

T 102: Invited Topical Talks III-B

Time: Thursday 14:00–15:20

Location: HSZ/0004

Invited Topical Talk T 102.1 Thu 14:00 HSZ/0004
Expanding the Frontiers of Galactic Neutrino Astronomy via Machine Learning* — ●MIRCO HÜNNEFELD for the IceCube-Collaboration — TU Dortmund, Dortmund, Germany

IceCube has discovered a flux of astrophysical neutrinos and presented evidence for the first neutrino sources, a flaring blazar known as TXS 0506+056 and the active galaxy NGC 1068. However, the sources responsible for the majority of the astrophysical neutrino flux remain elusive. Within our Galaxy, high energy neutrinos can be produced when cosmic rays interact at their acceleration sites and during propagation through the interstellar medium. The Galactic plane has therefore long been hypothesized as a potential neutrino source.

In this contribution, results are presented for a new search of neutrino emission utilizing an improved dataset of cascade-like events that builds upon recent advances in deep learning based reconstruction methods. Enabled by these novel methods, the resulting dataset improves IceCube’s sensitivity in the southern neutrino sky and is thus particularly promising for the identification of neutrino production from the Galactic plane.

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Invited Topical Talk T 102.2 Thu 14:20 HSZ/0004
Enhancing the CMS Level-1 Trigger with real-time Machine Learning — ●ARTUR LOBANOV — Institut für Experimentalphysik, Universität Hamburg, Hamburg, Germany

The Level-1 Trigger (L1) is the first stage of the online event filter system of the CMS Experiment at the LHC. It reduces the event rate from 40 MHz to $\mathcal{O}(100)$ kHz by reconstructing, identifying and filtering collision events in real-time using dedicated processing hardware based on field-programmable gate arrays (FPGAs).

Following the success of machine learning (ML) in enhancing event selections in the offline analysis of recorded data, ML algorithms are finding their way into the real-time processing of the CMS L1 Trigger system. Contrary to current filters that rely on simple rule-based selection algorithms using the detected physics objects, ML allows to capture deeper correlations between and within the objects, improving the identification of the event.

In addition to the tight constraints on the processing latency of several microseconds, trigger algorithms also have to fit into the restricted processing resource budget of the FPGAs. This requires a dedicated optimisation of ML models for their use in hardware in these challenging conditions.

In this talk I will outline the basics of the CMS L1 Trigger system, the principles of ML inference in FPGAs, and present the current state-of-the-art developments of novel ML algorithms enhancing the trigger performance at the LHC and beyond.

Invited Topical Talk T 102.3 Thu 14:40 HSZ/0004
Higgsino Hunting at ATLAS — ●MICHAEL HOLZBOCK — Max Planck Institut für Physik, München, Germany

Supersymmetry (SUSY) remains one of the best motivated candidates for physics beyond the Standard Model (SM) and predicts a new partner for each SM particle. The higgsino, the SUSY partner of the Higgs SM boson, has always been of particular interest due to its connection with the hierarchy problem and as a promising Dark Matter candidate when realized with masses near the weak scale. Intriguingly, (nearly) pure higgsino states can still escape the current constraints from colliders and direct Dark Matter searches, and hence they remain a prime target for new physics searches at the LHC.

In this talk the motivation and experimental challenges for higgsino searches at the LHC are reviewed, and the current results from ATLAS discussed. Finally, new techniques developed for accessing so far unprobed phase space in the search for higgsinos at the LHC are introduced.

Invited Topical Talk T 102.4 Thu 15:00 HSZ/0004
New Ideas for Baryo- and Leptogenesis — ●KAI SCHMITZ — Institut für Theoretische Physik, WWW Münster

The baryon asymmetry of the Universe (BAU) cannot be explained by the Standard Model and hence represents important evidence for new physics. In this talk, I will review recent new ideas for the generation of the BAU in the early Universe that generalize or are complementary to conventional scenarios of baryo- and leptogenesis. Specifically, I will discuss the interplay between lepton number/ flavor violation and the chemical transport in the Standard Model plasma at high temperatures, which provides the basis for new scenarios known as "wash-in leptogenesis" and "lepto-flavorgenesis". I will highlight possible UV completions of these scenarios, notably cosmic inflation driven by an axion-like field, and outline their rich phenomenological implications for particle physics and cosmology. This will include the possibility that the generation of the BAU is in fact closely related to the generation of primordial magnetic fields, which in turn would have important consequence for the electroweak phase transition and the properties of intergalactic magnetic fields in the present Universe.