INFN School on Underground Physics (SoUP2024)

Report of Contributions

https://agenda.infn.it/e/39440

Contribution ID: **1** Type: **not specified**

Dark Matter Phenomenology

Monday, October 14, 2024 9:00 AM (1h 45m)

Primary author: CIRELLI, Marco (LPTHE CNRS Jussieu Paris)

Presenter: CIRELLI, Marco (LPTHE CNRS Jussieu Paris)

Contribution ID: **2** Type: **not specified**

Neutrino Phenomenology

Monday, October 14, 2024 11:15 AM (1h 45m)

Presenter: Prof. PALLAVICINI, Marco (GE)

Contribution ID: **3** Type: **not specified**

Neutrino Phenomenology

Monday, October 14, 2024 2:30 PM (1h 45m)

Presenter: Prof. PALLAVICINI, Marco (GE)

Contribution ID: **4** Type: **not specified**

Speed Talk Presentations

Monday, October 14, 2024 4:45 PM (2h 45m)

Contribution ID: **5** Type: **not specified**

Dark Matter Phenomenology

Tuesday, October 15, 2024 9:00 AM (1h 45m)

Presenter: CIRELLI, Marco (LPTHE CNRS Jussieu Paris)

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

Noble Liquid Detectors

Tuesday, October 15, 2024 11:15 AM (1h 45m)

Presenter: FIORILLO, Giuliana (Istituto Nazionale di Fisica Nucleare)

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

Noble Liquid Detectors

Tuesday, October 15, 2024 2:30 PM (1h 45m)

Presenter: FIORILLO, Giuliana (Istituto Nazionale di Fisica Nucleare)

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

Statistics + HandsOn

Tuesday, October 15, 2024 4:45 PM (1h 45m)

Presenter: DUNDAS MORÅ, Knut (UZH)

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

Question Time

Tuesday, October 15, 2024 6:30 PM (1 hour)

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

Axion Phenomenology & Detectors

Wednesday, October 16, 2024 9:00 AM (1h 45m)

Presenter: CARUGNO, Giovanni (Istituto Nazionale di Fisica Nucleare)

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

Solid State Detectors

Wednesday, October 16, 2024 2:30 PM (1h 45m)

Presenter: VIGNATI, Marco (Istituto Nazionale di Fisica Nucleare)

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

Statistics + HandsOn

Wednesday, October 16, 2024 11:15 AM (1h 45m)

Presenter: DUNDAS MORÅ, Knut (UZH)

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

Poster Session

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

Solid State Detectors

Thursday, October 17, 2024 9:00 AM (1h 45m)

Presenter: VIGNATI, Marco (Istituto Nazionale di Fisica Nucleare)

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

LS & WC Detectors

Thursday, October 17, 2024 11:15 AM (1h 45m)

Presenter: CACCIANIGA, Barbara (Istituto Nazionale di Fisica Nucleare)

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

LS & WC Detectors

Thursday, October 17, 2024 2:30 PM (1h 45m)

Presenter: RICCOBENE, Giorgio Maria (Istituto Nazionale di Fisica Nucleare)

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

Solid State Detectors

Presenter: VIGNATI, Marco (Istituto Nazionale di Fisica Nucleare)

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

Statistics + HandsOnd

Thursday, October 17, 2024 4:45 PM (1h 45m)

Presenter: DUNDAS MORÅ, Knut (UZH)

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

Question Time

Thursday, October 17, 2024 6:30 PM (1 hour)

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

Outreach Event

Tuesday, October 15, 2024 9:00 PM (1h 30m)

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

Material Screening

Friday, October 18, 2024 9:00 AM (1h 45m)

Presenter: SISTI, Monica (Istituto Nazionale di Fisica Nucleare)

Contribution ID: **22** Type: **not specified**

Photon Detectors

Friday, October 18, 2024 11:15 AM (1h 45m)

Presenter: GOLA, Alberto (Politecnico di Milano)

Contribution ID: **23** Type: **not specified**

Introduction of the SoUP2024 school

Monday, October 14, 2024 8:45 AM (15 minutes)

Contribution ID: **32** Type: **not specified**

Migdal effect in dark matter direct detection

Wednesday, October 16, 2024 4:45 PM (1 minute)

