T 22: Poster

Zeit: Montag 16:00–18:30 Raum: Z6 - Foyer

T 22.1 Mo 16:00 Z6 - Foyer

Der Mechanismus der Trägheit: Masse — •Albrecht Giese — Taxusweg 15, 22605 Hamburg

Die kleinsten Teile der Materie sind so aneinander gebunden, dass sie einen Abstand einhalten. Ansonsten hätten physikalische Objekte keine Ausdehnung.

Diese Bindung auf Abstand führt unweigerlich zu Trägheit. Die Bindungskräfte breiten sich mit (endlicher) Lichtgeschwindigkeit 'c' aus. Dadurch werden in einem Verbund bei Änderung der Bewegung die elementaren Objekte vom Bindungsfeld zunächst an ihrem ältenÖrt festgehalten, so dass vorübergehend eine Kraft der Bewegungsänderung entgegensteht.

Dieser Effekt ist nicht nur eine qualitative Idee, sondern lässt die Berechnung der Masse realer Teilchen zu. Die Masse des Elektrons z.B. folgt aus seiner Ausdehnung mit der Präzision von fast 10^{-6}. - Im Gegensatz dazu liefert die Higgs-Theorie keine quantitativen Ergebnisse. Wobei auch das notwendige Higgs-Feld nach Feststellung der Astronomie nicht existiert.

Weitere Info: www.ag-physics.org/rmass

T 22.2 Mo 16:00 Z6 - Foyer

TARGET, An Integrated Readout Electronics for Cherenkov Telescopes — David Jankowsky[1], Adrian Zink[1], Manuel Kraus[1], •Jacky Catalano[1], Manuel Loos[1], Johannes Schäfer[1], Stefan Funk[1], Luigi Tibaldo[2], Gary Varner[3], and and the CTA Consortium[4] — [1]ECAP, Erlangen, Germany — [2]MPIK, Heidelberg, Germany — [3]University of Hawaii, Hawaii, USA — [4]Full consortium author list at: http://cta-observatory.org

he next generation ground based Gamma Ray Telescope, the Cherenkov Telescope Array (CTA), will have a large number of telescopes at two sites and is expected to be sensitive to γ rays in the range between 10 GeV and 300 TeV. γ rays produce air showers in the atmosphere whose particles emit short flashes of Cherenkov light. Fast cameras with special read-out electronics have been developed to allow for very short (nanosecond) exposure. The TARGET ASICs, with its high sampling rate (1 GSample/s) and 12 bit precision, are supposed to fulfill the scientific goals of CTA Furthermore, it provides Level 0 trigger information, small package sizes, high integration (16 channels/ASIC), deep buffer for trigger latency (16k samples) and low costs per channel. This makes it a perfect canditate to be implemented in the compact small size cameras of CTA. For a first camera prototype 54 electronics modules featuring TARGET with 16x54 channels in total where produced. The results of the commissioning tests will be presented.

T 22.3 Mo 16:00 Z6 - Foyer

A Modified Gravity solves the problem of Dark Matter — •Albrecht Giese — Taxusweg 15, 22605 Hamburg

Dark matter is one of the great mysteries in today's physics.

There are fundamentally two solutions possible: (1) there may exist a type of presently undetected particles which provides the missing contribution to the gravitational field; (2) the theory of gravity of Newton and of Einstein which related gravitation to mass and energy may be erroneous.

For the second alternative there is a working ansatz. If one extends the Lorentzian interpretation of relativity to the field of general relativity, so to gravitation, there follows a different causality for gravity. Gravity is no longer caused by mass but it is a side effect of other forces. So every elementary particle contributes to the field independently of its mass. And in this case photons and neutrinos are playing a particular role.

If the thoroughly investigated rotating galaxy NGC 3198 is taken as an example for this approach, it can be shown that the result for the amount of the field as well as its spatial distribution fits quite precisely to the measurement.

On the other hand the search for specific particles as an explanation of this phenomenon has up to now not yielded any hints for their existence.

T 22.4 Mo 16:00 Z6 - Foyer

GEANT 4 simulation of the Kiel Electron Telescope on board Ulysses — •M. Köberle, B. Heber, P. Kühl, and J. Marquardt — Institut für Experimentelle und Angewandte Physik, Christian-Albrechts-Universität zu Kiel, Germany

Ulysses was the first mission to explore the space environment above the poles of the sun. The mission launched in 1990, made three "fast latitude scans" of the Sun in 1994/1995, 2000/2001, and 2007/2008 providing a wealth of data. The COsmic and Solar Particle INvestigation Kiel Electron Telescope (COSPIN/KET) measures protons and alpha-particles in the energy range from about 4 to above 2000 MeV/n and electrons in the range from 2 to above 300 MeV in distinguished energy channels. The telescope consists of two parts: an entrance telescope of two semiconductors comprising a silica-aerogel Cherenkov detector with a refractive index of 1.066, selecting particles with speeds v/c = b > 0.938, which also determines the magnitude of the particle charge. Secondly the calorimeter, a lead-fluoride Cherenkov detector followed by a scintillation detector measuring escaping particles. In order to describe the instrument response function we setup a GEANT 4 model and validated it against calibration measurements performed prior to the launch of the spacecraft. Here we present the model and the corresponding calculations that are in excellent agreement with measurements obtained at different accelerators.

