TAUP 2013 - Young Researcher Poster Session

Report of Contributions

Contribution ID: **6** Type: **not specified**

The Tunka Radio Extension (Tunka-Rex): A new radio detector for cosmic ray air showers

Sunday, 8 September 2013 19:30 (0 minutes)

Tunka-Rex is a new radio detector for extensive air showers from cosmic rays, built in 2012 as an extension to Tunka-133. The latter is a non-imaging air-Cherenkov detector, located near lake Baikal, Siberia. With its 25 radio antennas, Tunka-Rex extends over 1~km^2 with a spacing of 200~m and therefore is expected to be sensitive to an primary energy range of 10^{17}-10^{18}~eV. Using Trigger and DAQ from Tunka-133 this setup allows for a hybrid analysis with the air-Cherenkov and radio technique combined. The main goals of Tunka-Rex are to investigate the achievable precision in reconstruction of energy and composition of the primary cosmic rays by cross-calibrating to the well understood air-Cherenkov detector. While the focus in the first season was to understand the detector and develop frame conditions for future work, an early analysis already proves the detection of air-shower events with dependencies on energy and incoming direction as expected from a geomagnetic emission mechanism. Furthermore, in near future tests will be conducted for a joint operation of Tunka-Rex with Tunka-HiSCORE, a gamma ray observatory at the same site, and the upcoming scintillator extension of Tunka-133.

Primary author: Mr HILLER, Roman (Karlsruhe Institute of Technology)

Presenter: Mr HILLER, Roman (Karlsruhe Institute of Technology)

Contribution ID: **7** Type: **not specified**

Measurement of Neutrino and Antineutrino Oscillation Parameters Using the Complete Atmospheric and Beam Data Sets from MINOS

Sunday, 8 September 2013 19:30 (0 minutes)

The MINOS detectors are used to collect data from the NuMI neutrino beam as well as atmospheric neutrino data. The atmospheric data taken by the Far Detector, located underground at a depth of 2070 meters-water-equivalent and at 735 km from the neutrino production target, is combined with beam data from both Near and Far Detectors to measure the neutrino and antineutrino mixing parameters. Because our detectors are magnetized, we are able to separate neutrinos and antineutrinos on an event-by-event basis. This allows us to analyze the complete MINOS data set under two possible scenarios: assuming neutrinos and antineutrinos have different oscillation parameters; and assuming their corresponding parameters are identical. We report the world-leading measurement of the neutrino and antineutrino atmospheric mass splitting parameter along with the most precise comparison to date of neutrino and antineutrino oscillation parameters.

Primary author: Ms MESQUITA DE MEDEIROS, Michelle (Federal University of Goias)

Presenter: Ms MESQUITA DE MEDEIROS, Michelle (Federal University of Goias)

Contribution ID: **8** Type: **not specified**

Ionization yield of 7 keV nuclear recoils in liquid argon

Sunday, 8 September 2013 19:30 (0 minutes)

The response of liquid argon, and other low-background detector materials, to low-energy nuclear recoils is important for determining the sensitivity of these materials to light WIMPS and coherent neutrino-nucleus scattering. Using a small prototype dual-phase argon proportional scintillation counter at LLNL we have probed the response of liquid argon to sub-keV electronic recoils using 37Ar as an homogeneous internal calibration source. With this same detector we have measured the ionization yield of 7 keV nuclear recoils. This measurement was made using a near-threshold collimated Fe-filtered 7Li(p,n) source that provides a monoenergetic source of 70 keV neutrons.

Summary

In this poster we discuss the design and low-energy sensitivity of our dual-phase argon detector, the design and characterization of the monoenergetic neutron source, and measurement of the ionization yield of 7 keV nuclear recoils in liquid argon.

