# T 153: Invited Overview Talks III

Time: Friday 11:00–12:30 Location: HSZ/AUDI

**Invited Talk** T 153.1 Fri 11:00 HSZ/AUDI

**The Standard Model on the test bench: What bosons and the top quark (will) tell us** — •Valerie Lang — Albert-Ludwigs-Universität Freiburg

The Standard Model of particle physics has been very successful at predicting the properties and interaction rates of particles since its formulation. The currently largest test bench for the Standard Model are the experiments at the Large Hadron Collider (LHC) at CERN. The supreme performance of both accelerator and detectors has allowed us to drive both, precision of measured properties and rarity of observed processes, into unprecendented areas. Particularly fascinating probes are the bosons of the Standard Model, which act as force carriers and can be produced directly at the LHC, as well as the top quark, the heaviest particle in the Standard Model and the only quark which we can observe as free particle. In this presentation, I will provide a glimpse at the insights we have gained so far, and at the possibilities that are still awaiting us with the current third running period of the LHC, and its upgrade - the high-luminosity LHC.

**Invited Talk** T 153.2 Fri 11:30 HSZ/AUDI

**Gravitational wave observations: Current results & future expectations** — •Harald Pfeiffer for the LIGO Scientific-Virgo-KAGRA-Collaboration — Max Planck Institute for Gravitational Physics, Am Mühlenberg 1, 14476 Potsdam

Gravitational Wave (GW) Astronomy has blossomed since the groundbreaking discovery in 2015 of a GW emitted by two merging black holes. The third observing run of the LIGO and Virgo observatories has increased the number of GW signals to nearly 100. Three types of compact object binaries have now been discovered: binary black holes, binary neutron stars and mixed systems with one neutron star and one black hole. This large set of GW signals enables ever more diverse conclusions about fundamental physics and astrophysics, with results including the equation of state at supernuclear densities, the mass-distribution of black holes, properties of gamma ray bursts, the nature of gravity and cosmology. This talk gives an overview of the observations and the wide variety of scientific results enabled by them. We close with an outlook to future observing runs and GW detectors.

**Invited Talk** T 153.3 Fri 12:00 HSZ/AUDI

**Precise muon detection: novel technologies for the luminosity frontier** — •Kerstin Hoepfner — RWTH Aachen, Phys. Inst. 3A, Aachen, Germany

Muons play an essential role in the discovery of new particles because of their potential to warrant a clean signature and low background. Outstanding examples from the past include the finding of the bottom quark as well as the tau lepton, and more recently the discovery of the Higgs boson. At present another type of signature is gaining importance: displaced muons as a probe for potential new BSM particles.

At the upcoming High-Luminosity LHC, muon detection as well as muon triggering face big challenges in terms of rate and precision. Consequently, modern muon systems evolve beyond being pure particle identification devices and rather turn into complex and high granularity trackers. High particle rates and densities also imply the requirement of increased radiation tolerance.

In anticipation of these challenges, new detection technologies were developed, largely based on micro-pattern gas detectors. These detectors provide a high spatial and time resolution. For the upcoming High-Luminosity LHC, the high-rate experiments ATLAS and CMS install large-scale systems of such detectors for muon detection. Their superior performance makes these detectors also good candidates for other applications in particle physics.