Helmholtz Imaging - Open Science along the Imaging Pipeline

Deborah Schmidt

Helmholtz Imaging Support & Engineering Unit,
Max Delbrück Center Berlin

Potsdam, March 3rd, 2025

HELMHOLTZ IMAGING

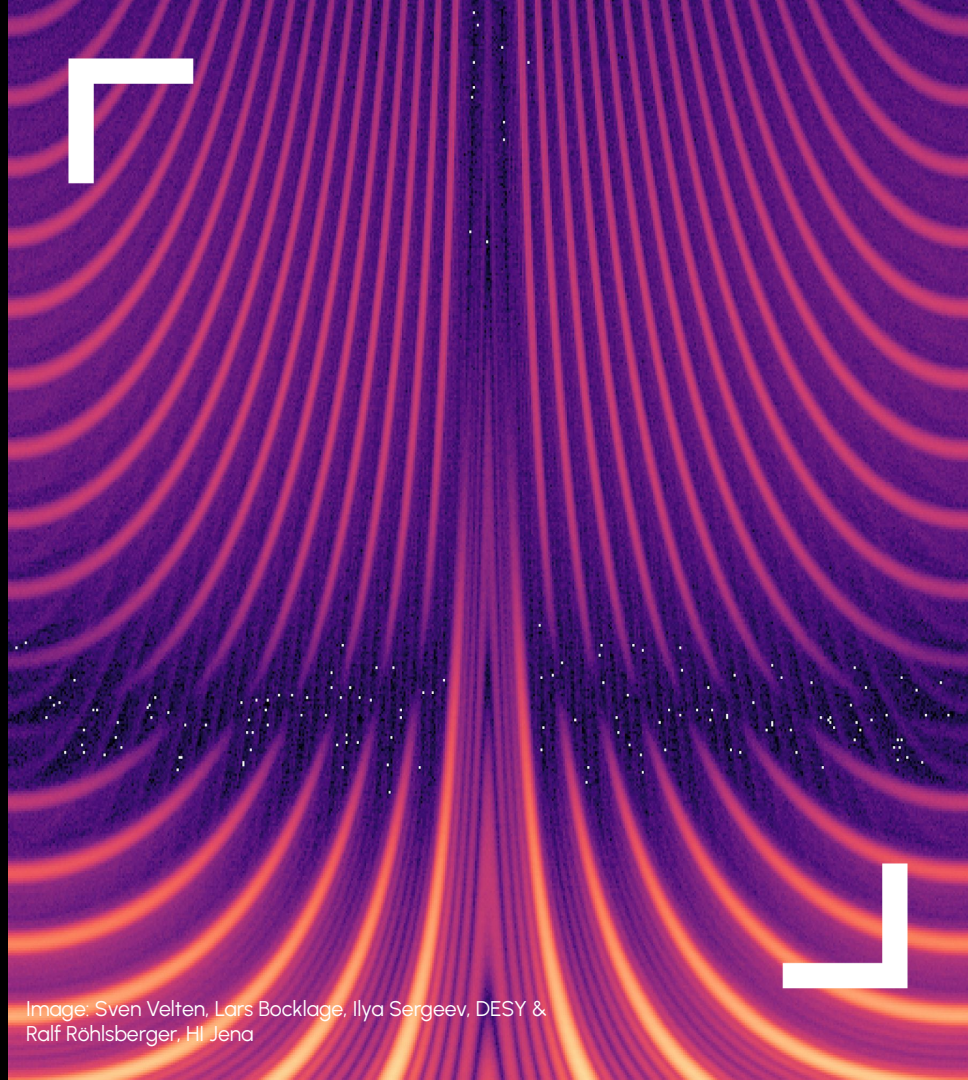


Image: Sven Velten, Lars Bocklage, Ilya Sergeev, DESY & Ralf Röhlsberger, HI Jena


Imaging is our passion.

