T 78: Invited Topical Talks 4

Time: Thursday 11:00–12:30 Location: Geb. 30.22: Gaede-HS

Invited Topical Talk T 78.1 Thu 11:00 Geb. 30.22: Gaede-HS

Signatures of quantum gravity in neutrino telescopes — •Alba Domi for the ANTARES-KM3NET-ERLANGEN-Collaboration — Erlangen Centre for Astroparticle Physics (ECAP), Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

The Standard Model of particle physics and General Relativity are expected to merge into a new theory of Quantum Gravity (QG) at energies approaching the Planck scale. However, none of the proposed QG approaches has been validated to date. In an effort to gain insights into this unifying theory, the existence of "Windows on Quantum Gravity" has been postulated: observable signatures of QG effects at energy scales that are accessible to current experiments. Two such signatures are quantum decoherence (QD) and violation of Lorentz invariance (LIV). In the neutrino sector, these effects could cause modifications in neutrino oscillations, that can be measured by neutrino telescopes such as IceCube, ANTARES, and KM3NeT.

The goal of the QGRANT project is to analyse the huge amount of data collected by these telescopes via a global and novel fit in order to search for evidence of QG effects. This talk will discuss the current progress and future prospects of quantum gravity searches using neutrino telescopes.

Invited Topical Talk T 78.2 Thu 11:30 Geb. 30.22: Gaede-HS

Development, characterization, and integration of the Silicon Drift Detector array TRISTAN for KATRIN — •Frank Edzards for the KATRIN-Collaboration — Technical University of Munich, TUM School of Natural Sciences, Physics Department, 85748 Garching, Germany — Max Planck Institute for Physics, 85748 Garching, Germany

Sterile neutrinos are a natural extension of the Standard Model of particle physics. If their mass is in the keV range, they are a viable dark matter candidate. One way to search for sterile neutrinos in a laboratory-based experiment is via tritium beta decay. A sterile neutrino with a mass up to 18.6 keV would manifest itself in the decay spectrum as a kink-like distortion. The objective of the TRISTAN project is to extend the KATRIN experiment with a novel multi-pixel silicon drift detector and readout system to search for a keV-scale sterile neutrino signal. This talk will give an overview on the current status of the project. Characterization measurement results obtained with a 166-pixel system will be shown.

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Invited Topical Talk T 78.3 Thu 12:00 Geb. 30.22: Gaede-HS

New Chapter in Neutrino Physics with JUNO — •Yury Malyshkin — GSI Helmholtzzentrum für Schwerionenforschung GmbH, Planckstraße 1, 64291, Darmstadt, Germany — Forschungszentrum Jülich GmbH, Wilhelm-Johnen-Straße, 52428, Jülich, Germany

The phenomenon of neutrino oscillations is being studied by various experiments around the world, leading to a more precise understanding of the neutrino properties and enabling to use these particles as a tool to investigate natural objects, either via their neutrino emission or via their transparency to neutrinos. However, several basic neutrino characteristics are still to be clarified. In JUNO (Jiangmen Underground Neutrino Observatory, South China) electron antineutrinos produced in two powerful nuclear power plants will be observed in a spherical target, 35.4 m in diameter, filled with 20 kton of liquid scintillator. The light produced after neutrino interaction will be collected by 17,612 20-inch and 25,600 3-inch photo-multiplier tubes covering 78% of the target surface, enabling measuring neutrino energy with unprecedented resolution. The talk will explain how this apparatus is going to resolve the neutrino mass ordering, measure three out of the six independent parameters driving the neutrino oscillations with a sub-percent precision, and how JUNO can serve as an observatory for neutrinos coming from the atmosphere and the interior of the Earth, from the Sun, and from the supernova explosions. The talk will also cover the status of JUNO construction which is planned to be accomplished already in the second half of 2024.