Presenter: AL-ADULRAZZAQ, Aula

Session Classification: Poster Session

Contribution ID: **33** Type: **not specified**

The Gd-loaded Neutron Veto of XENONnT experiment

Wednesday, October 16, 2024 4:46 PM (1 minute)

The XENONnT Neutron Veto is a Gd-loaded water Cherenkov detector designed to reduce radiogenic neutron background in the XENONnT dark matter search. Initially operating with demineralized water, Gd was introduced using a dedicated system for recirculation and purification of the Gd-loaded water. Details of the Gd insertion process and the first results from an AmBe neutron calibration are presented. Due to the large cross-section of Gd for thermal neutron capture, the detector performance has improved, resulting in a reduction in neutron background by a factor of 2, compared to the first scientific runs.

Presenter: ANGELINO, Emanuele

Session Classification: Poster Session

Contribution ID: **34** Type: **not specified**

Coating based radon barriers for future liquid xenon detectors

Wednesday, October 16, 2024 4:47 PM (1 minute)

Despite overwhelming evidence for dark matter in our universe, its true nature remains a mystery. In the search for direct detection, detectors using liquid xenon are currently leading in sensitivity. However, these experiments are increasingly limited by self-induced backgrounds, particularly the emanation of radon from detector materials. To address this challenge, a novel radon mitigation technique using surface coatings has been investigated. Systematic studies at MPIK have demonstrated that electrochemical plating with a 5 µm copper layer can reduce radon emanation by up to three orders of magnitude. This technique is currently scaled up for vessel-like geometries with a new setup. Furthermore, testing of the coating's performance in a dual-phase xenon detector's gas phase is currently in planning.

Presenter: ARMBRUSTER, Sophie

Session Classification: Poster Session

Contribution ID: **35** Type: **not specified**

ProtoDUNE-HD Photon Detection System: IV curve and Vbd determination

Wednesday, October 16, 2024 4:48 PM (1 minute)

The ProtoDUNE-HD detector is a horizontal drift (HD) liquid argon time projection chamber (LArTPC) that was constructed and operated in the CERN North Area during summer 2024. It is a prototype for the first far detector (FD) module of the Deep Underground Neutrino Experiment (DUNE), a next-generation long-baseline experiment for neutrino physics under construction in US. The successful operation of ProtoDUNE-HD should demonstrates the effectiveness of the horizontal drift far detector design.
In particular, the FD Photon Detection System (PDS) is critical for the DUNE physics program. The topology of a neutrino interaction is reconstructed by looking at the tracks of secondary charged particles, which produce scintillation light and free charge carriers by ionization during their propagation in LAr. The reference time of the event is given by the scintillation light, collected by the PDS equipped with Silicon PhotoMultipliers (SiPMs).
For this reason, it is important to monitor and check the performance of the PDS during ProtoDUNE-HD operation. One of the most important parameters to check is the SiPM breakdown voltage (Vbd), which can be measured by acquiring IV curves thanks to DAPHNE boards. Thanks to this work, an optimization of the required performances of the FD can be performed, in order to achieve DUNE scientific goals.

Presenter: BALBONI, Anna

Session Classification: Poster Session

Contribution ID: **36** Type: **not specified**

LZ Calibrations: MCMC tuning of electron recoil interactions

Wednesday, October 16, 2024 4:49 PM (1 minute)

The LUX-ZEPLIN (LZ) experiment is a 7-ton liquid xenon (LXe) direct detection dark matter experiment located a mile underground in the Sanford Underground Research Facility (SURF). The experiment looks for interaction signals of weakly interacting massive particles (WIMPs), one of the leading proposed models for dark matter. Searching for these signals requires very precise understanding of backgrounds and particle interactions in the LXe, which can be modeled with the Noble Element Simulation Technique (NEST), which models light and charge yields for particle interactions in the LXe as a function of electron recoil (ER), nuclear recoil (NR), and width parameters. Here, we demonstrate the process for tuning the NEST model to LZ's science run 2 (SR2) and 3 (SR3) wimp search data using a multi dimensional Markov Chain Monte Carlo technique.