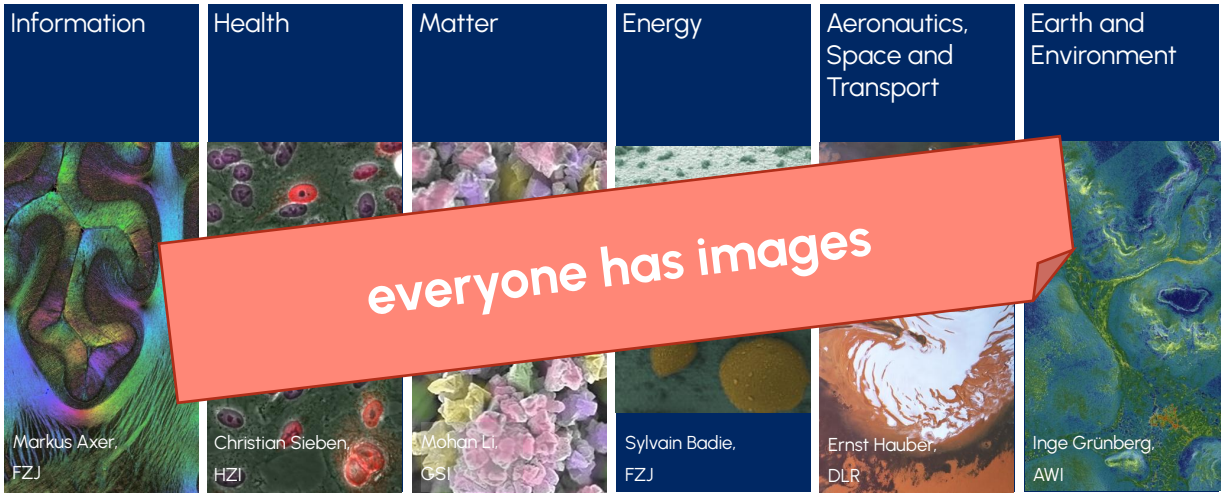
MISSION

We catalyze scientific discovery from sensory measurements to knowledge.

Promote and Advance Imaging Science

Competence hub for Imaging Sciences @Helmholtz

Helmholtz Imaging brings expertise together to promote and develop imaging science and to foster synergies across imaging modalities and applications within the Helmholtz Association.



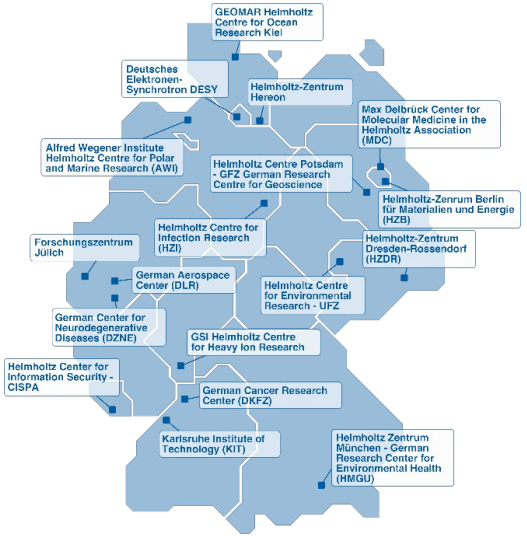
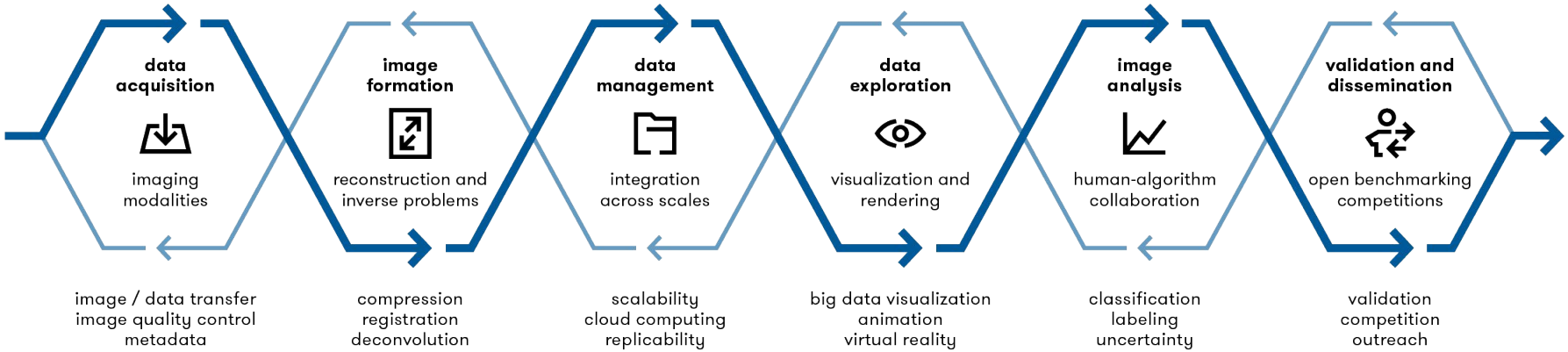