Primary author: Mr JOSHI, Tenzing (University of California Berkeley)

Presenter: Mr JOSHI, Tenzing (University of California Berkeley)

Contribution ID: **9** Type: **not specified**

The POLARBEAR Cosmic Microwave Background Polarization Experiment

Sunday, 8 September 2013 19:30 (0 minutes)

The POLARBEAR Cosmic Microwave Background (CMB) polarization experiment has been observing since early 2012 from its 17,000 ft site in the Atacama Desert in Northern Chile. Its measurements will characterize the expected CMB polarization due to gravitational lensing by large scale structure, and search for the possible B-mode polarization signature of inflationary gravitational waves. Its 250 mK focal plane detector array consists of 1,274 polarization-sensitive antenna-coupled bolometers, each with an associated lithographed band-defining filter and contacting dielectric lenslet, an architecture unique in current CMB experiments. We will present the status of the POLARBEAR instrument, its focal plane, and the analysis of its measurements.

Primary author: BARRON, Darcy (UC San Diego)

Co-author: Prof. KEATING, Brian (UC San Diego)

Presenter: BARRON, Darcy (UC San Diego)

Contribution ID: **10** Type: **not specified**

Efficiency Studies and Simulations for an Active Neutron Veto Detector for a Dark Matter Experiment

Sunday, 8 September 2013 19:30 (0 minutes)

In direct WIMP dark matter detection experiments, neutrons from cosmogenic sources and nuclear reactions in detector materials can provide backgrounds indistinguishable from WIMP signals. To reduce this background, an active neutron veto filled with a boron-loaded liquid scintillator is being developed. The scintillator will be pseudocumene, with trimethyl borate as a boron source, and PPO as a wavelength shifter. Such a veto would detect neutrons in the volume surrounding the detector, allowing coincident background events in the detector to be rejected. Neutrons are captured by the ^{10}B with a high cross section, resulting in an alpha and ^{7}Li. The energy from these products is heavily quenched, down to as low as 30-40 keVee. However, 96% of boron captures also produce a 478 keV gamma, which is much more easily detected. In order to efficiently detect the 4% of events that do not produce this gamma, the detector must have as high a light collection efficiency as possible. To model the neutron veto concept, light yield measurements were taken for a small prototype filled with the scintillator mixture and lined with a Lumirror reflector. These results were reproduced in GEANT4 and in an independent simulation. We then applied the simulations to the DarkSide-50 neutron veto to predicts its neutron rejection power.

Primary author: Mr WESTERDALE, Shawn (Princeton University)

Co-authors: Mrs SHIELDS, Emily (Graduate Student); CALAPRICE, Frank (Princeton Univ.)

Presenter: Mr WESTERDALE, Shawn (Princeton University)

Contribution ID: **11** Type: **not specified**

Cosmic Rays from Heavy Dark Matter from the Galactic Center

Sunday, 8 September 2013 19:30 (0 minutes)

The gamma-ray fluxes observed by the High Energy Stereoscopic System (H.E.S.S.) from the J1745-290 Galactic Center source is well fitted by the secondary photons coming from dark matter (DM) annihilation in particle-antiparticle standard model pairs over a diffuse power-law background. The spectral features of the signal are consistent with different channels: light quarks, electro-weak gauge bosons and the top-antitop channel. The amount of photons and morphology of the signal require compressed DM profiles as those resulting from baryonic contraction, which provides large enhancements in the signal over DM alone simulations. The fits return a heavy WIMP, with a mass above 10 TeV, but well below the unitary limit for thermal relic annihilations. The fitted background spectral index is compatible with the Fermi-Large Area Telescope (LAT) data from the same region. This possibility can be tested with future observations of other cosmic rays, whose amount and spectrum is unambiguously predicted for each channel. For example, high energy neutrinos could confirm this hypothesis at IceCube or ANTARES for angular resolutions smaller than 1^{o}.

Primary author: Ms GAMMALDI, Viviana (Universidad Complutense Madrid (UCM))

Co-authors: Prof. L. MAROTO, Antonio (Universidad Complutense Madrid (UCM)); Dr R. CEMBRANOS, Jose A. (Universidad Complutense Madrid (UCM))

Presenter: Ms GAMMALDI, Viviana (Universidad Complutense Madrid (UCM))

Contribution ID: **12** Type: **not specified**

Characterization of the Ge detectors for the Majorana Demonstrator

Sunday, 8 September 2013 19:30 (0 minutes)

High purity germanium (HPGe) crystals will be used for the Majorana Demonstrator, where they serve as both the source and the detector for neutrinoless double beta decays. It is crucial for the experiment to understand the performances of the HPGe crystals. A variety of crystal properties are being investigated, including both basic properties such as energy resolution, efficiency, uniformity, capacitance, leakage current and crystal axis orientation, as well as more sophisticated properties, e.g. pulse shapes and dead layer and transition layer distribution. In this talk, we will present our measurements to characterize the HPGe crystals and discuss the results. Since additional information regarding the crystals can be learned by data-simulation comparison, we will also discuss the experiment's simulation package for the detector characterization setup and for the prototype cryostat of the Demonstrator.
This work is supported by grants from the DOE Office of Nuclear Physics and the NSF Particle Astrophysics program.