Presenter: BARILLIER, Erin

Session Classification: Poster Session

Contribution ID: **37** Type: **not specified**

Measuring infrared light in xenon

Wednesday, October 16, 2024 4:50 PM (1 minute)

Xenon, a heavy noble gas, is an ideal target for direct dark matter detection. Several experiments utilize its ultraviolet scintillation to study interactions with nuclei and electrons. It is also known that gaseous xenon emits infrared light, which has been less extensively studied.
A major reason for this is the availability of sensors that meet the stringent sensitivity and radioactivity requirements for dark matter searches. Our group at the MPIK is currently investigating interactions in gaseous xenon using infrared-sensitive photomultiplier tubes and plans to soon explore emissions in the liquid phase.

Presenter: BOESE, Kai

Session Classification: Poster Session

Contribution ID: **38** Type: **not specified**

Reflectivity measurements of VUV light at the scintillation wavelength of xenon on XENON1T/nT PTFE samples

Wednesday, October 16, 2024 4:51 PM (1 minute)

Rare event searches as performed with liquid xenon (LXe) detectors demand a precise knowledge of the employed materials. Measurements of optical properties at the xenon scintillation wavelength in the VUV region are required for accurate simulations and detector characterization. Reflection measurements of polytetrafluorethylen (PTFE) were conducted in vacuum, gaseous and liquid xenon using the Reflectivity Setup in Münster. PTFE is the material used to encapsulate the active volume in the LXe detectors of the XENON dark matter project. This poster will report about the reflectivity of the PTFE from the XENON detectors depending on the surrounding material and its surface treatment.

Presenter: BRAUN, Robert

Session Classification: Poster Session

Contribution ID: **39** Type: **not specified**

Laser calibration system at ProtoDUNE-HD

Wednesday, October 16, 2024 4:52 PM (1 minute)

The Deep Underground Neutrino Experiment (DUNE) is a full experiment consisting of multiple detectors separated by a near and far site. DUNE will study long-baseline neutrino oscillations, which will provide insight into CP-violation, neutrino mass ordering, and the matter/antimatter asymmetry. Additionally, DUNE will search for nucleon decay and observe neutrinos from supernovae. DUNE relies on liquid argon time projection chambers (LAr TPCs), an excellent technology for tracking particles and reconstructing their interactions with high precision. To achieve its goals, DUNE is supported by the ProtoDUNE experiments at CERN, which serve as large-scale prototypes to validate detector technologies and calibration systems. The precise calibration of the electric field within the detector is vital for accurate 3D reconstruction of particle tracks, particularly in maintaining the consistency of charge measurements along the drift path. This work presents the development and implementation of a laser calibration system designed for ProtoDUNE-II. This poster involved the physical installation and commissioning of the laser system. The commissioning process included extensive testing to ensure alignment and operational efficiency, such as rotating the laser to observe behavior of tracks. The groundwork established during these steps is crucial for future data analysis, aiming to measure the electron lifetime (in the active volume) and map the electric field inside the detector with high precision.

Presenter: CAMPANELLI, Wallison

Session Classification: Poster Session

Contribution ID: **40** Type: **not specified**

Monitoring of LZ's Outer Detector and R&D for Next-Generation Experiments

Wednesday, October 16, 2024 4:53 PM (1 minute)

Covering the continued monitoring and stability of LUX-ZEPLINS outer-detector. As well as research into the potential use of WbLS in next generation experiments with Brookhavens 30Ton detector.

Presenter: CARTER, Megan

Session Classification: Poster Session

Contribution ID: **41** Type: **not specified**

Reactor antineutrino analysis in JUNO

Wednesday, October 16, 2024 4:54 PM (1 minute)

The JUNO experiment is a detector composed of 20kton liquid scintillator. Its main goal is to determine the neutrino Mass Ordering in 6 years data-taking. To achieve this, it targets reactor antineutrino at a medium baseline. In this poster, a overview of the whole analysis workflow is presented.

Presenter: CHEN, Ze

Session Classification: Poster Session

Contribution ID: **42** Type: **not specified**

The CRESST experiment

Wednesday, October 16, 2024 4:55 PM (1 minute)

CRESST (Cryogenic Rare Event Search with Superconducting Thermometers) is a dark matter experiment located at the Gran Sasso (LNGS) underground laboratory in Italy. It uses cryogenic detectors (temperature O(mK)) equipped with Transition Edge Sensors (TESs) to directly search for dark matter in the sub-GeV mass range. The extremely low threshold and high energy resolution achieved confirm CRESST as one of the world's leading sub-GeV dark matter experiments. However, the experiment's sensitivity is affected by an increasing event rate at low energies (below 200eV), the origin of which is still unclear. Several possibilities have already been ruled out, and studies of new detector designs are being developed to gain a deeper understanding of the observations. An overview of the experiment is presented with a focus on the latest detector designs and future projects.

