

Application

<https://ms.hereon.de/summerschool/078564/index.php/en>

In addition to the application form provided on the internet, please send your CV (pdf document, maximum one page, including the status of your education, if applicable the topic of your thesis) as well as your letter of motivation, supported and signed by your supervisor also stating their contact address, to matrac2@hereon.de

Organising Committee

Jens Birch (Linköping University, Sweden), Thorsten M. Gesing (Universität Bremen, Germany), Maths Karlsson (Chalmers University of Technology, Sweden), Martin Müller (Hereon/CAU Kiel, Germany)

Local Organisers

Nicola Kampner (Hereon, Germany)
Klaus Pranzas (Hereon, Germany)
Sebastian Busch (Hereon, Germany)
Jean-François Moulin, (Hereon, Germany)
Martin Müller (Hereon, Germany)

The School is supported by



the Röntgen Angström Cluster - a collaboration between Germany and Sweden



Bundesministerium für Forschung, Technologie und Raumfahrt

the BMFTR



Vetenskapsrådet

the Swedish Research Council

Venue and Arrival

The three-day theoretical course will be given at the conference centre „Schloss Fürstenried“ in Munich which is located in the Southwest of Munich. For the practical training at FRM II, a bus transfer will be organised to shuttle the students to Garching.

Board and lodging have already been booked. The address of our venue is:
Schloss Fürstenried
Forst-Kasten-Allee 103
81475 München
Phone: +49-89-7450829-0
E-mail: exerzitien@schloss-fuerstenried.de

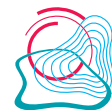
Please note

Application deadline: 7 November 2025
Decision about participation: 19 December 2025
Payment deadline: 30 January 2026

Contact:

Nicola Kampner (Ms)
Institute of Materials Physics
Phone: +49 4152 87-2555
nicola.kampner@hereon.de

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Helmholtz-Zentrum
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Helmholtz-Zentrum Hereon
Max-Planck-Straße 1
21502 Geesthacht
www.hereon.de

MATRAC 2 – School 2026

Application of Neutrons and Synchrotron Radiation in Materials Science with special focus on Fundamental Aspects of Materials



picture: © Wenzel Schürmann/TUM

Scope of School

The MATRAC School series provides an introduction to the fundamental principles and experimental techniques used in the analysis of advanced engineering materials through neutron (MATRAC 2) and synchrotron radiation (MATRAC 1). The two types of radiation share common characteristics, many of the experimental methods are similar and their results are analysed based on the same theories.

Both of the probes offer unique capabilities for probing materials non-destructively – at the surface as well as deep within the bulk. Neutrons however offer some unique properties like extremely low absorption, magnetic and isotopic sensitivity. MATRAC 2 will focus specifically on the neutron-based methods while putting them in a broader perspective, in most of the lectures the similarities to the X-ray-based methods will be briefly discussed.

Participants will explore a range of methods that are increasingly important in materials science, particularly in the design, processing, and evaluation of advanced materials:

- neutron absorption-induced secondary radiation that can be used to determine the elemental composition of materials,
- imaging methods such as tomography that offers 3D insights into microstructural features,
- diffraction techniques for the determination of crystalline phase fractions, texture, and residual stresses,
- small-angle scattering and reflectometry for the characterization of “large” structures such as precipitates,
- and neutron spectroscopy to determine the dynamics of atoms on a pico- to nanosecond scale.

The school emphasizes fundamental understanding, hands-on experimental training, and data analysis. Students will gain practical experience with instrumentation and measurement techniques during experiments conducted at the MLZ in Garching near Munich.

As the demand for advanced materials continues to grow, so does the need for precise, multi-scale structural analysis. MATRAC 2 addresses this need by equipping participants with the knowledge and skills to select appropriate neutron and synchrotron techniques for a wide range of materials science challenges.

Organisational Details

The school begins with lectures on the first day. Manuscripts of all lectures will be provided in digital form. On the following days, practical training at the instruments of the MLZ (Heinz Maier-Leibnitz Zentrum) at FRM II in Garching and lectures alternate. The fifth day of the school will be devoted to further lectures as well as a summing-up and final discussions.

The MATRAC 2 School is significantly funded by German and Swedish authorities for their respective students. Furthermore, financial support for students from other EU countries is granted. The participation fee amounts to 120 €.

Tentative Programme

Sunday, 01.03.2026

- Introductory Talk
- Get Together

Monday, 02.03.2026

- Properties of Neutrons and Photons, Introduction to Scattering Theory
- Scattering Theory, Correlation Functions
- Structure Determination
- Real Structure, Defects and Residual Stresses
- Experimental Techniques I: Diffraction
- Experimental Techniques II: SANS, Reflectivity
- Engineering Materials Science
- Introduction and Preparation of Experiments at FRM II
- Poster Session

Tuesday, 03.03.2026

- Experiments at FRM II

Wednesday, 04.03.2026

- Experimental Techniques III: Strain Scanning
- Lattice Dynamics/Photons
- Experimental Techniques IV: TAS, TOF
- Experimental Techniques V: Imaging and Tomography (Polymers, Porous Materials, Biomaterials)
- Experimental Techniques VI: Spin Echo Spectroscopy
- Students' Presentations
- Poster Session

Thursday, 05.03.2026

- Experiments at FRM II
- Conference Dinner

Friday, 06.03.2026

- Data Treatment and Modelling
- Actual Topic of Materials Science
- Results of Experiments
- Final Discussion



MATRAC 2:

Application of Neutrons and Synchrotron Radiation in Materials Science with special focus on Fundamental Aspects of Materials
01.03.-06.03.2026 in Munich/Garching