Primary author: Dr XU, Wenqin (LANL)

Presenter: Dr XU, Wenqin (LANL)

Contribution ID: **13** Type: **not specified**

The importance of heavy-quark loops for dark matter searches

Sunday, 8 September 2013 19:30 (0 minutes)

Effective operators are a convenient way to parameterise our ignorance of the interactions between Dark Matter (DM) particles and the Standard Model. However, if we want to apply the same effective operator to different processes (e.g. DM production at the LHC and DM direct detection in underground experiments), we need to worry about the large separation of scales. For example, to calculate direct detection cross sections, we need to evolve all effective operators from the TeV scale down to the MeV scale. In the process, new interactions may be induced at loop-level, leading to additional operators, which are absent at the TeV scale.

Summary

We demonstrate the effects of heavy-quark loops for two interesting cases, namely Yukawa-like couplings and tensor couplings. For the former case, top quark loops lead to an effective coupling of DM to gluons, which significantly improves the bound from LHC monojet searches compared to direct detection experiments. For the latter case, loop-induced magnetic dipole moments lead to spin-independent interactions which strongly enhance the direct detection cross section. In both cases we therefore find that loop-level processes may give the dominant contribution to the interactions of DM with Standard Model particles.

Primary author: Mr KAHLHOEFER, Felix (University of Oxford)

Co-authors: Dr UNWIN, James (University of Oxford); Dr HAISCH, Ulrich (University of Oxford)

Presenter: Mr KAHLHOEFER, Felix (University of Oxford)

Contribution ID: **14** Type: **not specified**

The TeV Cosmic-Ray Anisotropy from Local Dark Matter Annihilation

Sunday, 8 September 2013 19:30 (0 minutes)

Several experiments, including Milagro and IceCube, have reported regions in the TeV sky with an excess of cosmic rays. I will discuss the consistency of these cosmic-ray excesses with dark matter annihilations in a nearby subhalo. The dark matter explanation of the TeV cosmic-ray excess naturally explains both its spatial and spectral features. I will show that the dark matter annihilation rate needed to produce the excess is consistent with current measurements of antiprotons, positrons, and gamma-rays. Additionally, I will show the predicted signatures from the dark matter subhalo in several cosmic-ray channels, several of which are measurable by the next generation of experiments.

Primary author: Dr HARDING, J. Patrick (Los Alamos National Laboratory)

Presenter: Dr HARDING, J. Patrick (Los Alamos National Laboratory)

Contribution ID: **15** Type: **not specified**

Using Gamma-Rays to Probe the EBL & New Physics

Sunday, 8 September 2013 19:30 (0 minutes)

The Extragalactic Background Light (EBL) encompasses the light emitted by stars and other astrophysical objects throughout the history of the Universe. From this we can learn about star formation rate as well as galactic evolutionary traits. As gamma-rays travel from distant blazars they can maximally interact with this background light and create an electron-positron pair. This creates a measurable attenuation in the blazar's energy spectrum. As Cherenkov detectors become more prevalent, we are now finding more very high energy (VHE) blazars (E> 100s GeV). In turn we are now able to better probe the higher energy (UV) portion of the EBL. Using seven VHE blazars we test three different attenuation models and find they fit the sources well – within one standard deviation in likelihood space. We also show a simple way to put constraints on the parameters of axion-like particles (ALPs) by the observation of high energy objects such as blazars. We consider the scenario of gamma-rays oscillating into ALPS over large distances in intergalactic magnetic fields. We know that gamma-rays are attenuated enroute to Earth due to interactions with background light, but here we also consider the spread in that attenuation to be due to ALP physics.

