

T 65: Invited Topical Talks IV

Time: Thursday 13:45–15:45

Location: MED 00.915

Invited Topical Talk T 65.1 Thu 13:45 MED 00.915
Atmospheric neutrino oscillations with IceCube and the IceCube Upgrade — ●JAN WELDERT — Johannes Gutenberg Universität Mainz

DeepCore, the low-energy extension of the IceCube Neutrino Observatory, detects hundreds of thousands of atmospheric neutrinos per year at the basic filter level. This enables the oscillation properties of these elusive particles to be studied. Even in its current configuration, the detector achieves a level of precision to atmospheric oscillation parameters comparable to that of long-baseline accelerator experiments. One of DeepCore's particular strengths lies in its wide range of baselines, some of which pass through the Earth's dense core. As part of the so-called IceCube Upgrade, additional optical modules were added to the detector earlier this year. Compared to the existing modules, these new modules have larger photo cathode areas and are spaced closer together. This substantially increases the number of atmospheric neutrinos detected, particularly at energies of a few GeV. Additionally, the energy, direction and topology of the detected neutrinos can be reconstructed with greater precision. All of this significantly increases IceCube's sensitivity to atmospheric neutrino oscillation studies, especially the neutrino mass ordering.

In my talk, I will explain how we conduct atmospheric neutrino oscillation studies in IceCube, present our latest results and show the potential of the IceCube Upgrade. The focus will be on the determination of the atmospheric oscillation parameters and the neutrino mass ordering.

Invited Topical Talk T 65.2 Thu 14:15 MED 00.915
Exploring the Gravitational Wave Universe with Pulsar Timing Arrays — ●ANDREA MITRIDATE — Imperial College London, London, UK

By tracking the radio emission from a collection of millisecond pulsars, several pulsar timing array collaborations have found evidence for a background of gravitational waves permeating our galaxy. In this talk, I will discuss how we obtained this evidence, the ongoing efforts to identify the source of this signal, and explore its implications for cosmology and astrophysics.

Invited Topical Talk T 65.3 Thu 14:45 MED 00.915
Supernova Remnants as Accelerators of Galactic Cosmic Rays — ●ROBERT BROSE — Universität Potsdam

Particle acceleration in supernova remnants (SNRs) remains a cornerstone for understanding cosmic-ray (CR) origin. Multi-messenger signatures from SNRs are hereby crucial in pinning down the particularities of the acceleration process. Improvements in instrumental sensitivity from radio to gamma-ray energies and improved statistics in direct CR measurements have started to reveal cracks in the long-standing paradigm that SNRs are indeed the solely producers of Galactic CRs.

In this talk, we present a brief and candid overview of the numerical methods and assumptions typically employed in modeling shock acceleration in SNRs. Then we focus on multiwavelength (and multi-messenger) signals from SNRs bridging from very early stages, a few years after the explosion, to times where CRs start to leak out of the SNR's interior and considerably change the observational signatures.

Invited Topical Talk T 65.4 Thu 15:15 MED 00.915
Supermassive black holes and their relativistic jets: a beacon into the early universe — ●LEA MARCOTULLI — Deutsches Elektronen-Synchrotron (DESY), Zeuthen, Germany

About 10% of accreting supermassive black holes (AGN) at the center of galaxies are capable of launching extreme relativistic jets. Shining as bright as a hundred trillion Suns and detected at the dawn of time, these AGNs and their jets have been studied for decades, from radio up to gamma-rays. However, many open questions still remain about these powerful monsters. When, in the history of the universe, were the most luminous jets more numerous, and what is their connection with rapid supermassive black-hole growth at early cosmic times? Is there an evolutionary sequence linking jets of different power? How can we find and identify more of these extreme jets in the very early universe? In this talk, I will highlight how we can tackle some of these open issues through means of multi-wavelength and time-domain studies, in particular exploiting the capabilities of current and future X-ray and gamma-ray missions.