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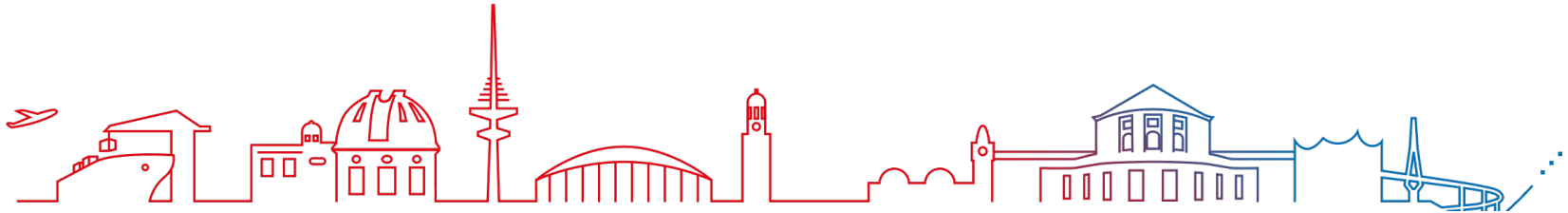

Hamburg International Summer Schools 2025

Welcome to University of Hamburg

Prof. Dr. Elisabetta Gallo

Agenda

- Welcome
- Lecturers and Courses
- Transportation
- Accommodation
- Sightseeing
- Important Contacts

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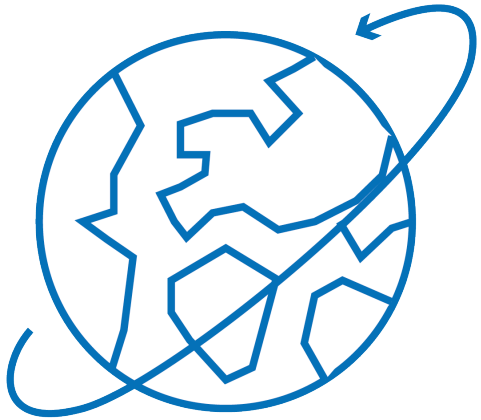
Welcome



Welcome

Welcome to the *SUMMER SCHOOL* at the University of Hamburg! We are thrilled to have you join us for this enriching experience. Over the coming weeks, you will have the opportunity to engage in insightful discussions, collaborative projects, and cultural exchanges with fellow students and faculty members.

We encourage you to make the most of your time here by exploring our vibrant campus, participating in various activities, and connecting with your peers. This is not only a chance to learn but also to build lasting friendships and networks.

This brochure serves as your guide, offering all the details about the planned program and practical information. Should you have any questions or require assistance at any point, please feel free to contact us.

We look forward to a wonderful summer together filled with knowledge, inspiration, and memorable experiences. Enjoy your time in Hamburg!

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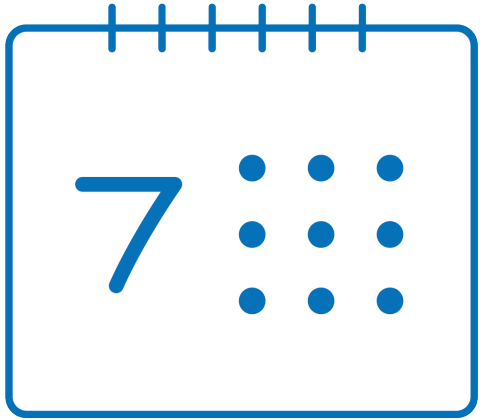

Lecturers and Courses

Dr. Katharina Behr

Katharina Behr leads the Helmholtz Young Investigator Group “Fingerprints of the Vacuum” at DESY, where she searches for new particles decaying to a pair of top quarks in the ATLAS experiment, such as additional Higgs bosons or new particles involved in the interaction between dark matter and ordinary matter. She also searches for Higgs boson pair production, a rare process predicted by the Standard Model that is crucial to our understanding of the vacuum structure and could be enhanced in the presence of new particles and interactions.

Katharina Behr obtained her PhD in Particle Physics at the University of Oxford on a Rhodes scholarship after completing her undergraduate degree in physics at the LMU Munich. She was awarded the DPG Hertha Sponer Preis in 2024.

Photo: Carsten Dammann

Prof. Dr. Elisabetta Gallo

Elisabetta Gallo is since 2015 full professor in particle physics at the University of Hamburg. University of Hamburg. She did research on strong and electroweak interactions at LEP, at HERA and now at the LHC. Her research is presently on Higgs physics with the CMS experiment.

She obtained her PhD at the University of Florence, Italy, where she was also staff researcher and senior staff INFN researcher.

Photo: Carsten Dammann

Prof. Dr. Gregor Kasieczka

After undergraduate studies in Vienna, a PhD in Heidelberg, and a postdoc at ETH Zurich, Gregor Kasieczka joined Universität Hamburg in 2017 where he is now a full professor for machine learning in particle physics.

His work focuses on searches for exotic new particles beyond the standard model with the CMS experiment at CERN as well as developing new data analysis techniques for fundamental physics.

Photo: Carsten Dammann

Prof. Dr. Timo Weigand

Timo Weigand is an expert on string theory and quantum field theory, focusing on the interplay of physics and geometry in the context of string compactifications and quantum gravity.