Primary author: REESMAN, Rebecca (The Ohio State University)

Presenter: REESMAN, Rebecca (The Ohio State University)

Contribution ID: **16** Type: **not specified**

The test-facility GALATEA

Sunday, 8 September 2013 19:30 (0 minutes)

The test-facility GALATEA is presented.
GALATEA is a test-stand designed to study the properties of Germanium detectors in detail.
It is a powerful high precision tool to investigate bulk and surface effects in germanium detectors.
A vacuum tank hauses a cooled detector volume and a system of three stages which allow a complete scan of a detector.
At current, a 19-fold segmented Germanium detector is under investigation.
The main feature of GALATEA is that there is no material between source and detector.
This allows the usage of alpha and beta sources as well as of a laser beam to study surface effects.

Primary author: PALERMO, Matteo (Max Plank Institut fur Physik, Munich)

Presenter: PALERMO, Matteo (Max Plank Institut fur Physik, Munich)

Contribution ID: **17** Type: **not specified**

Non-Standard Models, Solar Neutrinos, and Large theta 13

Sunday, 8 September 2013 19:30 (0 minutes)

Solar neutrino experiments have yet to see directly the transition region between matter-enhanced and vacuum oscillations. The transition region is particularly sensitive to models of non-standard neutrino interactions and propagation. We examine several such non-standard models, which predict a lower-energy transition region and a flatter survival probability for the 8B solar neutrinos than the standard large-mixing angle (LMA) model. We find that while some of the non-standard models provide a better fit to the solar neutrino data set, the large measured value of theta_13 and the size of the experimental uncertainties lead to a low statistical significance for these fits. We have also examined whether simple changes to the solar density profile can lead to a flatter 8B survival probability than the LMA prediction, but find that this is not the case for reasonable changes. We conclude that the data in this critical region is still too poor to determine whether any of these models, or LMA, is the best description of the data.

Primary authors: LATORRE, Anthony (University of Chicago); OREBI GANN, Gabriel (University of California at Berkeley); KLEIN, Josh (University of Pennsylvania); WASALSKI, Olivia (University of British Columbia); BONVENTRE, Richard (University of Pennsylvania); SEIBERT, Stanley (University of Pennsylvania)

Presenter: BONVENTRE, Richard (University of Pennsylvania)

Contribution ID: **18** Type: **not specified**

Research potential of the Pyhasalmi Mine in Finland

Sunday, 8 September 2013 19:30 (0 minutes)

We take this opportunity to advertise what kind of environment and existing infrastructure the Pyhasalmi mine could offer to the field of experimental astroparticle and underground physics. We summarize the status of the current research in the mine i.e. cosmic ray experiment EMMA and discuss the advantages of the mine in context of a large next-generation underground experiment, like LAGUNA-LBNO.

Primary author: Mr LOO, Kai (University of Jyvaskyla)

Presenter: Mr LOO, Kai (University of Jyvaskyla)

Contribution ID: **19** Type: **not specified**

All particle cosmic ray energy spectrum with IceCube

Sunday, 8 September 2013 19:30 (0 minutes)

We report on the measurement of the all-particle cosmic ray energy spectrum with the IceTop air shower array in the energy range from 1.58 PeV to 1.26 EeV. The IceTop air shower array is the surface component of the IceCube Neutrino Observatory at the geographical South Pole. The analysis was performed using only information from IceTop. The data used in this work were taken from June 1, 2010 to May 13, 2011. During that period the IceTop array consisted of 73 stations, compared to 81 in its final configuration. The measured spectrum exhibits a clear deviation from a single power law above the knee around 4 PeV and below 1 EeV. We observe spectral hardening around 18 PeV and steepening around 130 PeV.

Primary author: Dr RUZYBAYEV, Bakhtiyar (University of Delaware)

Presenter: Dr RUZYBAYEV, Bakhtiyar (University of Delaware)

Contribution ID: **20** Type: **not specified**

The Majorana Demonstrator

Sunday, 8 September 2013 19:30 (0 minutes)

The Majorana experiment proposes to assemble an array of HPGe detectors to search for neutrinoless double-beta decay in ^{76}Ge. Neutrinoless double-beta decay searches play a major role in determining the Majorana/Dirac nature of neutrinos, and would have significant implications for our understanding of the nature of neutrinos and matter in general. Initially, Majorana aims to construct a prototype system containing 40 kg of Ge detectors to demonstrate the feasibility and potential of a future tonne-scale experiment.