Fig. The Helmholtz Associations' Research Fields.

The Imaging Pipeline

Supporting imaging from data acquisition to images to knowledge



Helmholtz Imaging's holistic scope facilitates the incorporation of feedback loops.

Heads of Units

Support & Services

- Support along the full imaging pipeline
- First contact for technical and scientific support
- Guidance towards a suitable Solution
- Organise support and expertise within the Imaging network (on demand)

Get in touch:
support@helmholtz-imaging.de

Deborah Schmidt
Solutions

MAX DELBRÜCK CENTER

Dr. Fabian Isensee
Support Hub
& Applied Computer Vision Lab

dkfz.

Dr. Philipp Heuser
CONNECT
& Image Analysis

DESY.

Heads of Units

Research

Martin Burger
DESY

- Inverse problems
- Development of new modalities by applying new physical forward models

Dagmar Kainmüller
MDC

- Image data preparation, management & processing
- Visualization of solutions across modalities & scales in space & time

Annika Reinke
DKFZ
(interim)

- Image analysis validation

Klaus Maier-Hein
DKFZ

- Image analysis

Lena Maier-Hein
DKFZ

- Validation & bench-marking

Open and Impactful

HELMHOLTZ IMAGING HELMHOLTZAI HIFIS HMC

Helmholtz Foundation Model Initiative

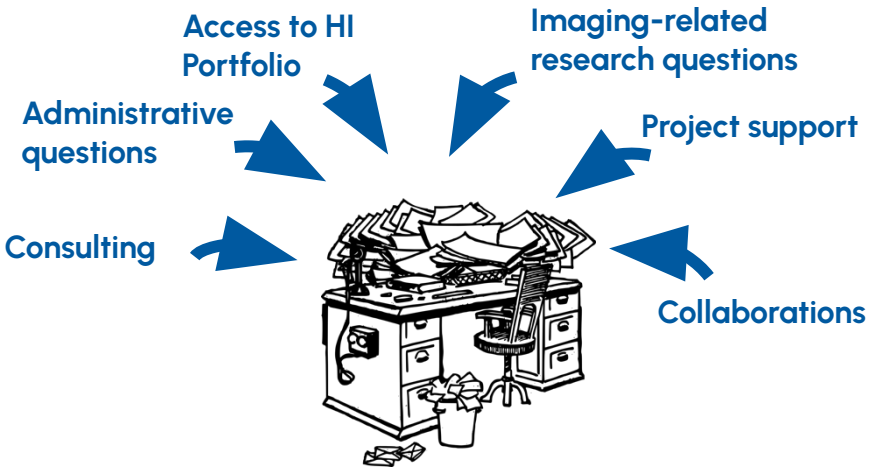
Paul F. Jäger*, Stefan Bauer*, Stefan Kesselheim*, Fabian Isensee*, Rainer Kiko, Uwe Ohler, Oliver Stegle, Guido Grosse, Michael Bussmann, Frederik Tilmann, Peter Steinbach, Markus Götz, Guido Juckeland, Philipp Heuser, Ralf Mikut, Sören Lorenz, Mario Fritz, Jilles Vreeken, Klaus Maier-Hein, Lena Maier-Hein, Fabian Theis, Dagmar Kainmueller*

*coordination team

Helmholtz Imaging for you:
How to benefit!

