## Habilitationsvortrag

<image>

Dr. Davide Giusti Forschungszentrum Jülich

## The Role of Lattice QCD+QED in the Era of Precision Flavor Physics

physikalisches

Flavor Physics provides a window to look beyond the Standard Model of elementary particles, in many cases reaching farther than direct searches at high-energy colliders. With experiments that are dramatically improving in precision now and in the coming years, an extraordinary theoretical effort is underway to answer open fundamental questions in our understanding of Nature and often the main limitation lies in our ability to quantify nonperturbative contributions due to Quantum Chromodynamics (QCD), the theory which describes the strong interactions of quarks and gluons.

In this context, important advances are made possible thanks to Lattice QCD simulations, in which space and time are approximated by a discrete lattice of points, performed on the world's most powerful supercomputers. This research field has reached such a high level of maturity in recent years that it has become a precision science, especially since techniques and methodologies have been developed to include radiative corrections of Quantum Electrodynamics (QED) in lattice calculations.

In this talk, I will discuss the preeminent role of Lattice QCD+QED simulations in Flavor Physics, both in the lepton sector, through the example of the muon anomalous magnetic moment, and in the quark sector, with focus on weak decays of hadrons.



Mo. 7.7.25 16:00 Uhr Ort: H34



Testing the Standard Model of elementary particles using a supercomputer. Credits: JUWELS supercomputer, Forschungszentrum Jülich.



