T 19: Suche nach dunkler Materie I

Zeit: Montag 11:00–12:35 Raum: VMP9 SR 28

Gruppenbericht T 19.1 Mo 11:00 VMP9 SR 28

First Low WIMP Mass Results in EDELWEISS III Experiment. — •Silvia Scorza for the EDELWEISS-Collaboration — Karlsruher Institut für Technologie, Institut für Experimentelle Kernphysik, Postfach 3640, Karlsruhe

The EDELWEISS-III collaboration is operating an experiment for the direct detection of Weakly Interacting Massive Particle (WIMPs) dark matter in the low radioactivity environment of the Modane Underground Laboratory. It consists of twenty-four advanced high purity germanium detectors operating at 18 mK in a dilution refrigerator in order to identify rare nuclear recoils induced by elastic scattering of WIMPs from our Galactic halo. The current EDELWEISS-III program, including improvements of the background, data-acquisition and the configuration will be detailed. Sources of background along with the rejection techniques will be discussed. Detector performances and a first low WIMP mass analysis of data acquired in a long-term campaign will be presented as well.

T 19.2 Mo 11:20 VMP9 SR 28

The EDELWEISS Dark Matter search programme for 2017 and beyond — •Klaus Eitel for the EDELWEISS-Collaboration — Karlsruher Institut für Technologie, Institut für Kernphysik, Postfach 3640, 76021 Karlsruhe

Starting from the achieved sensitivity of EDELWEISS-III with its FID800 Ge detector technology, we present the planning for the next measurement phase. This will concentrate on the usage of Ge bolometers with voltage-assisted amplified heat signals (so-called Neganov-Luke mode) to explore the parameter space for low mass WIMPs (down to m˜1GeV). Significant improvements in sensitivity can be realised with a moderate exposure of 350 kg.d within the next 2 years. Beyond 2017, the already existing cooperation with SuperCDMS should lead to a common experimental infrastructure in SNOLAB.

Current R&D activities, sensitivity projections and the project towards the SNOLAB cryogenic facility will be presented.

T 19.3 Mo 11:35 VMP9 SR 28

Nutzung von TSV-SiPMs für Fluoreszenzteleskope — •Thomas Huber[2], Francesca Bisconti[1], Andreas Ebersoldt[3], Andreas Haungs[1], Michael Karus[1], Max Renschler[2], Sally-Ann Sandkuhl[2], Harald Schieler[1] und Andreas Weindl[1] für die JEM-EUSO-Kollaboration — [1]Institut für Kernphysik (IKP), Karlsruher Institut für Technologie (KIT) — [2]Institut für Experimentelle Kernphysik (IEKP), KIT — [3]Institut für Prozessdatenverarbeitung und Elektronik (IPE), KIT

Um die Exposure, und damit die Statistik detektierter ultrahochenergetischer Teilchen zu erhöhen wird momentan das *Extreme Universe Space Observatory* (EUSO) entwickelt. Die Detektion im Standard-Design erfolgt mit *Multianoden-Photomultipliern* (MAPMT).

Eine weitere Möglichkeit Photonen nachzuweisen bilden *Sillicon Photomultiplier* (SiPMs). Diese besitzen im Vergleich zu klassischen Photomultipliern neben ähnlicher Detektionseffizienz zusätzliche Vorteile: Eine bessere Zeitauflösung, eine kompaktere Bauweise und eine Operationsspannung, die sich nicht im Hochspannungsbereich befindet.

Die neuste Generation, TSV-SiPMs *(Trough Silicon Via)*, verringert die nicht photosensitive Fläche zwischen zwei Kanälen signifikant und sind damit vielversprechende Kandidaten für eine auf SiPM basierte Fokalfläche. Unklar ist das thermische Verhalten unter realen Messbedingungen. Dies wurde am KIT untersucht. Die Ergebnisse werden in diesem Vortrag vorgestellt.

T 19.4 Mo 11:50 VMP9 SR 28

Search for chameleons with an InGrid based X-ray detector at the CAST experiment — Klaus Desch, Jochen Kaminski, •Christoph Krieger, and Sebastian Schmidt — Physikalisches Institut, Universität Bonn, Nußallee 12, 53115 Bonn

The CERN Axion Solar Telescope (CAST) searches for axions and also other exotic particles emerging from the Sun. Chameleons, for example, are part of Dark Energy theories. Like Axions they can be converted into soft X-ray photons in a high magnetic field and should result in an X-ray spectrum peaking below 1 keV. Because of their low energy and weak coupling, detectors with low energy threshold and low background rates are mandatory.

Both requirements are met by an X-ray detector based on the combination of a Micromegas gas amplification stage with a highly integrated pixel chip which allows to make full use of the Micromegas structure's granularity. It has been demonstrated that these devices can detect even single electrons. Thus, allowing for a topological background suppression as well as for detection of low energy X-ray photons creating only very few primary electrons.

After the detection threshold had been evaluated to be low enough to allow for the detection of the carbon K_α line at 277 eV, the detector was mounted at one of CAST's X-ray telescopes and installed along with its infrastructure in 2014. During data taking until end of 2015 background rates of less than 10^{-4} /keV/cm^2/s have been achieved below 2 keV. First preliminary results of the ongoing chameleon analysis and possibly an improved limit for solar chameleons will be presented.

T 19.5 Mo 12:05 VMP9 SR 28

Upgrade of the InGrid based X-ray detector for the CAST experiment — Klaus Desch, Jochen Kaminski, Christoph Krieger, and •Sebastian Schmidt — Physikalisches Institut, Universität Bonn, Nußallee 12, 53115 Bonn

The CERN Axion Solar Telescope (CAST) is a magnetic helioscope searching for solar axions and chameleons using the inverse Primakoff effect. The produced photons are in the low X-ray regime.

Chameleon search demands high sensitivity to photons with less than 1 keV and a very low background rate. Several improvements to the detector design used in 2014/15 are envisaged for 2016.

The readout system is to be improved by including a flash ADC to read out the analog signal induced on the grid. The pulse shape contains information about the longitudinal shape of the event in addition to the transverse shape given by the pixel read out. Tracks passing through the chip orthogonally resemble photons in transverse shape. A scintillator behind the detector will also allow cross referencing chip and and scintillator signals to further reduce background rates.

Finally, a new X-ray window separating detector and X-ray telescope volume from one another will be installed. Due to the low expected signal rate, a window with very low X-ray opacity is needed. Due to a pressure difference of $\sim$ 1 bar between detector and the vacuum of CAST this is demanding. The usage of silicon nitride windows is being explored.

The current progress of the detector upgrade will be presented.

T 19.6 Mo 12:20 VMP9 SR 28

Preliminary Result and Upgrade from WISPDMX Phase II — •le hoang nguyen[1], dieter horns[1], and andrei lobanov[1,2] — [1]Institut fur Experimentalphysik, Universitat Hamburg, Germany. — [2]Max-Planck-Institut fur Radioastronomie, Bonn, Germany.

The microwave cavity experiment WISPDMX is the first direct WISP (Weakly interactive slim particles) dark matter search experiment probing the particle masses in the 0.8-2.0 *eV range. The first stage of WISPDMX measurements has been completed at nominal resonant frequencies of the cavity. The upgrading of the data acquisition and analysing has been done to increase the sensitivity of the experiment. We report preliminary result from the cavity tuning at second stage of WISPDMX.