T 104: Neutrino Astronomy V

Time: Friday 9:00–10:30 Location: KS H C

T 104.1 Fri 9:00 KS H C

Searching for Periodic Neutrino Emission from Pulsars with KM3NeT — •Robert Petri, Thomas Eberl, and Rodrigo Gracia-Ruiz for the KM3NET-ERLANGEN-Collaboration — Erlangen Centre for Astroparticle Physics (ECAP) Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

Neutrino observatories such as KM3NeT enable exploratory searches in the time domain. In this feasibility study, we investigate whether the count rates of the photo-sensors, induced by optical background and potentially by low-energy neutrinos in the GeV range, can be used to probe periodic neutrino emission through precise timing alone. Following up on recent suggestions for neutrino emission scenarios, we investigate promising pulsars and develop an analysis pipeline. The pipeline includes a barycentric time correction and focuses on a Fast Fourier Transform approach to search for a count rate excess with the pulsar spin frequency. The contribution demonstrates the potential and limitations of periodicity searches and evaluates the sensitivity of KM3NeT to derive meaningful constraints on temporally modulated neutrino sources.

T 104.2 Fri 9:15 KS H C

Simulation Studies for Characterization of a Calibration Device for the IceCube Upgrade — •Selina Rudolph for the IceCube-Collaboration — Technical University of Munich (TUM)

The IceCube neutrino observatory at the geographic South Pole has officially begun its Upgrade campaign after successfully operating for over ten years. In addition to the existing 86 strings instrumented with over 5,000 photosensors, the IceCube Collaboration will deploy seven new strings. The Upgrade focuses on improving the lower-energy regime and sensitivity to neutrino oscillation parameters, as well as enhancing the recalibration of the gigaton glacial ice detector medium. One of the instruments deployed in the campaign is the Precision Optical Calibration Module (POCAM), which was developed and assembled at Technical University of Munich (TUM). Over 20 next-generation POCAMs will be utilized to further reduce existing detector systematics. This talk provides an overview of the simulation efforts, specifically for a series of special operations carried out during the installation. These Monte Carlo simulation studies are conducted to predict the POCAM's ability to characterize certain ice parameters, which are crucial for calibration and analysis studies.

T 104.3 Fri 9:30 KS H C

Improving tau neutrino reconstruction and identification with the IceCube Upgrade — •Despoina Mousadi for the IceCube-Collaboration — Deutsches Elektronen Synchrotron (DESY) Zeuthen — Friedrich-Alexander-Universität (FAU) Erlangen-Nürnberg

The IceCube Neutrino Observatory is a 1km3 neutrino detector located at the South Pole. It consists of optical modules which can detect Cherenkov light from charged neutrino interaction products in the Antarctic ice. Measuring the flavor composition of astrophysical neutrinos on Earth can give significant insight in their production mechanisms. However, even though tau neutrinos exhibit a unique double cascade (*double bang*) signature which cannot be attributed to the other two neutrino flavors, identifying these signatures remains the most challenging, with only few such events confidently identified so far. This is mainly due to the contrast between the large distance between sensors and the usually short tau decay length, but is also in part caused by limitations in modeling of the surrounding ice and reconstruction algorithm. Starting its operation in 2026, the IceCube Upgrade will provide new possibilities to improve tau neutrino reconstruction and identification, with more densely packed multi-PMT modules containing calibration devices which enable the creation of artificial *double bang* events. Such events can serve as benchmarks for validation of ice models and reconstruction methods, paving the way for improved tau neutrino identification and for better understanding of the underlying physics.

T 104.4 Fri 9:45 KS H C

Search for the DSNB in JUNO: Development of new Methods for Background Event Identification — •Matthias Mayer, Ulrike Fahrendholz, Shijiao Gao, Meishu Lu, Lothar Oberauer, Stefan Schönert, and Armin Siebert — School of Natural Science, TU München, James-Franck-Str. 1, 85748 Garching b. München

The diffuse supernova neutrino background (DSNB) describes the constant flux of neutrinos from past core-collapse supernovae over the entire visible universe. The Jiangmen Underground Neutrino Observatory (JUNO), a 20 kton liquid scintillator detector currently plans to observe the DSNB through the inverse beta decay (IBD) detection channel. While other $\bar{\nu}_e$ sources will cause irreducible IBD background, we aim to use various pulse-shape discrimination (PSD) techniques to reduce non-IBD backgrounds such as muon-induced fast neutrons and NC interactions of atmospheric neutrinos. For this talk, we compare the performance of different PSD techniques for the DSNB search and discuss our recent measurements towards the energy dependence of the neutron flourescence time profile in the JUNO scintillator. Given the current release of JUNO's first physics results and detector performance, we will also include a preliminary analysis using JUNO real data for background estimation in the region of interest (ROI) of DSNB. Besides, we will give an outlook into our upcoming publication discussing the JUNO detection potential for different DSNB models. This work has been supported by the Cluster of Excellence ORIGINS as well as the DFG Collaborative Research Center "NDM" (SFB1258) and the DFG Research Units 2319 and 5519.

T 104.5 Fri 10:00 KS H C

Background estimation for CC-Supernova neutrino searches in JUNO — •Tobias Kramer, Thilo Birkenfeld, Achim Stahl, and Christopher Wiebusch — III. Physikalisches Institut B, RWTH Aachen

The Jiangmen Underground Neutrino Observatory (JUNO) is a 20 kt liquid scintillator detector, which started data taking in August 2025. Its large target mass is well-suited for Core-Collapse Supernova (CC-SN) neutrino detection. Our goal is to identify individual CC-SN bursts up to nearby extragalactic distances, since galactic CC-SNe are rare events; the only CC-SN observed via neutrinos was almost 40 years ago in 1987. The search for distant CC-SNe requires optimized background suppression in the relevant supernova neutrino energy range, where the main detection channel is the inverse beta decay (IBD). In this talk, a general strategy for background estimation and suppression, and its impact on the distant CC-SNe search in JUNO, is discussed.

T 104.6 Fri 10:15 KS H C

Expanding Stochastic Acceleration in the AGN Corona — •Marc Hubert[1,2], Björn Eichmann[1,2], and Julia Becker Tjus[1,2,3] — [1]Theoretical Physics IV: Plasma Astroparticle Physics, Ruhr University Bochum, Germany — [2]RAPP Center, Bochum, Germany — [3]Department of Space, Earth and Environment, Chalmers University of Technology, Gothenburg, Sweden

In the field of astroparticle physics, understanding the mechanisms responsible for the acceleration of charged particles in astrophysical environments is of central interest. The so-called Fermi-II process describes stochastic acceleration in turbulent magnetic fields. Previous studies have presented a semianalytical solution of the isotropic steady-state momentum-diffusion equation that includes continuous and catastrophic momentum changes for weak magnetic turbulence constrained to a finite range. Within this framework, the solution is valid only in the momentum interval in which interactions with the turbulence occur. In my master thesis, I aim to extend this framework to lower momenta and to investigate how pre-acceleration processes, e.g. magnetic reconnection, affect the resulting particle spectra. Furthermore, I apply the extended model to the AGN corona in NGC 1068 and examine the compatibility of the predicted neutrino flux with current observations. In this talk, I present first results, including the extension to lower momenta and the influence of pre-acceleration processes.