T 22.5 Mo 16:00 Z6 - Foyer

A cryogenic detector characterization facility in the shallow underground laboratory at the Technical University of Munich — •Alexander Langenkämper[1], N. Ferreiro Iachellini[2], A. Kinast[1], E. Lindner[1], M. Mancuso[2], E. Mondragon[1], A. Münster[1], T. Ortmann[1], W. Potzel[1], S. Schönert[1], R. Strauss[2], S. Wawoczny[1], and M. Willers[1] — [1]Physikdepartment E15 and Excellence Cluster Universe, Technische Universität München, D-85748 Garching — [2]Max-Planck-Institut für Physik, D-80805 München

The Physics Department of the TUM operates a shallow underground detector laboratory (UGL) in Garching, Germany. It provides $\sim 160\,\mathrm{m}^2$ of laboratory space which is shielded from cosmic radiation by $\sim 6\,\mathrm{m}$ of gravel and soil, corresponding to $\sim 15\,\mathrm{m.w.e.}$. The laboratory houses a cleanroom (class ISO 7) equipped for fabrication and assembly of cryogenic detectors. Furthermore, the UGL runs a ^{3}He-^{4}He dilution refrigerator. The infrastructure is particularly relevant for the characterization of $CaWO_4$ target crystals for the CRESST-III experiment, detector fabrication and detector assembly for rare event searches. Future applications include detector development in the framework of coherent neutrino nucleus scattering experiments (ν-cleus) and studying its potential as a site to search for MeV-scale Dark Matter with gram-scale cryogenic detectors. This research was supported by the DFG cluster of excellence "Origin and Structure of the Universe", by the BMBF Verbundprojekt 05A2017 - CRESST-XENON and by the SFB1258.

T 22.6 Mo 16:00 Z6 - Foyer

Status of the Dortmund Low Background Facility — •Marcel Gerhardt, Claus Gössling, Kevin Kröninger, and Christian Nitsch — TU Dortmund, Lehrstuhl für Experimentelle Physik IV, Otto-Hahn-Straße 4a, 44227 Dortmund

The Dortmund Low Background Facility (DLB) is a low-background gamma-ray spectrometry system built at ground level on the campus of the Technische Universität Dortmund. It uses a high-purity germanium detector with a relative efficiency of 60 %. The detector is set up within a massive artificial overburden, corresponding to ten meters of water equivalent. This overburden consists of barite concrete and cast iron. It houses a multi-layer lead castle that features borated polyethylene as a neutron moderator and absorber. Additionally, an active muon veto is installed to reduce the cosmic-induced muon contributions to the spectrum.

The remarkably low background level of the DLB allows radio-purity screening measurements for material preselection and the detection of radionuclides with short halflifes for activation analysis, with sensitivities well below the Bq/kg-level, which is comparable to laboratories with shallow depths.

An overview of the current status of the DLB with the recently completed muon veto, which results into an approved background level, is given. Also, first developments in the digitization of the data acquisition system are presented.

T 22.7 Mo 16:00 Z6 - Foyer

Cryogenic detector and sensor production for rare event searches at the Technical University of Munich — •Elizabeth Mondragon, A. Kinast, A. Langenkaemper, A. Muenster, T. Ortmann, W. Potzel, S. Schoenert, S. Wawoczny, and M. Willers for the CRESST-Collaboration — Physikdepartment E15 and Excellence Cluster Universe, Technische Universität München, D-85748 Garching

For rare event searches, such as the direct dark matter search experiment CRESST (Cryogenic Rare Event Search with Superconducting Thermometers), highly sensitive temperature sensors and cryogenic detectors are indispensable. A very low energy threshold ($\ll 100\,\mathrm{eV}$) and good energy resolution is required to increase the experimental sensitivity particularly for low mass dark matter particles ($m_{DM} < 5\,\mathrm{GeV/c^2}$) and to differentiate between these rare events and other particle interactions such as, e.g., radioactive backgrounds. In this contribution we present an overview of the various facilities and techniques available at TUM which are necessary for the production, development and improvement of low temperature detectors and temperature sensors. We also explain the methods we employ for the study and characterization of such technology and the potential applications. In addition, we discuss the quality requirements imposed on the developed systems. This research was supported by the DFG cluster of excellence "Origin and Structure of the Universe", by the BMBF Verbundprojekt 05A2017 - CRESST-XENON and by the SFB1258.

T 22.8 Mo 16:00 Z6 - Foyer

Characterization of the XENON1T liquid xenon dual-phase time projection chamber using Kr-83m — •Michael Wigard — Institut für Kernphysik, WWU Münster

The XENON1T experiment aims to detect the interactions of weakly interacting massive particles (WIMPs) and xenon nuclei. With a projected sensitivity of $1.6 \cdot 10^{-47}\mathrm{cm}^2$ at 50 GeV after 2 ton-years exposure, it is the most sensitive dark matter direct detection experiment in the world, using the largest liquid xenon dual-phase time projection chamber in the world. The first dark matter search result with 34.2 live days has already been published, and the next run with $>$300 days is currently in progress. To understand the properties of this detector calibration measurements with sources of known energy are needed. Due to the large size of the detector, external sources are insufficient for this purpose: to characterize the inner, active target volume internal calibrations must be used. This poster presents an overview of the methods, advantages and challenges associated with using Kr-83m as an internal calibration source. Among the detector properties that can be investigated with Kr-83m are the lifetime of drift electrons, light- and charge-yield uniformity in the detector volume and stability over time, and the effects of localized detector features on event position reconstruction. This work is supported by BMBF under contract 05A17PM2.