

T 105: Invited Overview Talks IV

Time: Friday 11:00–13:00

Location: ZHG011

Invited Overview Talk T 105.1 Fri 11:00 ZHG011
Galactic Astrophysics with H.E.S.S. — •LARS MOHRMANN for the H.E.S.S.-Collaboration — Max-Planck-Institut für Kernphysik, Heidelberg, Germany

The High Energy Stereoscopic System (H.E.S.S.) is an array of imaging atmospheric Cherenkov telescopes that has been used to observe the sky in TeV γ rays since 2004. Thanks to its unique location in the Southern Hemisphere and several upgrades to the system, the experiment continues to enable cutting-edge astrophysics despite its age. In this contribution, I will review the latest H.E.S.S. results on Galactic γ -ray sources, including pulsar wind nebulae, young massive star clusters, microquasars, and the Galactic Centre region.

Invited Overview Talk T 105.2 Fri 11:30 ZHG011
Physics in the era of big data: AI in particle and astroparticle physics — •JONAS GLOMBITZA — Erlangen Centre for Astroparticle Physics, FAU Erlangen-Nürnberg

Physics and artificial intelligence (AI) are interconnected. The recent Nobel Prize for Physics has once again revealed this productive connection. While physics concepts laid the foundation for today's neural networks, these algorithms, in turn, enable efficient physics analyses with exceptional precision. This emerging technology opens new perspectives for the data-intensive research field of particle and astroparticle physics. In this talk, I will give an overview of the versatile applications of AI in particle and astroparticle physics, review the breakthroughs that this new technology made possible, and discuss future directions and challenges.

Invited Overview Talk T 105.3 Fri 12:00 ZHG011

What the LHC tells us about the top quark, the heaviest particle in nature — •MATTHIAS KOMM — DESY, Hamburg

The unprecedented data collected during proton-proton collisions at 13 and 13.6 TeV by the CERN LHC have significantly advanced our understanding of the top quark, the heaviest known elementary particle. This talk will highlight recent results on top quarks from the ATLAS and CMS collaborations, including precise determinations of key properties such as its mass and the production rates of rare processes, including four-top quark production. Additionally, the top quark's unique role in the Standard Model, particularly its large Yukawa coupling, close to unity, establishes a strong connection with the Higgs boson and makes it therefore a compelling focus for exploring potential new particles. Investigating top quark interactions at the highest energy scales underscores the potential of the LHC experiments to uncover fundamental new aspects of our universe.

Invited Overview Talk T 105.4 Fri 12:30 ZHG011
The flavor intensity frontier: latest results from Belle II and LHCb — •DANIEL GREENWALD — Technische Universität München, Garching

The study of the different flavors of quarks and leptons may answer some of the most interesting questions of particle physics, including explaining why the visible universe is built only of matter, not antimatter, and discovering new particles and forces not yet known to us. The Belle II and LHCb experiments, located at KEK in Tsukuba, Japan and at CERN in Geneva, Switzerland, precisely measure flavor phenomena using their uniquely large data sets. I will present an accessible overview of both experiments, their measurement techniques, and some of their recent results.