Support Hub

Gateway to the world of Helmholtz Imaging: support in all imaging related questions by HI Team



support@helmholtz-imaging.de

Funding Line:
Annual Helmholtz Imaging Project Call

Goals

- **promote imaging science** through innovative approaches & **foster interaction and method transfer** between applications and research fields

Terms

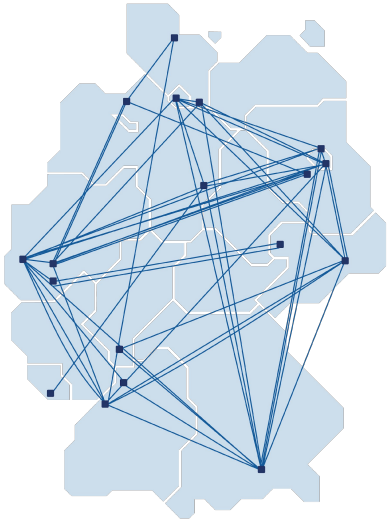
- **collaborative:** ≥ two centers, different expertise
- **eligible:** all researchers in the Helmholtz Association
- **budget:** €500k (€250k from INF, €250k matched)
- **duration:** 2-3 years

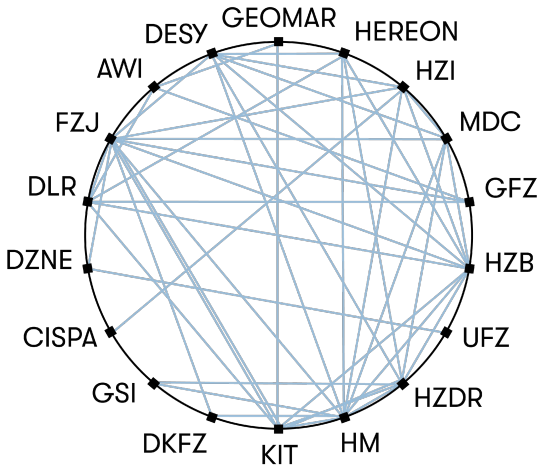
Next call will open in spring 2025.

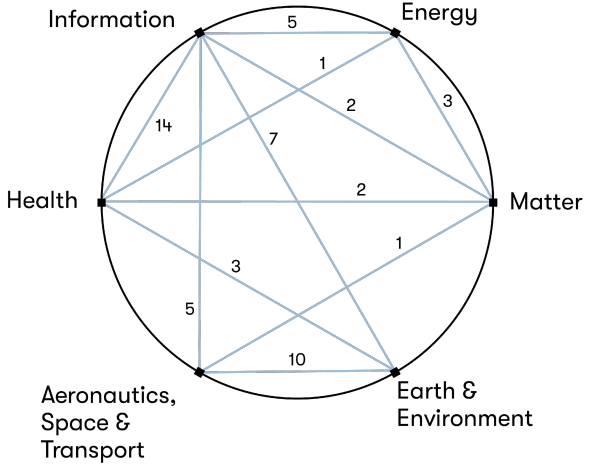
Image: Daniel Postrach, DKFZ

Engage centers, leverage synergies

Helmholtz Imaging has impact on all research fields and centers.







Impact of funded projects on networking between centers and research areas:
Left & center: Cross-center collaboration in Helmholtz Imaging Projects.
Right: Number of cross-field projects broken down by the six Helmholtz research fields.

