

## T 50: Invited Topical Talks I-A

Time: Wednesday 11:00–12:20

Location: HSZ/AUDI

**Invited Topical Talk** T 50.1 Wed 11:00 HSZ/AUDI  
**Search for leptoquarks at the ATLAS experiment** —  
 ●MAHSANA HALEEM for the ATLAS-Collaboration — Julius-  
 Maximillian-Universität Würzburg, Germany

The leptoquarks predicted in the extensions of physics beyond the Standard Model can describe the similarities between the lepton and quark generations. In the past years, these particles have been the most popular explanations for the B-anomalies reported in low-energy data, and the searches for leptoquarks have been among the important goals of the ATLAS program. Recent results from the LHCb collaboration reporting the disappearance of lepton flavour anomalies in the B-meson decays into kaon and charged-lepton pairs do not affect the search program. They probe unique signatures at the LHC, as they provide direct transitions between leptons and quarks. I will review some of these searches with ATLAS Run-2 dataset and their prospects in Run-3, particularly focusing on the final states with third-generation quarks, which offer great potential to the SM background reductions but are also challenging in terms of the remaining background modeling.

**Invited Topical Talk** T 50.2 Wed 11:20 HSZ/AUDI  
**Making the most of Yukawa couplings: searching for Dark Matter accompanied by heavy quarks** — ●DANYER PEREZ ADAN — Deutsches Elektronen Synchrotron (DESY), Hamburg, Germany

Among the foremost alternatives to unravel the mysteries of Dark Matter (DM) is the search for invisible particles at colliders. The main experiments at the Large Hadron Collider (LHC) are engaged in an intense search program to identify any evidence of non-standard unbalanced transverse momentum. Should this DM hunt be successful and the manifestation consistent with any of the various theoretical scenarios, it could be a first indication of the particle-like nature of this unknown matter. A large number of these models propose that the coupling between the DM mediators and the Standard Model (SM) fermions is of Yukawa type, thus favoring at the LHC the associated production of DM with top-quarks or b-quarks. Such consideration turns out to be one of the leading motivations for many of the analyses

that have a particular focus on heavy flavour fermions accompanying the DM particles in the final state. The most recent experimental efforts and some of the prospects in this direction will be the primary topic of this talk.

**Invited Topical Talk** T 50.3 Wed 11:40 HSZ/AUDI  
**Precision predictions for transverse momentum distributions of Higgs and vector bosons at the LHC** — ●MAXIMILIAN STAHLHOFEN — University of Freiburg

The transverse momentum ( $p_T$ ) spectra of Higgs and electroweak gauge bosons are among the most prominent observables measured at the LHC. The expected quality of their experimental data requires high precision theoretical predictions to enable maximally accurate physics analyses like Standard Model tests, new physics searches, or PDF fits. I will discuss recent developments and future prospects in the theoretical description of  $p_T$  spectra at small and large transverse momenta, which are largely based on effective field theory techniques. I will put a focus on bottom mass effects in the peak region of the Higgs transverse momentum distribution and third-order QCD calculations for direct photon production at large  $p_T$ .

**Invited Topical Talk** T 50.4 Wed 12:00 HSZ/AUDI  
**Axion fragmentation** — ●ENRICO MORGANTE — Johannes Gutenberg Universität, Mainz, Deutschland

Axion-like particles are a key ingredient of many new physics scenarios, well motivated both from the theoretical and phenomenological point of view. In a number of recent proposals, the non-trivial dynamical evolution of an axion field in the early universe is used to solve many open problems of particle physics and cosmology, such as the hierarchy problem, Dark Matter, and others. An effect which was previously overlooked is the growth of quantum fluctuations when the axion rolls down a potential with multiple minima. This effect is particularly relevant for the relaxion mechanism and for the kinetic misalignment scenario. I will introduce this effect presenting analytic and lattice results, and then discuss the cosmological aspects of the scenario.