Universität Münster

Fachbereich Physik

Allgemeines Physikalisches Kolloquium

Donnerstag, 07.11.2024 - 16 Uhr c.t.

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Dr. Johannes Michel

University of Amsterdam and NIKHEF

QCD Frontiers from TeV to MeV Scales

The Large Hadron Collider (LHC), which is gearing up for its high-luminosity phase, is stress testing the Standard Model of particle physics at an unprecedented level of detail. I give an overview of major recent highlights of the LHC experimental program on the TeV precision frontier, ranging from the direct observation of Higgs Yukawa interactions -- the fifth force of Nature -- and rare phenomena involving top quarks, including their quantum entanglement, to ultra-precise measurements of the mass of the W boson. In particular, I review some of the theory advances in Quantum Chromodynamics (QCD) making this progress possible, many of which concern the physics of transverse-momentum distributions (TMDs). I then relate these ideas to one of the least understood aspects of the Standard Model, the deeply nonlinear dynamics of quarks and gluons confining into color-neutral hadrons at a scale of hundreds of MeV. I showcase how heavy (bottom and charm) quarks provide a unique view into this phenomenon of hadronization by effectively serving as static sources of the gluon field, and outline the opportunities that heavy hadrons offer towards establishing a future Quantum Information Theory of hadronization.

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Kolloquiums-Kaffee ab 16 Uhr vor dem Hörsaal

Institutsgruppe 1 – HS 2
Wilhelm-Klemm-Str. 10