Open Science at the core of Helmholtz Imaging

CONNECT

All the imaging expertise of the association on one page:

Find the:

- modalities
- instruments
- labs
- experts
- solutions

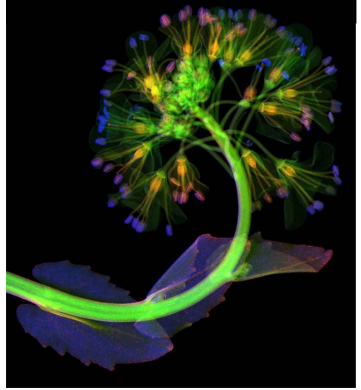
Join CONNECT: connect.helmholtz-imaging.de

Solutions

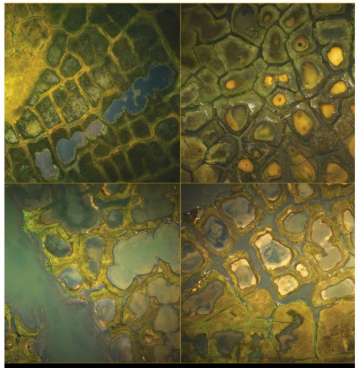
Catalog of open-source imaging solutions developed and used within our community

Tilman Bucher, DLR & Guido Grosse, AWI

Software

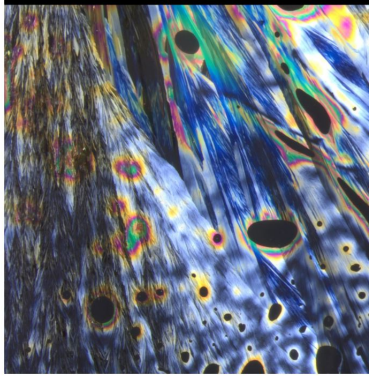


Kathryn Spiers, Dennis Brückner, DESY



Datasets

Protocols
White Papers



Sreevidya Thekku Veedu, Patrick YA Reinke, DESY

Solutions - Software

Development of our own open source software solutions addressing the most challenging research questions in imaging science

Example: **nnU-Net**

Helmholtz Imaging has enabled out-of-the-box high quality image segmentation by **developing the self-configuring segmentation tool "nnUNet"**, currently solving imaging problems across Helmholtz in numerous collaborations with Helmholtz Munich, HZDR, FZJ, DKFZ, HEREON, Helmholtz AI, MDC, HiF, and DLR.

The community using nnU-Net as a software basis for their own further developments in over 1200 cases further showcases how the tool catalyzes research in semantic segmentation.

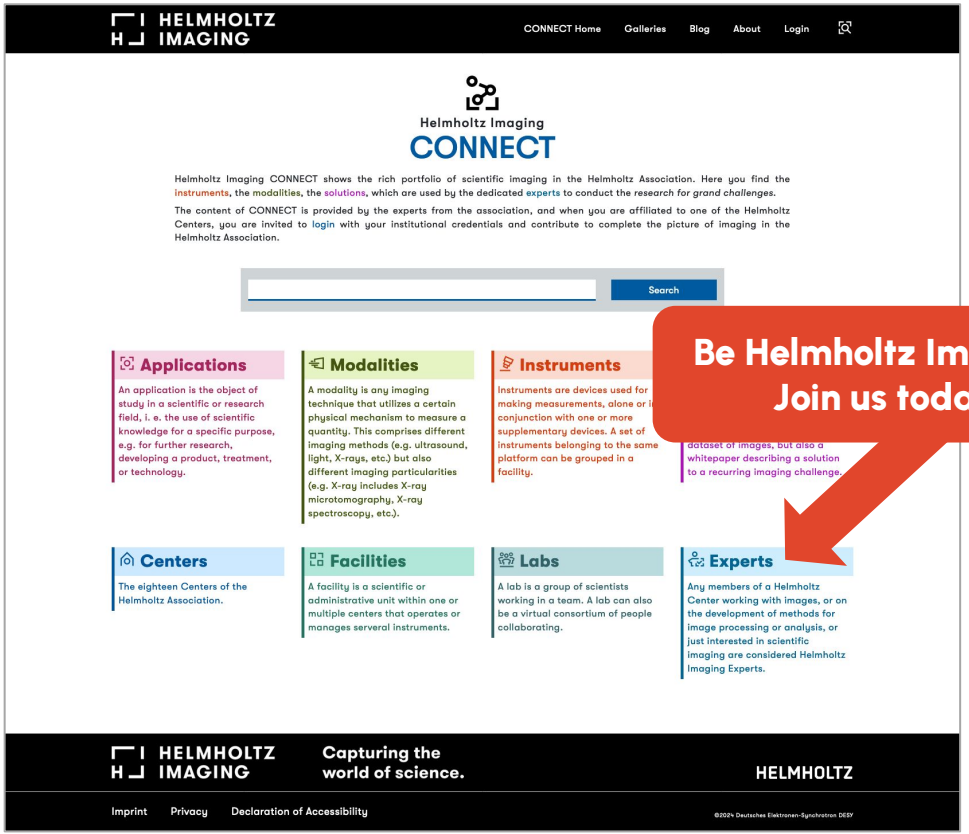
Thirteen abdominal organs in a CT image segmented by nnU-Net

