

T 101: Invited Topical Talks III-A

Time: Thursday 14:00–15:20

Location: HSZ/0003

Invited Topical Talk T 101.1 Thu 14:00 HSZ/0003
How to Study the Higgs Boson in its Bosonic Decays —
 •BENEDICT WINTER — Physikalisches Institut, Universität Freiburg

Measurements of the Higgs boson are means to probe electroweak symmetry breaking and the generation of the elementary particles' masses. Studies of Higgs boson decays to pairs of W and Z bosons and photons are cornerstones of the investigations by the ATLAS and CMS experiments at the LHC. This presentation illuminates how the Higgs boson's couplings as well as its mass and width are measured. It demonstrates how physics beyond the Standard Model is searched for in Higgs boson production and what opportunities will be provided by future LHC datasets.

Invited Topical Talk T 101.2 Thu 14:20 HSZ/0003
Measuring $H \rightarrow WW$ with the ATLAS Experiment —
 •CARSTEN BURGARD for the ATLAS-Collaboration — TU Dortmund

The past year saw the 10th anniversary of the discovery of the Higgs boson - an excellent time to reflect on past achievements and look into the future. The decay of the Higgs boson to a pair of W bosons is one of the most sensitive channels to measure the total Higgs boson production rate, mostly due to the relatively large rate of leptonic W decays. This leptonic signature comes with some unique challenges and opportunities: it exposes a high rate of gluon-fusion produced Higgs bosons on top of the backgrounds, providing an opportunity for a powerful differential measurement, while the rarer VBF and VH decays allow direct experimental access to the coupling of the Higgs to vector bosons. Also for possible high-mass particles decaying to a pair of W bosons, this channel is a sensitive probe. While the reconstruction of the properties of the Higgs boson itself can be challenging due to the evanescent neutrinos, precise measurements are still enabled by the sheer statistical power of the channel. Finally, even the neutrinos can be exploited: the parity-violation-induced spin-entanglement of the leptons does not only provide a distinctive feature to reject con-

tinuum WW background, but could also allow to measure violation of Bell inequalities in Higgs physics in the future. Run 2 of the LHC has provided the ATLAS experiment with a powerful dataset to tackle these measurements, and the ongoing Run 3 will only add to this.

Invited Topical Talk T 101.3 Thu 14:40 HSZ/0003
Belle II opportunities in B -decays with invisible signatures —
 •SLAVOMIRA STEFKOVA for the Belle II-Collaboration — KIT, Karlsruhe, Germany

$B \rightarrow K\nu\bar{\nu}$ decays are excellent probes for finding new physics for two reasons. Firstly, many extensions to the Standard Model are expected to manifest themselves in these very decays. Secondly, they belong to the family of $b \rightarrow sll$ transitions, where tensions with SM have been measured. They are, however, experimentally challenging as not only are they rare but they contain two neutrinos leaving no signature in the detector. In this talk I will present the latest status of the measurements of observables in $B \rightarrow K\nu\bar{\nu}$ decays with the data collected by the Belle II experiment. I will also outline the prospects for future measurements of $B \rightarrow K\nu\bar{\nu}$ decays and similar processes using the growing Belle II dataset.

Invited Topical Talk T 101.4 Thu 15:00 HSZ/0003
Two Pieces of a Puzzle: Inclusive and Exclusive $|V_{cb}|$ —
 •MARKUS PRIM — Physikalisches Institut, Bonn, Germany

Over the last decade, the CKM matrix element $|V_{cb}|$ has been measured by various experiments, and the tension between the two experimental methods - the inclusive and the exclusive reconstruction of the final-state hadron system - persists to this day, despite the increasing precision of the experimental measurements and the higher-order corrections in the theoretical calculations. In this talk, we will review the current status of measurements and the implications of the ever-increasing Belle II data on the precision that can be achieved in the coming years.