

PETRA III  
Maxe von Laue

EMBL Hamburg

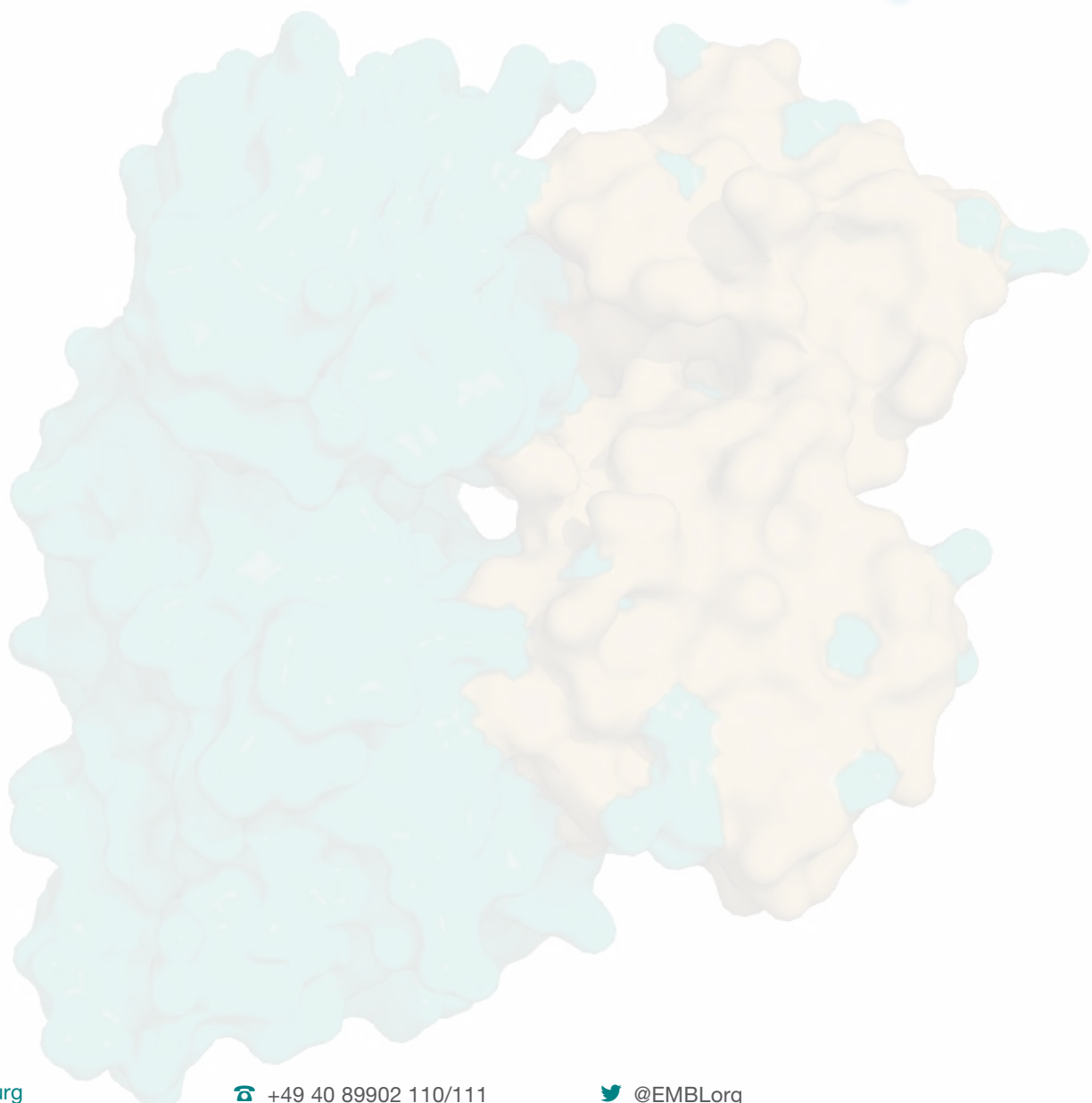
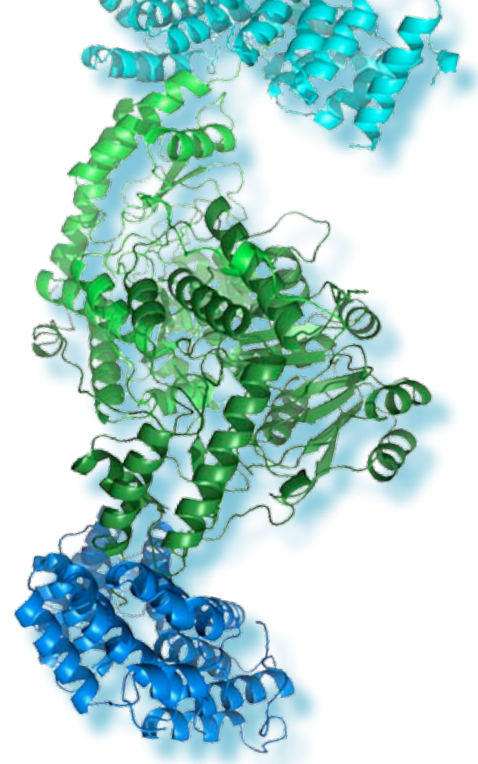
# Research services in structural biology

