

T 64: Invited Topical Talks III

Time: Thursday 13:45–15:45

Location: ZHG011

Invited Topical Talk T 64.1 Thu 13:45 ZHG011
Performance of the ATLAS New Small Wheels — ●FABIAN VOGEL — LMU München

As the Large Hadron Collider (LHC) transitions into the High-Luminosity era (after 2029), all experiments are undergoing significant upgrades to cope with the more intense collision environment and to select the most interesting – and often rarest – events. For the ATLAS experiment, these upgrades are carried out in multiple steps. The first upgrade (Phase 1) was completed in 2022, while the second phase (Phase 2) is currently being prepared for 2026.

A major upgrade during Phase 1 was the replacement of the inner forward muon spectrometer (Small Wheels) with the New Small Wheels (NSWs) to handle the increased particle fluxes with excellent spatial and temporal resolution, effectively reducing fake triggers and pile-up. The NSWs consist of two gaseous detector technologies: small-strip Thin-Gap Chambers (sTGCs) and Micro-Mesh Gaseous Structure (Micromegas) detectors.

This talk will highlight the performance of these new detector technologies in the ATLAS muon spectrometer and assess their success in reducing pile-up while maintaining excellent spatial and temporal resolution with high efficiency and longevity during HL-LHC operation.

Further, studies on Micromegas position reconstruction will be presented, focusing on algorithms optimized for inclined particle trajectories.

Invited Topical Talk T 64.2 Thu 14:15 ZHG011
Top quark and friends — ●JAN VAN DER LINDEN — Gent University, Belgium

With the conclusion of Run 2 at the LHC, and a successful ongoing Run 3, the amount of data collected at the CMS experiment allows for precision measurements of rare top quark-associated processes and measurements of interesting top quark properties which have previously not been accessible.

In this talk I will highlight some of the recent CMS measurements in top quark physics, including (but not limited to) top quark-antiquark pair production in association with bosons or jets. I will discuss the improvements that have been made in recent years and what still remains unanswered.

Invited Topical Talk T 64.3 Thu 14:45 ZHG011
Searching for New Physics in Soft Unclustered Energy Patterns — ●ALEXANDER LORY — Ludwig-Maximilians-Universität München

Most collider-based searches for new physics focus on final states with a small number of high-momentum particles. In contrast, a Soft Unclustered Energy Pattern (SUEP) represents a distinct signature characterized by a high multiplicity of spherically distributed, low-momentum particles. Such a signature can arise from strongly coupled, quasi-conformal Hidden Valley models.

Although it may seem very exotic, such an extension of the Standard Model is well-motivated, as quantum chromodynamics exhibits similar behavior in its non-perturbative regime. However, identifying SUEPs at the LHC poses unique challenges, as their diffuse, low-momentum nature closely resembles the ubiquitous background from pile-up interactions. Furthermore, detecting them often requires pushing detector performance beyond its original design specifications.

Despite these challenges, the signature offers promising opportunities to explore new physics in uncharted regions of the kinematic phase space. This presentation reviews existing experimental searches for SUEPs and explores potential new strategies.

Invited Topical Talk T 64.4 Thu 15:15 ZHG011
Alignment and calibration at the LHCb experiment — ●BILJANA MITRESKA — TU Dortmund University, Dortmund, Germany

The LHCb software trigger allows splitting the triggering of events in two stages, allowing to perform the detector alignment and calibration in real time. The real-time alignment and calibration procedure is a fully automatic procedure at LHCb that is executed at the beginning of each fill of the LHC. The alignment estimates the position of detector elements and is essential to achieve the best data quality. The procedure is implemented for the full tracking system at LHCb with the event reconstruction run as a multithreaded process ensuring consistency between triggered and offline selected events. The operational and technical aspects of this procedure during data-taking is discussed with the focus on the performance in the 2024 data-taking period where the first global tracker alignment was obtained.