

Symposium Quantum Physics at the High-Energy Frontier: The Higgs Boson in the Standard Model and Beyond (SYHB)

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Experiments at modern particle colliders probe the fundamental laws of quantum physics at the highest energies. The Standard Model (SM) of particle physics is based on quantum field theory and describes the basic building blocks of matter and the forces acting between them. At its heart is the Higgs boson, an exceptional quantum state that plays a crucial role in generating the masses of bosons, fermions and even itself. This scalar state is closely connected to fundamental open questions in quantum physics and cosmology for which the SM offers no explanation; among them the nature of dark matter, the matter-antimatter asymmetry and the evolution of the universe from the big bang to the present day. For this reason, the Higgs boson could be the key to a new description of the quantum world.

Almost five decades after its postulation, the discovery of the Higgs boson by the ATLAS and CMS experiments at the Large Hadron Collider (LHC) was a triumphant confirmation of quantum physics. The ongoing measurements of the Higgs boson properties constitute an enormous further progress. However, only future experiments at the High-Luminosity LHC (HL-LHC) or at proposed next-generation colliders will provide us with the necessary quantum leap forward in our understanding of nature.

In this symposium, world-class experts will give an overview of the physics of the Higgs boson: its role in the quantum theory of particles and cosmology (Mühlleitner), the experimental path from the establishment of the SM to the Higgs boson discovery (Jakobs), the status of current Higgs boson measurements (Köneke) and an outlook into the future (Klute).

Overview of Invited Talks and Sessions

(Lecture hall ZHG105)

Invited Talks

SYHB 1.1	Wed	10:45–11:15	ZHG105	The Higgs Boson – Key to our Understanding of the Universe — •MILADA M. MÜHLEITNER
SYHB 1.2	Wed	11:15–11:45	ZHG105	The path to the discovery of the Higgs boson — •KARL JAKOBS
SYHB 1.3	Wed	11:45–12:15	ZHG105	The Higgs boson revealed: What current experiments teach us about this unique quantum state — •KARSTEN KÖNEKE
SYHB 1.4	Wed	12:15–12:45	ZHG105	A Quantum Leap Forward: Unlocking the Higgs Boson at Future Colliders — •MARKUS KLUTE

Sessions

SYHB 1.1–1.4	Wed	10:45–12:45	ZHG105	Symposium Quantum Physics at the High-Energy Frontier: The Higgs Boson in the Standard Model and Beyond
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