Research ∴ Services ∴ Training

Heidelberg ∴ Hinxton ∴ Grenoble ∴ Hamburg ∴ Monterotondo

[www.embl-hamburg.de](http://www.embl-hamburg.de)





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# Welcome to EMBL Hamburg

EMBL Hamburg is situated on the campus of the German Synchrotron Research Centre (DESY), which hosts leading facilities for synchrotron radiation (PETRA III) and free electron lasers (FLASH, XFEL – under construction).

Research activities focus on state-of-the-art structural biology methods using synchrotron radiation, combining cutting-edge technology with an ambitious research programme for structures of multifunctional proteins and protein complexes of biomedical relevance.



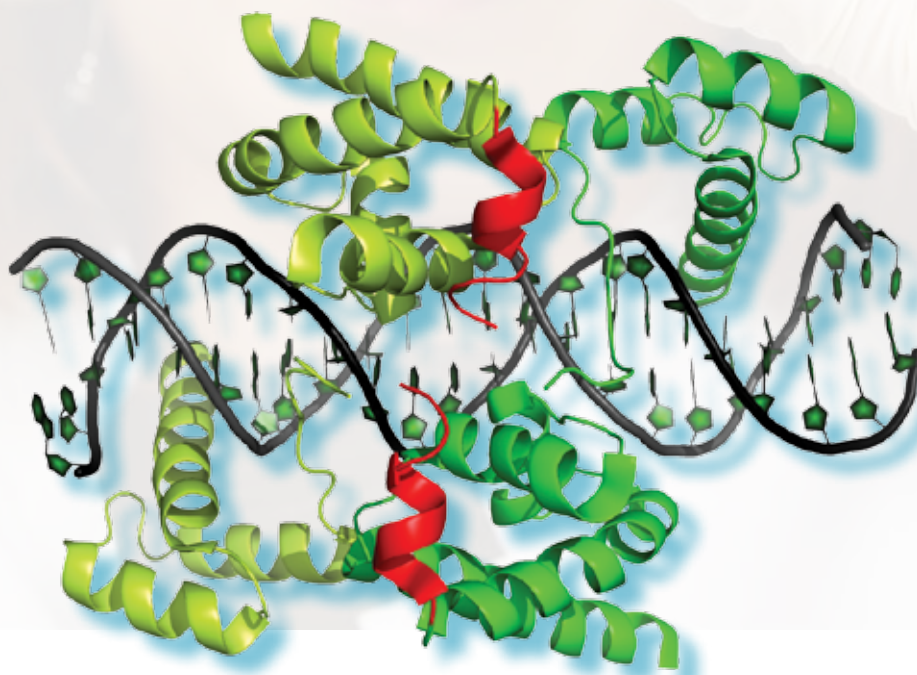
PETRA III is one of the most brilliant storage-ring-based X-ray radiation sources in the world, offering outstanding experimental opportunities



# EMBL at a glance

EMBL is Europe's flagship laboratory for the life sciences, with more than 85 independent groups covering the spectrum of molecular biology. Founded in 1974, EMBL is an inter-governmental organisation funded by public research monies from its member states.

EMBL is international, innovative and interdisciplinary – its 1800 employees from many nations represent scientific disciplines including biology, physics, chemistry and computer science. Researchers pursue their interests in broad thematic units, which encourage the combination of methods and technologies from diverse disciplines.



## EMBL's missions

- Perform basic research in molecular and cell biology
- Provide advanced training to young researchers and visitors at all levels
- Offer services and research infrastructure to the scientific community
- Develop new instruments and methods for biological research
- Actively engage in technology transfer for the benefit of society
- Support integration of European life sciences



EMBL operates from five sites:

the main laboratory in Heidelberg, and sites in Hinxton, near Cambridge (the European Bioinformatics Institute, EMBL-EBI), Grenoble, Hamburg, and Monterotondo, near Rome.



## High-brilliance beamlines

PETRA III is a dedicated high-brilliance synchrotron radiation source with optical parameters providing parallel and small X-ray beams of high intensity.

Three undulator-based beamlines have been designed and built by EMBL for the international structural biology community: two for macromolecular X-ray crystallography with options in micro-crystallography and experimental phasing approaches, and one for small angle X-ray scattering of biological samples with options for time-resolved experiments.