Primary author: Dr CUESTA, Clara (University of Washington)

Presenter: Dr CUESTA, Clara (University of Washington)

Contribution ID: **21** Type: **not specified**

A Pedagogical Discussion on Neutrino Wave Packet Evolution

Sunday, 8 September 2013 19:30 (0 minutes)

We present a pedagogical discussion on the time evolution of neutrino wave packet in free space. A common treatment is to keep terms up to quadratic order in the energy expansion so that the Fourier transform can be evaluated analytically via Gaussian integral. This leads to a solution representing a "flat"Gaussian distribution with a constant longitudinal width and a spreading transverse width. It is tempting to conclude that special relativity is violated if the neutrino wave packet is detected on its edge. However, we demonstrate that by including higher order terms in the energy expansion the correct geometry of the wave packet will be restored. The corrected solution has a spherical wave front so that it complies with special relativity.

Primary author: Mr LI, Cheng-Hsien (School of Physics and Astronomy, University of Minnesota at Twin Cities)

Co-author: Prof. QIAN, Yong-Zhong (School of Physics and Astronomy, University of Minnesota at Twin Cities)

Presenter: Mr LI, Cheng-Hsien (School of Physics and Astronomy, University of Minnesota at Twin Cities)

Contribution ID: **22** Type: **Poster**

Evaluating Gadolinium's Action on Detector Systems

Sunday, 8 September 2013 19:30 (0 minutes)

The proposed introduction of a soluble gadolinium [Gd] compound into water Cherenkov detectors can result in a high efficiency for the detection of free neutrons capturing on the Gd. The delayed 8 MeV gamma cascades produced by these captures in coincidence with a prompt positron signal serve to uniquely identify electron anti-neutrinos interacting via inverse beta decay. Such coincidence detection greatly reduces backgrounds, which should allow a large Gd-enhanced water Cherenkov detector to make the first observation of the diffuse supernova neutrino background and high precision measurements of Japan's reactor anti-neutrino flux, while still allowing for all current physics studies to be continued. Now a dedicated Gd test facility is operating in the Kamioka Mine, home of the Super-Kamiokande [SK] detector. This new facility houses a stainless steel tank, capable of holding 200 tons of water and lined with 240 50-cm photomultiplier tubes connected to a functioning data acquisition system, a specially designed water system for filtration and gadolinium recovery, and multiple devices for evaluating the quality of the water in the tank. Successful running of this new facility will demonstrate that adding Gd salt to SK is both safe for the detector and is capable of delivering the expected physics benefits.

Summary

The poster will give an update of the EGADS R&D experiment run by the Low Energy group of the Super-Kamiokande Collaboration.

Primary author: RENSHAW, Andrew (UC Irvine)

Presenter: RENSHAW, Andrew (UC Irvine)

Contribution ID: **23** Type: **Poster**

Search for light WIMP captured in the Sun using contained events in Super-Kamiokande

Sunday, 8 September 2013 19:30 (0 minutes)

Super-Kamiokande can search for dark matter by detecting neutrinos and muons which are produced by WIMP pair annihilations occur inside the Sun. The huge gravity and hydrogen-rich composition of the Sun combined with high sensitivity of Super-Kamiokande for low-energy (few GeV) neutrinos allow us good sensitivity to light (few GeV to few 10 GeV) WIMP dark matter, especially for spin-dependent coupling case. In this analysis, we increased signal acceptance by using fully-contained and partially-contained neutrino events added to up-going muons in Super-Kamiokande. We also used minimum χ^2 method to use energy, direction and flavor information. We fitted Super-Kamiokande I-IV data to find the allowed contribution of WIMP-induced neutrino events added to large background of atmospheric neutrino events. As a result, we found no signal observed and the null result was interpreted as upper limit on the spin-dependent (SD) WIMP-nucleon elastic scattering cross-section for $\chi\chi \to b\bar{b}$ and $\chi\chi \to \tau^+\tau^-$ WIMP annihilation channels. We set current best limit on SD WIMP-proton cross-section for WIMP mass below 100 GeV.