Presenter: CIPELLI, Eleonora Rebecca

Session Classification: Poster Session

Contribution ID: **43** Type: **not specified**

BULLKID: Array of particle absorbers sensed by Kinetic Inductance Detectors

Wednesday, October 16, 2024 4:56 PM (1 minute)

BULLKID is a R&D project aiming to pair an array of Kinetic Inductance Detectors with a diced silicon absorber, achieving mass scalability up o the Kg scale and high segmentation. An average baseline resolution of ▯▯ ± ▯ ▯▯ makes it a suitable detector for low-energy processes such as direct interactions of dark matter and coherent elastic neutrino-nucleus scattering. The above ground unshielded operation of this prototype has led to the characterization of a background level of 2·10^6 counts/(kev·kg·day) flat down to an energy threshold of 160 eV. We present the status of the project and its future development towards an improvement in terms of threshold and active volume of the detector.

Presenter: DELICATO, Daniele

Session Classification: Poster Session

Contribution ID: **44** Type: **not specified**

The ever elusive blazar host galaxies: a guide to their characterisation

Wednesday, October 16, 2024 4:57 PM (1 minute)

One of the fundamental characteristics of blazars is their central black hole mass. In absence of broad emission lines, which is the case for the majority of blazars (i.e. BL Lacs), the black holes mass is estimated by analysing the luminosity of the host galaxies. To date, these galaxies are thought to be massive and luminous ellipticals, but the data sample supporting this conclusion is limited. While the most recent studies date back to the early 2000s, it is crucial to provide a detailed characterization of the host galaxies in order to build realistic models exploiting the large number of sources whose photometric and spectral properties are measured with greater precision. In this contribution I will show preliminary results of the adaptation of the QSFit software to the study of blazars. This is of interest for the creation of a criterion for discriminating (and quantifying) the host from the blazar jet, and also for the generation of a repeatable and reusable classification algorithm for more general purposes. This work provides for the first time a study of the host galaxies of blazars on a theoretical level using analytical and coherent spectra, and can be applied to large new-generation surveys such as JWST and Euclid to characterise blazars at various redshifts and contribute to understand better the relation between the black hole activity and the host galaxy.

Presenter: DELUCCHI, Gaia

Session Classification: Poster Session

Contribution ID: **45** Type: **not specified**

STAR: a cryogenic LXe test facility for the characterization of innovative electrodes for the DARWIN experiment

Wednesday, October 16, 2024 4:58 PM (1 minute)

This work is based on the realization of a cryogenic test facility (STAR) with a noble liquid single phase TPC of small dimensions and the design and production of innovative electrode prototypes, that could possibly solve the difficulties related to the realization and correct functioning of the very large electrodes needed for DARWIN, the next-generation Xenon based dual-phase time projection chamber (DP-TPC). The STAR facility, currently being installed at Laboratori Nazionali del Gran Sasso of INFN , will be used to characterize the performances of the electrode prototypes.

Presenter: DI DONATO, Chiara

Session Classification: Poster Session

Contribution ID: **46** Type: **not specified**

Construction of the inner detector of DArTinArDM

Wednesday, October 16, 2024 4:59 PM (1 minute)

To ensure the radiopurity of underground argon (UAr) for DarkSide-20k, the final version of the DArTinArDM experiment is being assembled at LSC in Spain. A 1-liter chamber, called DArT, will be filled with UAr and placed inside the ArDM detector, which will serve as an active veto. This setup is designed to measure depletion factors greater than 10,000 in the intrinsic activity of Ar-39. This poster focuses on prototype testing and the construction process of the inner detector.

