Dresden University of Technology

Faculty of Physics

PHYSICS COLLOQUIUM

Speaker:

Dr. Philip Sommer
Institut für Kern- und Teilchenphysik,
Technische Universität Dresden

Topic: **Testing the Electroweak Theory at Highest Energies** – *Introduction for Habilitation*

Time and place: Tuesday, January 6, 2025, **2:50 pm** – hybrid event
The colloquium will be held in REC/C213.
Online participation possible:
Zoom-Meeting: Meeting-ID: 631 3817 8900 / passcode: PC-WiSe25
https://tu-dresden.zoom-x.de/j/63138178900?pwd=TlmGawPz1dtDA6VzO2N1XdqqI7bE6b.1

Host: Prof. Michael Kobel

Abstract:

The Standard Model of particle physics describes the fundamental building blocks of matter and the forces that govern their behaviour. At its heart lies the electroweak theory. Unlike other fundamental interactions, the electroweak force is mediated by heavy particles, the W and Z bosons. According to the Standard Model, their masses arise through the mechanism of electroweak symmetry breaking with the Brout–Englert–Higgs field. The CERN Large Hadron Collider (LHC) allows for the exploration of this theory at the highest energies. At the LHC, the electroweak theory is probed through precision measurements of W and Z boson production, as well as through studies of their self-interactions. These interactions are tightly constrained by the structure of the theory. In the proton-proton collision data from the second experimental phase of LHC operation, the ATLAS experiment has achieved unprecedented precision in measurements of electroweak processes and explored new regimes of interactions. In particular, it has significantly extended the energy reach beyond that of previous collider experiments and has provided experimental access to processes involving the self-interactions of four W or Z bosons. This colloquium will give an overview of these advances and discuss recent results from the ATLAS experiment that provide stringent tests of the electroweak sector of the Standard Model.

Bio: Philip Sommer received his PhD in 2016 from the University of Freiburg and subsequently held research positions at the University of Sheffield and at CERN. His work focuses on precision measurements of the Standard Model of particle physics with the ATLAS experiment at the CERN Large Hadron Collider, aiming to test the internal consistency of the electroweak theory. Within

the ATLAS Collaboration, he has taken on several leadership roles in Standard Model measurements as well as in the electron and photon reconstruction. In 2024, he joined the Institute of Nuclear and Particle Physics at the TU Dresden.