T 99: Hauptvorträge (Invited Talks) IV

Time: Friday 9:45–12:30 Location: Tb

Invited Talk T 99.1 Fri 9:45 Tb

Probing the neutrino mass scale with the KATRIN experiment — •Kathrin Valerius — Karlsruhe Institute of Technology, Institute for Astroparticle Physics, Karlsruhe, Germany

Precision measurements of the kinematics of weak decays offer a direct and nearly model-independent approach to probe the absolute neutrino mass scale. The KArlsruhe TRItium Neutrino experiment (KATRIN) is searching for the minute imprint of the neutrino mass in the endpoint region of the tritium beta-decay spectrum. KATRIN employs a high-intensity gaseous molecular tritium source and a high-resolution electrostatic filter with magnetic adiabatic collimation to target a neutrino-mass sensitivity of $0.2\,\mathrm{eV/c^2}$, thus improving on previous experiments by an order of magnitude, after five years of data-taking.

With just its first science run, KATRIN has tightened previous direct neutrino mass bounds by about a factor of two, yielding a new upper limit of $1.1\,\mathrm{eV/c^2}$ (90% CL), and has begun to address further science channels such as the direct search for light sterile neutrinos. As larger data sets are collected and further improvements in terms of signal-to-background ratio and systematics are being achieved, KATRIN is continuing along its path towards sub-eV neutrino-mass sensitivity and the exploration of interesting BSM physics cases.

Coffee Break 30 min

Invited Talk T 99.2 Fri 11:00 Tb

The quest for precise LHC predictions — •Jonas Lindert — University of Sussex, Brighton, UK

The continuous improvement of statistics and experimental systematics at the Large Hadron Collider permits to challenge the Standard Model (SM) of particle physics at steadily increasing levels of energy and precision. In this context, the uncertainty of theoretical predictions starts to play a decisive role in many areas of the physics program at the LHC. This provides a strong motivation to push theoretical predictions towards more complex processes and higher perturbative orders including both QCD and electroweak corrections.

In this talk, I will summarise the current status of SM probes and will introduce several related theoretical challenges. I will briefly review the recent progress in perturbative calculations at the precision frontier, followed by a discussion of crucial applications to Higgs physics, EW physics, top-quark physics and to background predictions in new-physics searches at the LHC.

Invited Talk T 99.3 Fri 11:45 Tb

European Strategy for Particle Physics: towards the next collider at CERN — •Ursula Bassler — IN2P3 - CNRS, Paris, France

In June 2020, CERN Council updated for the third time the European Strategy of Particle Physics after 2 years of preparatory work by the particle physics community from all over the world and scientific leaders from the CERN member states. After the publication of the Strategy, newspaper headlines reported prominently on the possible construction of a 100km Collider as CERN's next flagship project. Yet, the implementation of such a project requires in-depth feasibility studies in various areas before a possible approval. This presentation aims to work out the nuances in the Strategy Paper, the physics questions discussed to converge to the Strategy and the challenges ahead of a future collider project at CERN. Some emphasis will also be given to transvers considerations of the field, such as Education and Public Engagement, Early Careers, Diversity, Sustainability and Technology Transfer.