Karlsruher Institut für Technologie

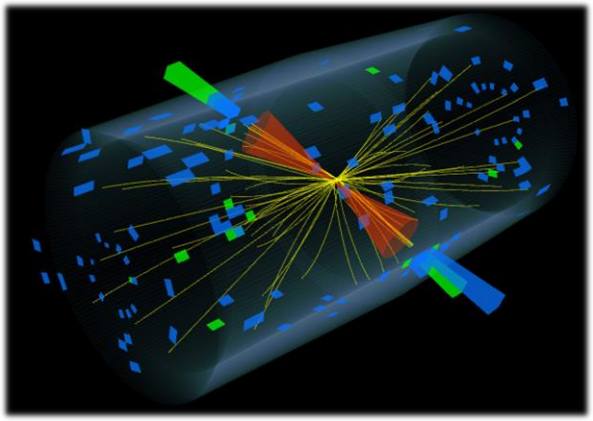
KIT-Fakultät für Physik

Einladung zum Physikalischen Kolloquium

26.06.2026 Klaus Rabbertz, Karlsruher Institut für Technologie

»Proton unboxing – What the LHC teaches us about the proton**«**

Einführung: M. Klute



Scattering α-particles of a few MeV onto a thin gold foil Rutherford, Geiger, and Marsden could demonstrate that, in contrast to expectations, atoms are made of a small, hard nucleus surrounded by an electron cloud. Sixty years later at the SLAC-MIT experiment electrons of up to 20 GeV revealed that hydrogen nuclei themselves, i.e. protons, must contain tiny charged scattering centres nowadays known as quarks. Today the world's most powerful particle accelerator, the Large Hadron Collider at CERN, smashes protons onto each other at more than 2000 times higher center-of-mass energies of almost 14 TeV.

In this colloquium I will explain what from the smashed protons we actually measure in our detectors namely high-energetic collimated streams of hadrons called jets, and how we can use them to deeply look inside protons. Jets, also in association with Z bosons, allow us in particular to analyse the gluon content that is due to the strong interaction. Moreover, the running of the strong coupling α_s, predicted by quantum chromodynamics, can be tested over three orders of magnitude in energy scale up to 7 TeV. I will provide an overview where this enters into the world average determination of α_s at the reference scale of the Z boson mass and conclude with the latest results on the size of the smallest constituents of matter.

Der Vortrag findet **am Freitag, den 26. Juni 2026 um 15:45 Uhr im Otto-Lehmann-Hörsaal**, Physik-Flachbau (Geb. 30.22), KIT-Campus Süd statt.

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