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FUTURE ENVIRONMENT

## Application

<https://www.hzg.de/ms/summerschool/058651/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 his/her contact address, to **matrac1@hzg.de**

## Organising Committee

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

## Local Organisers

Nicola Kampner (HZG, Germany)  
Klaus Pranzas (HZG, Germany)  
Christina Krywka (HZG, Germany)  
Peter Staron (HZG, Germany)  
Martin Müller (HZG, Germany)

## The School is supported by



the Röntgen Angström Cluster - a collaboration between Germany and Sweden



the BMBF and the North German Länder via the Röntgen Angström Cluster



Vetenskapsrådet

the Swedish Research Council



and SINE2020 - Grant Agreement number1: 654000 – SINE2020 – H2020-INFRADEV-2014-2015/ H2020-INFRADEV-1-2014-1

## Venue and Arrival

The three-day theoretical course will be given at the youth hostel „Zündholzfabrik“ in Lauenburg which is located in the East of Hamburg, about 40 km from Hamburg City centre. Train and bus from Hamburg can reach Lauenburg within about an hour.

A bus transfer will be organised to shuttle the students from Lauenburg to Hamburg for the practical training at PETRA III.

Accommodation for all participants has already been booked at: Youth Hostel Lauenburg „Zündholzfabrik“ Elbstrasse 2, 21481 Lauenburg, Germany  
Phone: +49-4153-598880

Email: [lauenburg-zuendholzfabrik@jugendherberge.de](mailto:lauenburg-zuendholzfabrik@jugendherberge.de)

<https://lauenburg-zuendholzfabrik.jugendherberge.de/net/en/youth-hostels/lauenburg-zuendholzfabrik-692/portrait>

NB: Accommodation will be in double bedrooms!

## Please note

Application deadline:

3 June 2018

Decision about participation:

end of June 2018

Payment deadline:

end of July 2018

## Contact

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<https://www.hzg.de/matrac>

 **Helmholtz-Zentrum  
Geesthacht**

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wissen  
schafft  
nutzen

# MATRAC 1 – Summer School 2018

Application of Neutrons and Synchrotron  
Radiation in Engineering Materials Science



## Scope of School

Neutron and photon sources offer unique possibilities by complementary use of the radiations for structural analyses of advanced engineering materials. Using neutrons and photons delivered by a synchrotron radiation source, information about materials' microstructures can be obtained non-destructively for the near-surface region as well as for the bulk of samples and components. Compared to conventional laboratory X-rays the spatial resolution achievable using synchrotron radiation can be improved by up to several orders of magnitude.

Diffraction methods reveal information about crystalline phase volume fractions, texture and residual stresses, while tomography provides complementary 3-dimensional images of the material's microstructure. Both diffraction and tomography have increasing impact in the fields of design of tailored materials, their processing and lifetime assessment. The current situation regarding the exploitation of photons and neutrons for engineering materials science is characterised by rapid developments: flux increase of photon and neutron sources, refurbishment of existing as well as design and construction of new beamlines and instruments with optimised beam optics and position sensitive detectors and also increasing quality and quantity of data.

These new possibilities for microstructure analyses for advanced materials and multi-material systems meet with increasing demands from the materials engineering point of view. In materials engineering, the establishment and refinement of relationships between microstructure parameters and macroscopic properties requires information on different length and time scales, both covering several orders of magnitude.

The MATRAC 1 School is designed to provide a systematic overview of the application of neutrons and in particular synchrotron radiation to the structural analysis of engineering materials. The programme will touch all methods mentioned above in a focused three-day theoretical course and two days of practical training. Students and young scientists from research and industry from all of Europe interested in this field are welcome to participate.

This school is the continuation of six very successful summer respectively autumn schools with the same title starting in 2005.

## Organisational Details

The school starts with two days of lectures. The manuscripts of all lectures will be provided in digital form. In addition the book „Neutrons and Synchrotron Radiation in Engineering Materials Science“, which has resulted from previous summer and autumn schools, will be provided for all participants.

The following two days will be spent at GEMS at PETRA III (DESY) in Hamburg with practical training at GEMS and DESY instruments. Whilst the focus of the practical training will be on synchrotron experiments, neutron data analysis will also be practised.

The fifth day of the school will be devoted to further lectures as well as a summing-up and final discussions.

The MATRAC 1 School is significantly funded by German and Swedish authorities for their respective students. Furthermore, financial support for students from other EU countries is granted within the frame of the SINE2020 Neutron and Muon Advanced Schools. The participation fee amounts to 100 €.

## Tentative Programme



### Sunday, 02.09.2018

- Get-Together

### Monday, 03.09.2018

- Fundamentals of Neutron Scattering and the Application of Synchrotron Radiation – Properties of Neutrons and Photons, Scattering Theory
- Scattering Theory, Correlation Function
- Structure Determination
- Real Structure, Defects and Residual Stresses
- Experimental Techniques I: Diffraction
- Engineering Materials Science
- Experimental Techniques II: Strain Scanning
- Poster Session

### Tuesday, 04.09.2018

- Photo Electron Spectroscopy
- X-ray Spectroscopy
- Imaging
- Scanning Techniques
- Large Scale Structures (Polymers, Porous Materials, Biomaterials)
- Experimental Techniques III: SAXS, Reflectivity
- Coherent Applications
- Grain Mapping
- Poster Session

### Wednesday, 05.09.2018

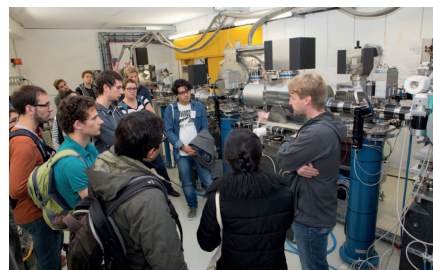
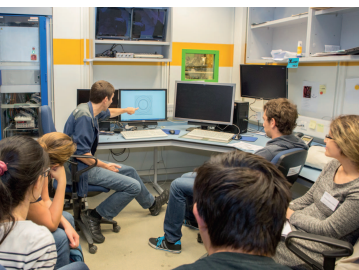
- Experiments at PETRA III (DESY)

### Thursday, 06.09.2018

- Experiments at PETRA III (DESY)

### Friday, 07.09.2018

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



### MATRAC 1:

Focus on using synchrotron radiation

### MATRAC 2:

Focus on the application of neutrons in materials science 31.03.-05.04.2019 in Herrsching/Garching