Presenter: DÍAZ MAIRENA, Daniel

Session Classification: Poster Session

Contribution ID: **47** Type: **not specified**

Optimizing the TES design for diamond cryogenic detectors

Wednesday, October 16, 2024 5:00 PM (1 minute)

The CRESST experiment is one of the most sensitive experiments for the direct detection of light dark matter via nuclear recoils in a crystalline target. The mass range of dark matter particle candidates CRESST can probe is heavily influenced by the target material, with lighter elements being particularly advantageous for detecting lower mass dark matter. In this regard, diamonds emerged as a promising target material for direct dark matter detection. In this study, we build upon the successful application of artificial diamond crystals as targets, exploring the impact of varying the dimensions of the Transition Edge Sensors (TES) on detector performance. We present results of three measurements, analyzing how different TES sizes affect the energy resolution. These findings contribute to the development of an optimized TES for diamond detectors, potentially extending the sensitivity of CRESST to lower mass dark matter particles.

Presenter: DOMINSKY, Felix

Session Classification: Poster Session

Contribution ID: **48** Type: **not specified**

Physics reach of the BULLKID-DM experiment: background and sensitivity limits

Wednesday, October 16, 2024 5:01 PM (1 minute)

BULLKID-DM is a new detector concept for direct dark matter research, aimed at controlling backgrounds by creating a fully active array of detectors. It will be composed of more than 2,000 silicon dice, sensed by cryogenic phonon-mediated kinetic inductance detectors (KIDs). In this poster, I present the expected background and the projected sensitivity, to WIMP signals, for the final configuration of the detector at the Laboratori Nazionali del Gran Sasso (LNGS).

Presenter: FOLCARELLI, Matteo

Session Classification: Poster Session

Contribution ID: **49** Type: **not specified**

Development of Hermetic Xenon Time Projection Chamber for Reducing 222Rn Background

Wednesday, October 16, 2024 5:02 PM (1 minute)

In direct dark matter searches with liquid xenon, the main background is the beta decay of 214Pb, the daughter nucleus of radioactive radon; in the DARWIN experiment, a future dark matter experiment using 50 tonnes of LXe, to reduce the radon background, the radon concentration in the detector 10% of XENONnT is required.
This poster presentation reports on the development of a hermetically sealed detector made of quartz and PTFE using thermal shrinkage.

Presenter: FUJIKAWA, Koki

Session Classification: Poster Session

Contribution ID: **50** Type: **not specified**

Searching for Coherent Elastic Neutrino-Nucleus Scattering (CEvNS) with the NUCLEUS detectors

Wednesday, October 16, 2024 5:03 PM (1 minute)

My Ph.D. research focuses on the NUCLEUS experiment, which aims to precisely measure coherent elastic neutrino-nucleus scattering (CEvNS) using reactor neutrinos at the Chooz power plant in France. This experiment employs transition-edge sensors (TESs) to detect the energy deposited by neutrinos into CaWO4 and Al2O3 substrates. Operated at 10mK within a dry dilution cryostat, our cryogenic setup allows for a ultra-low noise environment in order to detect energies up to O(1keV). A central challenge of the NUCLEUS experiment is achieving a background level of 100 dru at surface level. This goal is pursued through a combination of passive and active veto systems installed at both ambient and cryogenic temperatures. Currently undergoing commissioning at the Technical University of Munich (TUM) in Germany, NUCLEUS is scheduled to be deployed at Chooz in 2025.

Presenter: GIAMMEI, Marco

Session Classification: Poster Session

Contribution ID: **51** Type: **not specified**

Development of Position Reconstruction in the LUX-ZEPLIN Outer Detector

Wednesday, October 16, 2024 5:04 PM (1 minute)

Position reconstruction in the LZ Outer Detector is currently based on a centroid method. Due to this, positions are being mis-reconstructed. Accurate position reconstruction would allow for additional quantities in background discrimination, full mapping of light collection efficiencies and a reduced neutron veto dead-time. Two methods have been investigated: a TPC-like method with light response functions (LRFs) and machine learning using convolutional neural networks.

Presenter: HALL, Tea

Session Classification: Poster Session

Contribution ID: **52** Type: **not specified**

The Cygno Experiment

Wednesday, October 16, 2024 5:05 PM (1 minute)

The CYGNO experiment aims at the development of a high-resolution gaseous Time Projection Chamber (TPC) with an optical readout, operated at atmospheric pressure and room temperature, for rare events searches. The gas of choice is a mixture of helium and carbon tetrafluoride, and the primary charge amplification is performed with Gas Electron Multipliers (GEMs) .