Primary author: CHOI, Koun (Nagoya University)

Presenter: CHOI, Koun (Nagoya University)

Contribution ID: **24** Type: **Poster**

Dilution generated sterile neutrino dark matter

Sunday, 8 September 2013 19:30 (0 minutes)

We present a model where a keV–MeV scale sterile neutrino plays the role of cold dark matter. This is accomplished by having a heavier (GeV–TeV scale) sterile neutrino decay out-of-equilibrium to generate vast amounts of entropy. This process of dilution modifies the number densities and spectra of the lighter neutrino, allowing it to evade existing constraints and behave as cold dark matter.

Primary author: Mr PATWARDHAN, Amol (UC San Diego (Graduate student))

Presenter: Mr PATWARDHAN, Amol (UC San Diego (Graduate student))

Contribution ID: **25** Type: **Poster**

Development of ZnMoO4 scintillating bolometers for the LUMINEU project

Sunday, 8 September 2013 19:30 (0 minutes)

The Luminescent Underground Molybdenum Investigation for NEUtrino mass and nature (LUMINEU), funded by ANR in France, aims at preparing the ground for a next-generation neutrinoless double beta decay experiment employing scintillating bolometers: these devices are in fact very promising tools in rare events search, in terms of efficiency, energy resolution and background control. In particular, they can tag alpha events, which are the dominant residual background for double beta decay candidates with a transition energy higher than 2615 keV. LUMINEU's goal is the operation of a pilot detector, consisting of four 400 g ZnMoO4 scintillating bolometers, probing an active 100Mo mass of about 0.7 kg, the energy transition of this isotope being 3034 keV. This preliminary investigation intends to be feasibility test for a next-generation neutrinoless double beta decay experiment, aiming at probing the inverted hierarchy region of the neutrino mass pattern. LUMINEU will help to fix the detailed structure of the single module of this future large-scale experiment and to develop the protocol for the synthetization of radiopure ZnMoO4 crystals.
The crystals will be grown at the Nikolaev Institute for Inorganic Chemistry in Novosibirsk, Russia. LUMINEU foresees a systematic study of the crystal parameters, in order to optimize the bolometric performance, the light yield, the alpha particle rejection factor and the radiopurity of the scintillating bolometers.
Previous tests with preliminary ZnMoO4 scintillating bolometers demonstrated the feasibility of aboveground tests for detector characterization: despite the dominating pile-up due to cosmic rays, it was possible to operate a 313 g bolometer and determine its sensitivity, energy resolution and particle discrimination power. This test was performed at the Centre de Sciences Nucléaires et de Sciences de la Matière (CSNSM), in Orsay, France, in a LHe dilution refrigerator.
As a follow-up of these encouraging results, in view of future serial runs with LUMINEU's bolometers for a routine quality-control of the grown crystals, a dedicated aboveground facility was set up: this apparatus is based on a cryostat exploiting the Pulse-Tube (PT) technology, which allows to dispense with cryogenic fluids.
In order to pave the way to the final pilot experiment, underground tests will have to be performed: 23.8 g and 313 g crystals have been operated in the EDELWEISS cryostat (where a direct dark matter search is performed with Ge hybrid detectors), at Laboratoire Souterrain de Modane (LSM), France, showing promising results, despite microphonic noise. In the incoming months, the test of the 313 g bolometer with a fully EDELWEISS-compatible holder will take place, looking forward to assess a noise improvement.

Primary author: TENCONI, Margherita (CSNSM)

Presenter: TENCONI, Margherita (CSNSM)

Contribution ID: **26** Type: **Poster**

Measurement of the diffuse neutrino flux by a global fit to multiple IceCube results

Sunday, 8 September 2013 19:30 (0 minutes)

The IceCube Neutrino Observatory is the largest operating experiment searching for astrophysical neutrinos. Situated at the geographical South Pole, IceCube has been completed in 2010 and is entering its phase of discovery now. Several studies that have recently been performed in IceCube show an excess of events at high energies,
indicating the presence of a non-atmospheric component in the diffuse neutrino flux.

