T 19: Various topics in astroparticle physics

Time: Monday 16:30–17:30 Location: L-3.002

T 19.1 Mon 16:30 L-3.002

Multi-wavelength observations of Mrk421 and Mrk501 — •Lea Heckmann and David Paneque for the MAGIC-Collaboration — Max Planck Institute for Physics, Munich, Germany

Blazars, together with other active galactic nuclei, are the most luminous persistent sources in our universe; and therefore a prime candidate for very-high-energy gamma-ray observations. For the two MAGIC telescopes, the Mrk421 and Mrk501 galaxies are amongst the brightest observed objects due to their proximity. Hence, besides single detections during flaring periods, as it is the case for most blazars, also detailed studies of low emission states can be accomplished. Even though blazars have been observed for decades, their jet structures, particle populations and emission mechanism are still intensely discussed, and extensive monitoring campaigns covering the whole electromagnetic spectrum are organised to collect data that will help us understand these extreme objects. Spectral, variability and correlation studies and their evolution over many years are crucial techniques to put constraints on the existing theoretical models that describe the broadband emission and the blazar environments. This talk aims to give an insight into some of the efforts made for the described purpose using data collected on Mrk421 and Mrk501.

T 19.2 Mon 16:45 L-3.002

Time-Dependent AMS-02 Electron-Positron Fluxes in an Extended Force-Field Model — •Marco Kuhlen and Philipp Mertsch — Institute for Theoretical Particle Physics and Cosmology (TTK), RWTH Aachen University, Aachen, Germany

The magnetized solar wind modulates the Galactic cosmic ray flux in the heliosphere up to rigidities as high as 40 GeV. We present a new and straightforward extension of the popular but limited force-field model, thus providing a fast and robust method for phenomenological studies of Galactic cosmic rays. Our semianalytical approach takes into account charge-sign dependent modulation due to drifts in the heliospheric magnetic field and has been validated via comparison to a fully numerical code. Our model nicely reproduces the time-dependent AMS-02 measurements and we find the strength of diffusion and drifts to be strongly correlated with the heliospheric tilt angle and magnitude of the magnetic field. We are able to predict the electron and positron fluxes beyond the range for which measurements by AMS-02 have been presented. We have made an example script for the semianalytical model publicly available and we urge the community to adopt this approach for phenomenological studies.

T 19.3 Mon 17:00 L-3.002

Spatially resolved parameters of photomultipliers for the multi-PMT Digital Optical Module of the IceCube-Upgrade — •Martin Antonio Unland Elorrieta, Lew Classen, and Alexander Kappes for the IceCube-Collaboration — Institut für Kernphysik, Westfälische Wilhelms-Universität Münster, Münster

IceCube located at the South Pole is the largest Neutrino Observatory and is going to be expanded in the season 2022/2023 with seven new strings. For this project, the IceCube-Upgrade, new sensors are being developed, which are expected to increase the detector sensitivity. Over half of the modules foreseen for deployment are multi-PMT Digital Optical Modules (mDOMs) which feature 24 photomultipliers (PMTs) inside a pressure vessel pointing in all directions. Since the PMTs are the main detection device of the module, a good understanding of their performance is essential. Several key parameters of the PMTs were spatially resolved across the sensitive area. This talk will present current results and measurement techniques.

T 19.4 Mon 17:15 L-3.002

Studies on the hole ice characterization with mDOM flashers in IceCube Upgrade — •Cristian Jesus Lozano Mariscal and Alexander Kappes for the IceCube-Collaboration — Institut für Kernphysik, Westfälische Wilhelms-Universität Münster, Münster

For the planned upgrade of the IceCube neutrino telescope, seven additional strings equipped with new optical modules will be installed in the center of DeepCore, the current low energy IceCube extension. The upgrade does not only aim at enhancing IceCube's low-energy neutrino detection capabilities, but also to improve the calibration of the existing IceCube detector by installing calibration devices in the new optical modules. One of these devices consists of LEDs which produce ns-long flashes of light. One goal is to characterize the dust column which formes when the ice re-freezes after module deployment, and which poses one of the current biggest sources of uncertainty in IceCube. The talk presents initial studies on the dust column characterization using the LEDs in the mDOM module.