Presenter: Dr ISLAM, Zahoor ul

Session Classification: Poster Session

Contribution ID: **53** Type: **not specified**

SABRE-North Experiment for Dark Matter detection

Wednesday, October 16, 2024 5:05 PM (1 minute)

The SABRE experiment aims to detect dark matter by improving upon DAMA/LIBRA's annual modulation signal using ultra-pure NaI(TI) crystals to reduce the background noise from contamination such as 40K, 238U, 232Th through advanced zone-refining techniques and high-purity crystal production. With detectors in both hemispheres, SABRE can distinguish dark matter signals from seasonal effects, enhancing its sensitivity to WIMPs.

Presenter: KHATTAK, Sana Gul

Session Classification: Poster Session

Contribution ID: **54** Type: **not specified**

Solar Neutrino Studies in JUNO

Wednesday, October 16, 2024 5:06 PM (1 minute)

JUNO (Jiangmen Underground Neutrino Observatory) is highly sensitive to solar neutrinos across a broad spectrum of energies. Due to its large volume and exceptional radiopurity, JUNO is uniquely positioned to detect and study neutrinos produced in various stages of solar fusion processes. The detector's ability to capture low-energy solar neutrinos, in particular, provides valuable insights into the nuclear reactions occurring at the Sun's core, including those from the proton-proton (pp) chain and the carbon-nitrogen-oxygen (CNO) cycle.

Presenter: KONISSERY SANTHOSH, Ujwal

Session Classification: Poster Session

Contribution ID: **55** Type: **not specified**

Detection of neutrinos from astronomical sources in JUNO

Wednesday, October 16, 2024 5:07 PM (1 minute)

JUNO (Jiangmen Underground Neutrino Observatory) is a 20 kton organic liquid scintillator detector currently under construction in south China. Its main goal is to determine the Neutrino Mass Ordering with ~3σ sensitivity through reactor antineutrinos. Furthermore, JUNO is also perfect to study neutrinos from natural sources, such as atmospheric, solar, geo- and supernova neutrinos. In this poster I will present JUNO potentialities in detecting these classes of neutrinos.

Presenter: MALABARBA, Marco

Session Classification: Poster Session

Contribution ID: **56** Type: **not specified**

Event reconstruction with machine learning techniques

Wednesday, October 16, 2024 5:08 PM (1 minute)

The XENONnT Dark Matter Experiment is a dual phase TPC searching for nuclear recoil signals generated by WIMP dark matter. Interactions in the sensitive detector material result in a prompt light signal (S1) and a delayed secondary scintillation signal (S2), resulting from ionization electrons drifted in a moderate electric field to the liquid surface, where they are extracted to the gas phase in a strong field between two wire electrodes, called gate and anode. These electrons lead to proportional scintillation in the gas phase and hence to an amplified S2 signal. XENONnT features a substantial background rate of single electrons, largely due to photoionization of neutral impurities, leading to numerous small S2 signals, which can be confused with S1 signals of similar size. The goal of this study is to improve the discrimination of both signals using Machine Learning approaches.

Presenter: MERZ, Johannes

Session Classification: Poster Session

Contribution ID: **57** Type: **not specified**

Characterization and validation of SiPM for the DUNE Far Detector Photon Detection System

Wednesday, October 16, 2024 5:09 PM (1 minute)

This work is focused on the validation and test activities of the SiPMs for the DUNE experiment.The results obtained during a first down-selection envising a full characterization of the devices both at room and cryogenic temperatures (77 K), are reported. A campaign of validation of all the SiPMs (~300000) produced basing on these results, is currently ongoing. A description of the semi-automated system used to validate the sensors is given along with the results obtained so far.

Presenter: MONTAGNA, Elisabetta

Session Classification: Poster Session

Contribution ID: **58** Type: **not specified**

Weak decay search with XENONnT

Wednesday, October 16, 2024 5:10 PM (1 minute)

In the context of the first search for neutrinoless double electron capture with XENONnT, this poster presents preliminary work on high-energy cleaning cuts applied to calibration runs. These efforts aim to support this search and future high-energy analyses.

Presenter: OUAHADA, Sana

Session Classification: Poster Session

Contribution ID: **59** Type: **not specified**

Searching for dark matter in high energy nuclear recoils at the Lux Zeplin experiment.