The aim of this study is to characterize the diffuse neutrino flux as measured by IceCube. To this end, a global likelihood fit to the results of multiple IceCube analyses has been performed. These analyses include both main detection channels (track-like and shower-like events) and use data taken between 2008 and 2012 with
four different IceCube configurations (featuring 40, 59, 79 and 86 strings, respectively).

Primary author: Mr MOHRMANN, Lars (DESY)

Presenter: Mr MOHRMANN, Lars (DESY)

Contribution ID: **27** Type: **Poster**

High Pressure Xenon Detectors for Rare Physics Searches

Sunday, 8 September 2013 19:30 (0 minutes)

(On behalf of the NEXT collaboration) The existence of neutrinoless double beta decay and WIMP dark matter are both important questions that could be addressed by xenon gas-based detectors. We describe results obtained with the NEXT (Neutrino Experiment with a Xenon TPC) prototype for research and development towards the direct detection of neutrinoless Double Beta decay and Dark Matter (NEXT-DBDM). Good energy resolution (extrapolated to 0.5% FWHM at the 136Xe double beta Q-value) and tracking capabilities have been demonstrated in approximately 15 bar xenon gas. The ability to distinguish between electron and nuclear recoils in xenon gas using the simultaneous observation of primary scintillation (S1) and ionization (S2) has also been demonstrated.

Primary author: RENNER, Joshua

Presenter: RENNER, Joshua

Contribution ID: **28** Type: **Poster**

Systematics of Low Threshold Modulation Searches in CDMS-II

Sunday, 8 September 2013 19:30 (0 minutes)

The Cryogenic Dark Matter Search experiment (CDMS-II) uses ground-based germanium and silicon detectors to search for the scattering of Weakly Interacting Massive Particles (WIMPs), which are among the leading candidates for the dark matter component of the universe. Using the ionization and athermal phonons measured in particle interactions, CDMS-II is able to achieve excellent discrimination between the nuclear recoils expected for WIMP interactions and radioactively produced electron recoils. With the rise of interest in the low energy interactions of light mass WIMPs, CDMS-II has undertaken a search for an annually modulating signal at low thresholds. Previous results detailed the analysis of data from eight germanium detectors over the course of six runs, to thresholds of 5 keVnr (nuclear recoil energy). We will discuss the impact of systematics at these low thresholds and their implications for thresholds down to 2.27 keVnr.

Primary author: SPELLER, Danielle (UC Berkeley)

Presenter: SPELLER, Danielle (UC Berkeley)

Contribution ID: **29** Type: **Poster**

NEWAGE

Sunday, 8 September 2013 19:30 (0 minutes)

NEWAGE is a direction sensitive WIMP search experiment using micro pixel chamber. After our first underground measurement at Kamioka (PLB686(2010)11), we constructed new detector. The size of new detector is twice than older one. And its drift-cage is made by PEEK material to reduce radon emanation. Also we constructed the gas circulation system using cooled charcoal to reduce radon gas. We confirmed detector performance with low pressure gas to lower energy threshold, then we applied to use gas with 76torr pressure. Then we performed underground measurement at Kamioka. We will report about result of underground measurements.

Primary author: Mr NAKAMURA, Kiseki (Kyoto university)

Co-authors: Dr TAKADA, Atsushi (Kyoto university); Prof. KUBO, Hidetoshi (Kyoto university); Dr NISHIMURA, Hironobu (Kyoto university); Prof. MIUCHI, Kentaro (Kobe university); Dr JOSEPH D, Parker (Kyoto university); Mr NAKAURA, Shota (Kobe university); Mr SAWANO, Tatsuya (Kyoto university); Dr MIZUMOTO, Tetsuya (Kyoto university); Prof. TANIMORI, Toru (Kyoto university); Mr MATSUOKA, Yoshihiro (Kyoto university); Mr YAMAGUCHI, Yushiro (Kobe university)

Presenter: Mr NAKAMURA, Kiseki (Kyoto university)

Contribution ID: **31** Type: **Poster**

Multivariate search for a diffuse astrophysical muon neutrino flux with ANTARES

Sunday, 8 September 2013 19:30 (0 minutes)

The ANTARES Cherenkov detector is optimized for the detection of neutrino-induced muons in the TeV range with the aim to measure astrophysical neutrinos. A search for a diffuse astrophysical neutrino flux was performed on four years of ANTARES data through parameter space scanning and an upper limit is set on the expected muon neutrino flux.