## Biological Small Angle X-ray Scattering (SAXS)

### Beamline P12

- Robotic sample changer for high-throughput and remote operation
- Automated data analysis pipeline
- In-line purification and biophysical characterisation

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## Macromolecular Crystallography (MX)

### Beamline P13

- High-throughput operation with robotic sample changer
- Single- and multi-wavelength anomalous dispersion (SAD/MAD) phasing
- 20 micron-sized beam with low-divergence, fully tunable beam
- Energy range: 4-17.5 keV

### Beamline P14

- 5 micron-sized fully tunable beam
- Rapid toggling between focused and unfocused beam
- Sub-micron precision vertical rotation axis
- Energy range: 7-35 keV

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## User office

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# Bench to beamlines

EMBL Hamburg's integrated life science facility at the PETRA III synchrotron ring enables academic and industrial users to access a package of structural biology services and expertise all under one roof.

The integrated facility encompasses laboratories for sample preparation and characterisation, alongside beamlines for small angle X-ray scattering and macromolecular crystallography, and X-ray data processing and evaluation facilities. This pipeline, from bench to beamlines, enables non-expert researchers to quantitatively investigate the structural and biophysical properties of their biological samples.





## Sample Preparation and Characterisation facility

- › Offline protein purification
- › Quality control by mass spectrometry
- › Characterisation by circular dichroism, dynamic and static light scattering, and isothermal calorimetry
- › Sample optimisation with thermal shift assay buffer and additive screens, and limited proteolysis screens
- › Ship-in high-throughput crystallisation services
- › Wide range of protocols and crystallisation screens suited for soluble and membrane proteins, and macromolecular complexes
- › Automated inspection and web-based monitoring of experiments
- › Support for experts and non-experts

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## Computational services

- › Remote and download services
- › ARP/wARP for automated data interpretation in X-ray crystallography
- › ATSAS for the processing and interpretation of small angle X-ray scattering data
- › Several other in-house software developments

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# Advanced training

The unique mix of expertise and technological disciplines found at EMBL Hamburg breeds a dynamic and exciting working environment – a unique experience for staff and visitors.

## Fellowships

EMBL Hamburg offers unrivalled learning and research conditions for PhD students and postdoctoral fellows. Students interested in carrying out their PhD at EMBL Hamburg should apply to the EMBL International PhD Programme.

> [www.embl.org/phdprogramme](http://www.embl.org/phdprogramme)

Postdoctoral fellows are invited to apply directly to research groups about potential projects. EMBL also offers the coveted Interdisciplinary Postdocs (EIPOD) programme, which builds on highly interactive research between units and is aimed at candidates whose research crosses scientific boundaries.

> [www.embl.org/postdocs](http://www.embl.org/postdocs)

## Courses and workshops

EMBL Hamburg hosts numerous advanced training activities to complement its synchrotron radiation beamlines and sample preparation and characterisation facilities. Training is offered through a range of courses, conferences and workshops, and by extended training visits. For details of upcoming events:

> [www.embl-hamburg.de](http://www.embl-hamburg.de)

# Research cooperations

Through close cooperation with institutions of comparable standard, vision and international orientation, EMBL pursues shared goals and scientific synergy to enhance the development of the molecular life sciences, across Europe and the world.

## Centre for Structural Systems Biology (CSSB)

The CSSB complements the infrastructures on the DESY campus with top-notch research activities in structural biology, systems biology and infection biology. It provides privileged access to on-campus synchrotron and free electron laser facilities, alongside state-of-the-art cryo-electron microscopy. The CSSB is supported by nine member research organisations, including EMBL, and will host highly interconnected research groups, with opportunities for visiting groups and scientists in the Centre's 'research hotel'.

> [www.cssb-hamburg.de](http://www.cssb-hamburg.de)

## Hamburg University Clinical Center Eppendorf (UKE)

EMBL and UKE have joined forces in biomedical research by way of strategic bilateral collaboration providing for:

- > a joint PhD programme
- > engagement in joint research activities
- > training and exchange of scientific personnel for the purposes of studying complementary research developments and techniques.

## European X-ray Free Electron Laser (XFEL)

Currently under construction, XFEL is unique worldwide, designed to generate high intensity X-ray pulses with a brilliance a billion times higher than that of conventional X-ray radiation sources. EMBL Hamburg and XFEL will cooperate on an infrastructure for biological sample preparation.

> [www.xfel.eu](http://www.xfel.eu)



# EMBL



European Molecular Biology Laboratory

Heidelberg

Hinxton

Grenoble



Hamburg




Monterotondo

## EMBL's member states:

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Iceland, Ireland, Israel, Italy, Luxembourg,  
the Netherlands, Norway, Portugal, Spain,  
Sweden, Switzerland and the United Kingdom.  
**Associate member states:** Argentina, Australia.

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