Wednesday, October 16, 2024 5:11 PM (1 minute)

The standard dark matter search performed by LZ looks spin independent dark matter interactions in low energy xenon nuclear recoils. However, interactions at higher energies are possible and can be interpreted through the lens of effective field theory. Our plan for the high energy nuclear recoil search using data from LZ's most recent science run is presented.

Presenter: PANNIFER, Nathan

Session Classification: Poster Session

Contribution ID: **60** Type: **not specified**

JUNO calibration campaign for NMO determination

Wednesday, October 16, 2024 5:12 PM (1 minute)

JUNO (Jiangmen Underground Neutrino Observatory) is a neutrino detector, based on 20k tons of liquid scintillator, that will determine the neutrino mass ordering. Now the detector is very close to the start of data taking (in 2025) and teh calibration campaign wil be crucial for the understanding of the data. In my poster I will explain the detector and the proposed calibrations, and my work in it.

Presenter: PERCALLI, Elisa

Session Classification: Poster Session

Contribution ID: **61** Type: **not specified**

Data-Driven Field Distortion Correction Maps for the XENONnT experiment

Wednesday, October 16, 2024 5:13 PM (1 minute)

The poster will present the methodology in creating the Field Distortion Correction maps for the data and simulation pipelines of the XENONnT experiment, primarily designed to serach for dark matter candidates. Those maps are necessary to correct the reconstructed position of an event, due to the non uniformity of the electric field within the detector. The poster will also present the progress on analytical studies that are being conducted that will improve the way the map is produced and implemented.

Presenter: RAVINDRAN, Ananthakrishnan

Session Classification: Poster Session

Contribution ID: **62** Type: **not specified**

Novel Photo- detection systems in Liquid Argon TPCs SiPM - The ARIADNE and PHAIDRA experiment

Wednesday, October 16, 2024 5:14 PM (1 minute)

Presenter: RAVINTHIRAN, Sudikshan

Session Classification: Poster Session

Contribution ID: **63** Type: **not specified**

Design and test of the lens based optical detector for SAND in the DUNE experiment

Wednesday, October 16, 2024 5:15 PM (1 minute)

This work focuses on the development and testing of prototypes for a novel optical detector designed for the GRAIN within the SAND detector. One of the two possibilities for the optical system is a two-lens focusing system composed of plano-convex lenses enclosing gas, paired with a 32×32 Silicon PhotoMultiplier (SiPM) array. This configuration allows for the efficient transmission and focusing of vacuum ultraviolet (VUV) scintillation light from Liquid Argon onto the SiPM plane. The goal of the tests was to calibrate the acquisition board using an artificial light source and evaluate detector performance.
The readout of SiPM matrices requires a multi-channel mixed-signal ASIC, while the back-end electronics is implemented using Field Programmable Gate Arrays (FPGAs). In this context, I contributed to the design of a dedicated ASIC for the 32×32 SiPM readout system. A Monte Carlo simulation analysis was performed to validate the proposed ASIC design, ensuring compatibility and performance optimization for the GRAIN detector setup.

Presenters: REPETTO, Silvia; REPETTO, Silvia (Istituto Nazionale di Fisica Nucleare)

Session Classification: Poster Session

Contribution ID: **64** Type: **not specified**

The tracking system of SAND at the DUNE Near Detector

Wednesday, October 16, 2024 5:16 PM (1 minute)

The SAND detector at the DUNE Near Detector Complex will be capable of studying neutrino interactions on different nuclear targets with its inner STT tracker. STT will combine a relatively large target mass (about 5 t) with high spatial and momentum resolution using light gas detectors. This poster will present the physics program of the SAND tracker and the current status of the design and prototyping activities.

Presenter: RUGGERI, Alessandro

Session Classification: Poster Session

Contribution ID: **65** Type: **not specified**

Analysis techniques for spotting 0vbb signals in LEGEND-200 data

Wednesday, October 16, 2024 5:17PM (1 minute)

The LEGEND experiment searches for neutrinoless double beta decay (0vbb) in Germanium-76. Given the extreme rarity of this process, it is crucial to minimize the background and to develop effective analysis techniques to identify signal events. In particular, this poster focuses on Pulse Shape Discrimination (PSD) methods, which are optimized to identify signal events based on the shape of their waveform.

