T 90: Neutrinos, Dark Matter X

Time: Wednesday 17:30–19:00 Location: POT/0361

T 90.1 Wed 17:30 POT/0361

Estimate of the electronic and nuclear recoil background in DARWIN: — •Antoine Chauvin, Maike Doerenkamp, Andrii Terliuk, and Stephanie Hansmann-Menzemer — Universität Heidelberg

The DARWIN experiment is a proposed future Direct Dark Matter observatory that aims to detect WIMPs through WIMP-nucleus interactions, in a multi-ton liquid xenon TPC. Its goal is to become the most sensitive experiment to WIMP-nucleus interaction. To estimate this sensitivity, good models for signal and background generation, and of the detection processes are fundamental. In this talk, we will report on the simulation of the response of the DARWIN detector to different background sources, interacting both through Electronic Recoil and Nuclear Recoil. We compare these to the response of a WIMP signal and derive according estimates for the WIMP sensitivity of the DARWIN experiment.

T 90.2 Wed 17:45 POT/0361

Properties of the radiogenic neutron background in DARWIN — •Maike Doerenkamp, Antoine Chauvin, Andrii Terliuk, and Stephanie Hansmann-Menzemer — Universität Heidelberg

DARWIN is a proposed multi-ton liquid xenon experiment that aims to explore new parameter-space in the direct detection of WIMPs through nuclear recoil. A major source of background for this experiment are radiogenic neutrons, originating from detector materials. A good understanding and modelling of their properties is therefore necessary for sensitivity studies. This talk will discuss characteristics of this background and methods to reduce it, to ultimately improve the sensitivity.

T 90.3 Wed 18:00 POT/0361

Radon mitigation in current and future liquid xenon detectors — •Florian Jörg for the XENON-Collaboration — Max-Planck-Institut für Kernphysik Heidelberg, Germany

Dual-phase liquid xenon time projection chambers have become a leading technology for rare-event searches such as the direct detection of particle dark matter. The sensitivity of current experiments is limited by the xenon-internal background from ^{222}Rn. Therefore, techniques for radon mitigation are applied during all stages of the experiment.

The XENONnT detector belongs to the latest generation of liquid xenon detectors and has reached an unprecedented low radon concentration of $< 1\,\mu$Bq/kg. This achievement was driven by a thorough material pre-selection in combination with a novel radon removal system. In-situ measurements of its radon concentration during scientific data taking will be presented. Furthermore, recent results from a novel radon mitigation method using surface coatings will be discussed.

T 90.4 Wed 18:15 POT/0361

Liquid Handling System (LHS) of the OSIRIS Detector — Michael Wurm, Kai Loo, •Oliver Pilarczyk, Arshak Jafar, George Parker, Tim Charisse, and Marcel Büchner for the JUNO-Collaboration — Johannes Gutenberg-University Mainz

The Jiangmen Underground Neutrino Observatory (JUNO) is a 20kt liquid scintillator (LS) detector currently being built in southern China. It will use the neutrino flux from 2 nuclear power plants in a distance of 53km to achieve its main goal of determining the neutrino mass hierarchy. During the filling of the main JUNO detector the LS will undergo several cleaning steps as well as a final monitoring by the Online Scintillator Internal Radioactivity Investigation System (OSIRIS) to ensure it meets the needed radiopurity requirements. This talk will present the Liquid Handling System (LHS) of the OSIRIS detector.

T 90.5 Wed 18:30 POT/0361

Towards an Online Radiopurity Analysis with BiPo coincidences in the JUNO Pre-Detector OSIRIS — •Konstantin Schweizer[1], Lothar Oberauer[1], Michael Wurm[2,3], and Kai Loo[3] — [1]Technische Universität München, Physik Department, James-Franck-Str., 85748 Garching, Germany — [2]Institute of Physics, Johannes Gutenberg University Mainz Staudingerweg 7, 55128 Mainz, Germany — [3]Institute of Physics and Excellence Cluster PRISMA+, Johannes-Gutenberg Universität Mainz, Mainz, Germany

The organic liquid scintillator based JUNO experiment (Jiangmen Underground Neutrino Observatory) is aiming to determine the neutrino mass hierarchy. This goal imposes strict requirements on the radiopurity of the scintillator.

The 20m^3 OSIRIS pre-detector is expected to monitor the level of radioactive contaminations in the purified scintillator as the last device after the purification plants. This way the scintillator's radiopurity will be checked just before it is filled into the JUNO main detector. The level of U/Th contaminations can be determined by exploiting the coincidence structure of a Bi β-decay to Po immediately followed by an α-decay to Pb. This talk presents the status of the development of an in-situ analysis of this method using pulse shape discrimination.

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T 90.6 Wed 18:45 POT/0361

Machine learning based event reconstruction for the OSIRIS detector — •Lukas Bieger, Marc Breisch, Jessica Eck, Tobias Heinz, Benedict Kaiser, Tobias Lachenmaier, and Tobias Sterr — Eberhard Karls Universität Tübingen, Physikalisches Institut

The Jiangmen Underground Neutrino Observatory (JUNO) is a multi-purpose neutrino experiment with a 20 kt liquid scintillator detector that is currently set up in southern China. The main goal of JUNO is determining the neutrino mass hierarchy, which is to be achieved by a precise measurement of the oscillated energy spectrum of electron antineutrinos from nearby nuclear power plants. The Online Scintillator Internal Radioactivity Investigation System (OSIRIS) will monitor the radio-purity of the liquid scintillator during the filling of JUNO, to ensure that the required contamination levels are met. OSIRIS itself is a 18 t liquid scintillator detector, which is instrumented with 64 20-inch PMTs to collect the light produced by events in the detector's sensitive volume. This talk will present an event reconstruction method based on machine learning which was developed for the application in the OSIRIS detector.