CONNECT

All the imaging expertise of the association on one page:

Find the & add your:

- modalities
- instruments
- labs
- experts
- solutions



Join CONNECT: connect.helmholtz-imaging.de

Solutions

work in progres s

Where to upload image data?

Image Datasets Across Domains

- InfiniteSpace / dCache
- Kaggle Datasets
- Open Science Framework (OSF)
- Open Images Dataset
- Figshare
- Zenodo

Image Datasets in Health

- The Cancer Imaging Archive (TCIA)
- BioImage Archive
- ICPSR
- BioStudies

Image Datasets in Earth & Environment

- PANGAEA
- Earthdata
- GBIF

Image Datasets in Energy

- OpenEI
- International Energy Agency (IEA) Data

Image Datasets in Aeronautics, Space, and Transport

- NASA's Planetary Data System (PDS)
- OpenSky Network

Image Datasets in Matter

- Materials Data Facility (MDF)
- NanoHub

Input, ideas, suggestions?

➜ support@helmholtz-imaging.de

Training & Events

Develop your skills in the realm of imaging science

We offer on a regular basis:

- Helmholtz Summer School: Lectures and tutorial
- Hackathons and datathons
- Trainings in cooperation with partners from Helmholtz Centers or other organisations
- Tutorials
- Workshops

Visit our events' page for an overview of current trainings:

Training & Events

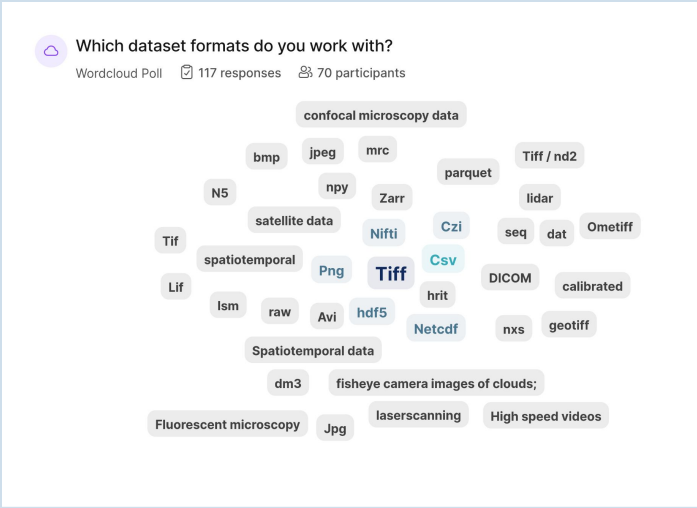
Develop your skills in the realm of imaging science

Helmholtz Imaging Conference
June 25-27, 2025, Potsdam

https://helmholtz-imaging.de/news/helmholtz-imaging-conference-2025/

4. Helmholtz Reproducibility Workshop
March 25th, 2025, Berlin, MDC

https://events.hifis.net/event/1750/



Training & Events

work in progres s

Prevalidation

What should we know about image datasets before we work with them?