Presenter: SALEH, Giovanna (Istituto Nazionale di Fisica Nucleare)

Session Classification: Poster Session

Contribution ID: **66** Type: **not specified**

The neutrinoless double beta decay experiment LEGEND- R&D on wavelength shifting materials for the liquid argon instrumentation

Wednesday, October 16, 2024 5:18 PM (1 minute)

The neutrinoless double beta decay is a process beyond the Standard Model of particle physics, in which a nucleus undergoes a double beta decay without any neutrinos in the final state. If this reaction is observed, the Majorana nature of the neutrino will be established (a fermion is a Majorana particle if it coincides with its own antiparticle). Moreover, this reaction would have important implications for the neutrino absolute mass scale and ordering, for the lepton number violation and would provide hints on the matter-antimatter asymmetry observed in the Universe. Located at the Gran Sasso National Laboratories, LEGEND (Large Enriched Germanium Experiment for Neutrinoless double beta Decay) has the goal of searching for this reaction in high-purity germanium (HPGe) crystals enriched in 76Ge. In five years of data-taking, the first phase LEGEND-200 is expected to reach a sensitivity to the half-life of the 76Ge neutrinoless double beta decay of 10^(27) years, and of 10^(28) yr in the second phase, LEGEND-1000, in ten years of data-taking. LEGEND set-up consists in HPGe crystals contained in a cryostat filled with liquid argon, which cools the detectors to 87 K, acts as both passive and active veto. Indeed, liquid argon scintillates when a particle releases energy in it. LEGEND is equipped with the so-called liquid argon instrumentation, consisting in several structures of wavelength-shifting materials surrounding the HPGe crystals and optical sensors, with the goal of collecting the scintillation light from the argon. This is important for the signal-background discrimination, considering that a neutrinoless double beta decay releases all its energy inside one HPGe detector, without any energy deposition in the liquid argon.
In my poster I am going to present the experimental designs of the two LEGEND phases and explain the R&D on the wavelength-shifter materials for the liquid argon instrumentation of LEGEND-1000 I am carrying on at the University of Zürich.

Presenter: SENATORE, Gloria

Session Classification: Poster Session

Contribution ID: **67** Type: **not specified**

R&D Towards Next Generation Dark Matter Experiment at Boulby

Wednesday, October 16, 2024 5:19 PM (1 minute)

Rare event experiments, such as those targeting dark matter interactions and neutrinoless double beta decay ($0\nu\beta\beta$), should be shielded from ɣ-rays originating in rock. This poster presents the simulation of gamma-ray transport through water shielding and assessment of the water thickness needed to suppress the background from rock down to a negligible level. The simulation studies the effectiveness of water shielding around a detector, focusing on the Weakly Interacting Massive Particle (WIMP) energy range (0 –20 keV) and the region of interest (ROI) around the $0\nu\beta\beta$ Q-value (2.458 MeV). This poster also presents the measurements of radioactivity of rock in the Boulby mine that is a potential site for a future dark matter experiment. The measurements are used to normalise simulation results in assessing the required shielding at Boulby.

Presenter: TRANTER, Jemima

Session Classification: Poster Session

Contribution ID: **68** Type: **not specified**

Development of a Trace Hydrogen Measurement Method for Quantitative Evaluation of Tritium Concentration in Liquid Xenon

Wednesday, October 16, 2024 5:20 PM (1 minute)

We are making progress in developing a method to quantitatively evaluate the concentration of tritium in liquid xenon for the XENON/DARWIN experiment.

Presenter: UTOYAMA, Mitsuki

Session Classification: Poster Session

Contribution ID: **69** Type: **not specified**

Study of impact of an aluminium layer as a shield against magnetic fields

Wednesday, October 16, 2024 5:21 PM (1 minute)

The CRESST experiment aims to search for rare events by using Transition Edge Sensors (TES) made out of a superconducting thin layer of tungsten as super-sensitive thermometers. The superconducting properties of a material depend on both its temperature and on the magnetic field applied to it. While the temperature stability of the sensors is very well achieved by the design of the experiment, the shielding of the CRESST sensors against the variation of the magnetic field is still under investigation. In my project, I exploit the Meissner effect of superconducting materials to achieve such a goal. In the poster I will present the first results of my research and the next steps.

Presenter: ZANIRATO, Marco Maria

Session Classification: Poster Session