Symposium Future (SYFU)

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Overview of Invited Talks and Sessions

Invited Talks

SYFU 1.1	Wed	14:00–14:30	Geb. 30.95: Audimax	**Future in Collisions – The need for an e^+e^- Higgs Factory** — •Jürgen Reuter
SYFU 1.2	Wed	14:30–15:00	Geb. 30.95: Audimax	**Exploring the Gravitational Wave Universe with the Einstein Telescope and LISA** — •Katharina-Sophie Isleif, the ET Collaboration, the LISA Consortium, the LVK Collaboration
SYFU 1.3	Wed	15:00–15:30	Geb. 30.95: Audimax	**Sustainable Partnerships: Navigating the Environmental Challenges in Modern Particle and Astroparticle Physics** — •Michael Düren

Sessions

SYFU 1.1–1.3	Wed	14:00–15:30	Geb. 30.95: Audimax	**Symposium Future**

SYFU 1: Symposium Future

Time: Wednesday 14:00–15:30 Location: Geb. 30.95: Audimax

Invited Talk SYFU 1.1 Wed 14:00 Geb. 30.95: Audimax
Future in Collisions – The need for an e^+e^- Higgs Factory — •Jürgen Reuter — Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany

The European Strategy Update for Particle Physics in 2020 and the corresponding US Particle Physics Prioritization Panel report 2023 as well as strategy processes in the Asian region have selected an e^+e^- Higgs factory as the most important future project in collider physics. In this talk, the motivation and reasoning behind this decision will be laid out why ultrahigh precision measurements of the most unique particle in the cosmos, the Higgs boson, as well as the top quark and the weak gauge bosons chart the path for our deeper understanding of the microcosm (and hence the structure of the universe) in the best possible way. Most of what we take for granted from textbooks needs experimental testing: the flavor structure of particle physics, the mass generation of all fermion generations and the microscopic origin of electroweak symmetry breaking.

Invited Talk SYFU 1.2 Wed 14:30 Geb. 30.95: Audimax
Exploring the Gravitational Wave Universe with the Einstein Telescope and LISA — •Katharina-Sophie Isleif[1], the ET Collaboration[2], the LISA Consortium[3], and the LVK Collaboration[4] — [1]Helmut Schmidt University, Hamburg, Germany — [2]https://www.et-gw.eu — [3]https://www.elisascience.org — [4]https://www.ligo.org

The detection of gravitational waves has started a new era in astronomy and our understanding of the universe. Since the first detection in 2015, the ground-based detectors LIGO and Virgo have captured more than 100 gravitational wave signals from merging black holes and neutron stars within the audible frequency range. This talk will delve into the next phase in gravitational wave astronomy, focusing on expanding into the low-frequency domain inaccessible with current detectors. We will examine the opportunities afforded by next-generation detectors like the Einstein Telescope, designed to observe gravitational wave signals below 10 Hz, and the space-based LISA mission, which aims to reach the millihertz range. We will discuss how low-frequency gravitational wave detectors unveil cosmic events that promise novel insights into our universe and how they can advance multi-messenger astronomy by acting as early-warning systems for astronomical events. Navigating this low-frequency frontier poses unique challenges for detector design on ground and in space. This talk will also provide a brief overview of some of the technological advancements being developed to mitigate unique noise sources, underlining their crucial role in the successful realization of low-frequency gravitational wave astronomy.

Invited Talk SYFU 1.3 Wed 15:00 Geb. 30.95: Audimax
Sustainable Partnerships: Navigating the Environmental Challenges in Modern Particle and Astroparticle Physics — •Michael Düren — JLU Giessen, Gießen, Germany

The climate crisis, combined with growing economic and geopolitical turbulence, presents a challenging global landscape for next-generation research projects. The imminent impact of geopolitical tensions on the field is exemplified by FAIR, a nuclear research facility primarily funded by Germany and Russia.

Immediate action is required at individual, research group, and institutional levels to reduce the carbon footprint of existing and future facilities. However, merely abstaining from contributing to global environmental issues is insufficient. Recognizing the interconnectedness of the scientific community and the pressing need for environmental stewardship, it is imperative to transition from being part of the problem to becoming part of the solution.

Leveraging our community's rich history of solving complex problems through sensor technologies, modelling, and global collaboration, there is an opportunity to apply this expertise to address global challenges. To achieve this, we propose forging partnerships with stakeholders in the socio-economic and ecological realm, establishing 1-to-1 collaborations that facilitate the exchange of knowledge, technologies, and international structures. Such partnerships can catalyse a sustainable societal transition, while preserving the invaluable expertise of our global community and attracting a new generation of young minds into our sphere.