# BVM 2022

## Bildverarbeitung für die Medizin

### Algorithms • Systems • Applications

## 26-28 June, Heidelberg

### Organizer

Prof. Dr. Klaus Maier-Hein
Division of Medical Image Computing
German Cancer Research Center (DKFZ)

### Venue

Communication Center, DKFZ
Im Neuenheimer Feld 280, 69120 Heidelberg

**dkfz.**

ICD

**cúrac**   **GI**   **gmds** Deutsche Gesellschaft für Medizinische Informatik, Biometrie und Epidemiologie e.V.   **DAGM** Deutsche Arbeitsgemeinschaft für Mustererkennung e.V.   **BVMI** Berufsverband Medizinischer Informatiker e.V.   **DGBMT** German Society for Biomedical Engineering   **IEEE**

# Foreword

Welcome to the workshop "Bildverarbeitung für die Medizin" (BVM; Image processing for medicine) 2022 – after two years of virtuality and e-meeting fortunately again in person!

Considerable progress is currently being made in the computer-aided processing and automatic analysis of medical image data and the limits of what is possible are being extended significantly. This workshop provides us with an excellent opportunity to extensively discuss the current state of research and developments on site in Heidelberg.



**Prof. Dr. Klaus Maier-Hein**
Conference Lead Organizer
June, 2022

We are also particularly pleased about the invited lectures at this year's BVM, which will provide exciting insights into the current state of medical imaging. Three keynotes will address topics such as solving inverse problems with machine learning, AI-assisted surgery and remote medical care. Furthermore, we look forward to 24 oral presentations, 32 posters and a software demonstration, which were selected from a total of 88 submissions for presentation. For the first time we will additionally show 14 e-posters.

Finally, BVM's well-known social evening - this year a summer boat trip on the Neckar River - will provide ample opportunity for networking and for friendly exchange.

We would like to take this opportunity to express our sincere thanks to all those who contributed to the success of the workshop during the extensive preparations: the speakers of the guest lectures, the authors of the papers, the industry representatives, the program committee, the professional societies, the members of the BVM organization team, and all the staff of the Division of Medical Image Computing.

## WLAN

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After you connect to the network, open any page in your browser. You will then be automatically forwarded to the registration page, where you will be asked to enter your username and password. Alternatively, the "eduro-am" WLAN is available at the conference venue.

## CME Credits

The workshop is officially recognized as a training event by the Baden--Württemberg State Medical Association.

# Table of Contents

# