle and astrophysics — •Teresa Marrodan Undagoitia[1], Franz von Feilitzsch[1], Marianne Goeger-Neff[1], Kathrin Hochmuth[2], Lothar Oberauer[1], Walter Potzel[1], and Michael Wurm[1] — [1]Physik-Department E15, Technische Universität München, James-Franck-Str. 85748 Garching bei München — [2]Max Planck Institut für Physik, Föhringer Ring, München

The LENA (Low Energy Neutrino Astronomy) detector is proposed to be a large-volume liquid-scintillator device. The liquid scintillator sug-

gested is about 50kt of PXE. In order to collect the emitted scintillation light, 30% of the detector surface will be covered with about 12000 photomultipliers of 50cm diameter each. The site of the detector can be at the 'Center of Underground Physics' in Pyhaesalmi (CUPP, Finland). The detector will be highly suitable for the investigation of a variety of topics in astrophysics, geophysics and particle physics. The project aims to study the gravitational collapse of a massive star and the star formation in the early universe by measuring both supernovae and relic supernovae neutrinos. Further goals consist of the precise measurement of low-energy solar neutrinos properties, the test of geophysical models with antineutrino spectroscopy, the use of the detector for long-baseline neutrino oscillation experiments and the search for the proton decay. Special emphasis will be given to the potential of such a detector concerning the search for proton decay in the SUSY favored decay channel $p \to K^+\overline{\nu}$.

T 508.9 Do 18:20 HG2-HS1

Quenching Factor Measurement for $CaWO_4$ with Neutrons — •Chiara Coppi[1], Franz von Feilitzsch[1], Christian Isaila[1], Thomas Jagemann[2], Josef Jochum[2], Tobias Lachenmaier[2], Jean-Côme Lanfranchi[1], Walter Potzel[1], Wolfgang Rau[1], Michael Stark[1], Doreen Wernicke[1,3], and Wolfgang Westphal[1] — [1]Technische Universität München, Physik Department E15, James-Franck-Straße, D-85748 Garching, Germany — [2]Eberhard Karls Universität Tübingen, Physikalisches Institut I, Auf der Morgenstelle 14, D-72076 Tübingen, Germany — [3]VeriCold Technologies GmbH, Bahnhofstr. 21, D-85737 Ismaning, Germany

CRESST is an experiment to search for Dark Matter particles (WIMPs). The $CaWO_4$ crystals of CRESST are able to distinguish electron from nuclear recoils by the measurement of coincident phonon and scintillation light signals produced in an event. Since WIMPs are expected to react via nuclear recoils, this allows to discriminate most of the background. Neutrons however also produce nuclear recoils, but a neutron signal would mainly originate from oxygen recoils while WIMPs, prefering haevy nuclei, scatter mainly off tungsten.

At the TUM, experiments have been performed to determine the light output (quenching factor) from the different recoiling nuclei. Standard neutron sources have been applied as well as a monoenergetic pulsed neutron beam produced at the tandem accellerator at the Maier-Leibnitz-Laboratory in Garching. Results, status and future plans for the differen measurements will be presented.

T 508.10 Do 18:35 HG2-HS1

Simulation of Inelastic Neutron Scattering with GEANT4 — •Stephan Scholl, Michael Bauer, Josef Jochum, Marcel Kimmerle, Florian Ritter, and Klemens Rottler — Physikalisches Institut, Auf der Morgenstelle 14, 72076 Tübingen

An important background of direct dark matter search experiments consists of neutrons. Therefore the understanding and simulation of neutron–induced nuclear recoils is crucial to achieve an excellent sensitivity. Simulations of low-energy neutron scattering in GEANT4 show good agreement for elastic scattering but fail to reproduce the features of inelastic scattering. An improvement of the GEANT4 code is presented where the inelastic scattering is treated properly.