Dataset Visualization

Interactive Exploration

Statistical Summaries

Quality Control Checks / Report

Ella Bahry

Interested?

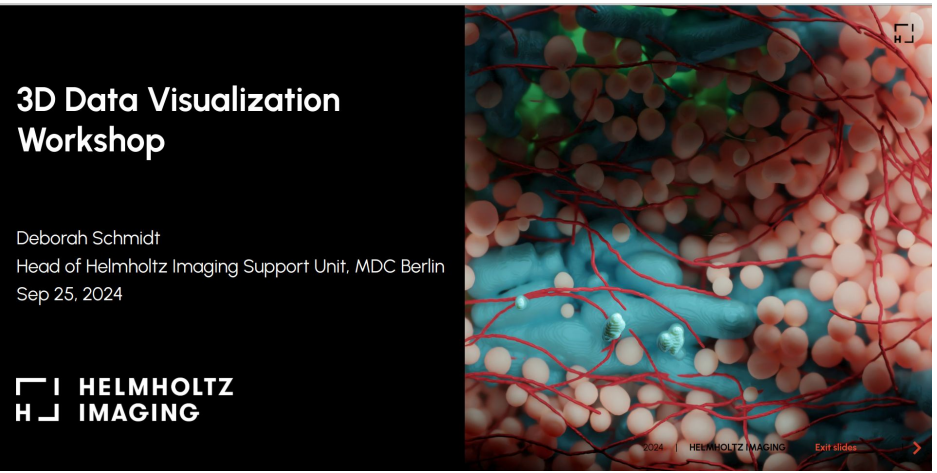
→ support@helmholtz-imaging.de

→ Helmholtz Reproducibility Workshop @MDC, March 25th

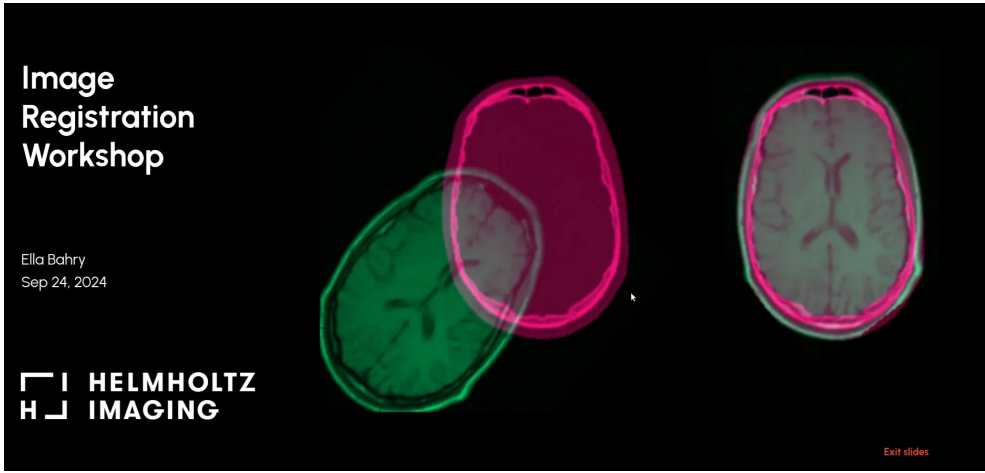
Training & Events

open question

Where to host teaching resources (i.e. videos)?