After completing his PhD at the Max- Planck-Institute for Physics in Munich in 2006, he continued his research as a postdoc at the University of Pennsylvania and at SLAC, Stanford. After leading a research group as Associated Professor at Heidelberg University from 2009 - 2016, he joined the CERN theory group 2017 and was appointed Professor for Mathematical Physics at JGU Mainz in 2019. Since 2020, he has been a Professor for Mathematical Physics at Hamburg University. He is presently deputy spokesperson of the Quantum Universe Cluster of Excellence.

Photo: Carsten Dammann

Dr. Alexander Wesphal

His main research interests move along the boundary between inflationary cosmology, string theory and string phenomenology, and higher-dimensional field theory including supergravity, with some forays into quantum cosmology.

Alexander Westphal got his PhD at the University of Hamburg, was research associate at SISSA, Trieste, postdoc at Stanford University and since 2010 he is staff member of the theory group at DESY. He obtained an ERC Consolidator Grant in 2015.

Photo: Carsten Dammann

Particles

(Lecturers: Elisabetta Gallo, Gregor Kasieczka, Katharina Behr)

The course will start with an introduction to experimental particle physics and principles of detection of particles. It will first cover tests at colliders of the strong and electroweak interactions and then describe measurements of the properties of the Higgs boson. Finally searches for new physics beyond the standard model will be reported, including dark matter candidates. Local experiments at DESY, e.g. searching for axion-like particles, will also be covered. Particular emphasis will be given to recent results at the LHC. Exercises classes will complement the lectures, including applications of machine learning to particle physics.

Strings

(Lecturer: Timo Weigand)

String theory is a promising candidate for a unified theory of all particles and interactions that also encompasses a quantum theory of gravity. Its basic idea is to re-interpret the apparently point-like elementary particles we observe in Nature as different vibration modes of one and the same type of tiny one-dimensional objects - the strings. The course starts with a detailed discussion of the classical and quantized bosonic string, followed by discussions of interactions, D-branes and superstrings. Prerequisites are a standard knowledge of special relativity and quantum mechanics.

Cosmology

(Lecturer: Alexander Westphal)

This course will give an overview of and introduction to modern and timely topics in cosmology. It focuses on the main theoretical concepts covering cosmic times ranging from the creation of primordial density fluctuations to the onset of structure formation. Observational signatures will be presented qualitatively and further developed in a separate module. The following topics will be covered: the expanding Universe, thermal processes after the hot big bang, primordial nucleosynthesis, origin of matter- anti-matter asymmetry, dark matter production in the early Universe, cosmic microwave background as probe of the early Universe, inflation, production of primordial gravitational waves and techniques for their detection, also in the context of the recent first detection of gravitational waves, charged and neutral cosmic radiation including high energy gamma-rays and neutrinos as probes of the dark sector of the Universe and of energetic astrophysical processes. An overview over these topics will be given in the lecture and part of the topics and the theoretical concepts behind them will be developed in more detail in the exercise classes..

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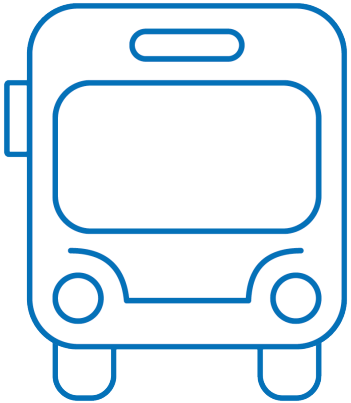
Transportation



Transportation

Getting around Hamburg is very easy thanks to its excellent public transportation system. From busses to trains (U-Bahn and S-Bahn) and even scenic ferries, the city offers a variety of options to explore. To help you navigate the city, we suggest using the convenient "Google Maps" app or website to find the best routes between places.

For hassle-free ticket purchases, consider using the "hvv" app. Whether you opt for a weekly pass at just EUR 29 for unlimited rides or single tickets (priced between EUR 2 and EUR 3.80, depending on your journey), you'll have the flexibility to travel at your own pace.

If you want to use a bycicle during your stay in Hamburg, you can download the Stadtrad App. You can pay 5 EUR once and the bycicles are free for the first 30 minutes or you pay 0.10 EUR per minute without the registration fee.

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Accommodation

Hotel

Several hostels/hotels are located within reach from University of Hamburg. To ensure a seamless stay, we kindly request all participants to independently secure their own accommodations. Should you encounter any difficulties during the booking process, please feel free to reach out to us for assistance. Below, we have listed a few website recommendations to help you find accommodation:

- booking.com – generel booking website
- Hostelworld – booking website specialized in hostels
- AirBnb – website to book apartments and rooms

For more information and bookings, please visit their respective websites.

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Sightseeing

Exploring Hamburg

- Hop on Hop off bus - perfect to see the main spots in a short time
- Elbphilharmonie Plaza - get a great view of the harbor for free
- Musicals – buy tickets online
- Schanze - many restaurants, bars and small shops
- Reeperbahn – discover the red light and party district, maybe take a tour
- Speicherstadt – learn about the hanseatic history and world trade
- Trip to the Elbstrand with ferry 62

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Important Contacts

Important Contacts

Please save the most important contact information in your phone to have them available if needed.

Emergency telephone numbers:

- Police: 110
- Ambulance + fire department: 112
- Out-of-hours Medical Service: 116 117

Contact

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