Primary author: Ms SCHNABEL, Jutta (ECAP Universität Erlangen-Nürnberg)

Presenter: Ms SCHNABEL, Jutta (ECAP Universität Erlangen-Nürnberg)

Contribution ID: **32** Type: **Poster**

Constraining the nature of bow shocks of runaway stars through Fermi-LAT observations

Sunday, 8 September 2013 19:30 (0 minutes)

Bow shocks of runaway stars were suggested as possible sources of high-energy gamma-ray emission. In addition to the detection at infrared wavelengths, there have recently been claims for detection in X-rays and radio, indicating a spectrally wide non-thermal component. For the first time we systematically analyzed nearly five years of Fermi-LAT data from the regions of 28 bow shock candidates. These candidates are the ones listed in the E-BOSS catalogue of stellar bow shocks. Since no significant emission was found, we calculated flux upper limits. For one of the candidates (Zeta Ophiuchi) a recent prediction of gamma-ray emission can be robustly ruled out by our data. Our flux upper limits on the gamma-ray emission from any of the known stellar bow shocks strongly constrain the possible gamma-ray component that these objects may have.

Primary author: SCHULZ, Anneli (DESY)

Presenter: SCHULZ, Anneli (DESY)

Contribution ID: **33** Type: **Poster**

Understanding the SNO+ Detector

Sunday, 8 September 2013 19:30 (0 minutes)

The SNO+ detector is located in the Creighton Mine near Sudbury, Canada. It reuses the SNO detector for a broad neutrino-physics program, with emphasis on neutrinoless double beta decay. The heart of the SNO+ detector is a 12m-diameter acrylic sphere filled with liquid scintillator and the double beta decay isotope, 130Te. Light is emitted when charged particles pass through the scintillator, and is detected by an array of ~9,500 photomultiplier tubes. Event energies and positions are reconstructed using hit-level PMT information. Several aspects of the PMT response, a critical input to reconstruction resolution, are being calibrated as the detector is commissioned. During SNO, an aspect of PMT response called angular response was found to change over time. Modeling this time evolution to better understand the angular response is underway, and is essential for accurate energy reconstruction in SNO+. In addition, first runs of electronic calibration and comparison to SNO results show that SNO+ is accurately extracting the relevant constants.

Primary author: Ms KAMDIN, Katayun (UC Berkeley)

Presenter: Ms KAMDIN, Katayun (UC Berkeley)

Contribution ID: **34** Type: **Poster**

Non Standard Neutrino Oscillation

Sunday, 8 September 2013 19:30 (0 minutes)

Taup Abstract

This work aims to propose a possible solution to the Gallium and Reactor Neutrino Problem, which verifies a difference between predictions and observations of neutrino flux originated from nuclear reactors.
Based on non-standard neutrino interactions we could promote an instantaneous neutrino flavor changing at the moment of neutrino creation.

The approach used is based on weak leptonic number violation, with the restriction of keeping the Lorentz invariance. That approach allow interactions like electron/muon-neutrino that create muon-neutrinos inside the reactor and give a better understanding of the quantum neutrino oscillation phenomenon for a region near to the reactor.

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Contribution ID: **35** Type: **Poster**

Development of a Low-Frequency Antenna for Detection of Ultra-High Energy Cosmic Rays with ANITA-III

Sunday, 8 September 2013 19:30 (0 minutes)

The ANtarctic Impulsive Transient Antenna (ANITA) is a balloon-borne radiometer sensitive to broadband radiation from neutrinos interacting in ice and cosmic-ray air showers in the 200–1000 MHz range. The third flight of ANITA will achieve improved sensitivity through an upgraded triggering system and larger antenna array enabling the detection of an order of magnitude more ultra-high energy cosmic ray events over the first flight of ANITA and increased background rejection. Additionally, a prototypical drop-down antenna will record the first in-flight observations of cosmic-ray air showers at frequencies of 30–80 MHz. We report on the development of the low frequency antenna.

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