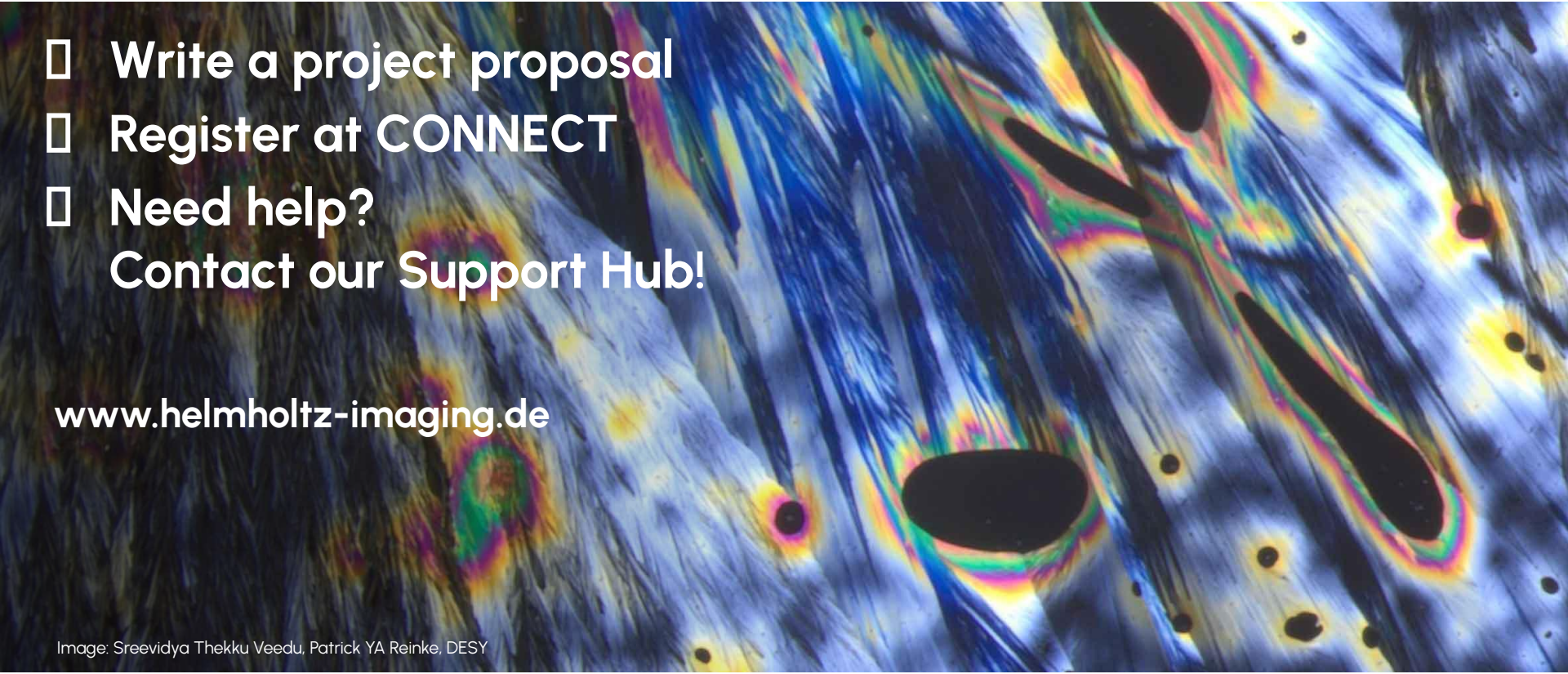
https://ida-mdc.github.io/workshop-visualization/3d-data/



https://ida-mdc.github.io/registration-workshop/

Opinions? ➜ support@helmholtz-imaging.de

Be part of Helmholtz Imaging



- Write a project proposal
- Register at CONNECT
- Need help?
  Contact our Support Hub!

www.helmholtz-imaging.de

Image: Sreevidya Thekku Veedu, Patrick YA Reinke, DESY

Find us on Social Media:

Join our Mattermost channel:

helmholtzimaging

company/helmholtzimaging

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@helmholtzimaging.bsky.social

Notkestraße 85
22607 Hamburg

+49 40 8998-4198
info@helmholtz-imaging.de

www.helmholtz-imaging.de

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