T 1: Invited Overview Talks I

Time: Monday 14:45–15:45   Location: AudiMax

Invited Overview Talk   T 1.1   Mon 14:45   AudiMax
Top-quark physics in a new regime: precision, effective field theory, and the top-quark pair production threshold — •KNUT ZOCH — CERN, Geneva, Switzerland

The top quark, the heaviest known elementary particle, plays a central role in testing the Standard Model and probing physics at the highest energy scales. Building on the legacy of the Run 2 data set and motivated by the growing Run 3 program, the LHC experiments continue to deliver a broad range of results that advance our understanding of top-quark production and interactions.

This talk will review recent experimental highlights from the ATLAS and CMS collaborations, including measurements of top-quark production in association with the Higgs boson, effective field theory interpretations of top-quark observables, improved determinations of the top-quark mass, and first results exploiting Run 3 data. Particular emphasis will be placed on measurements of top-quark pair production near threshold, where bound-state-like effects ("toponium") become accessible and open a new window on strong-interaction dynamics in the top-quark sector.

Together, these results illustrate how precision measurements and novel kinematic regimes in top-quark physics continue to sharpen our picture of the Standard Model and constrain possible extensions.

Invited Overview Talk   T 1.2   Mon 15:15   AudiMax
Monte Carlo event generators for the HL-LHC — •STEFFEN SCHUMANN — Institut für Theoretische Physik, Georg-August Universität Göttingen

Monte Carlo event generators are indispensable tools for the analysis and interpretation of high-energy collider experiments. They provide detailed simulations of scattering events at the level of observable particles that reflect our current understanding of the dynamics and interactions of the fundamental constituents of nature. In this talk an overview of the status of Monte Carlo event generators will be given. Guided by the experimental needs and requirements of the High-Luminosity LHC, areas of active developments will be highlighted. This includes, among others, the enhancement of the perturbative accuracy of the predictions and means to improve the computational efficiency of the simulations. A strategic approach of event generator development will allow these tools to be further improved and systematic uncertainties to be reduced, facilitating future experimental success.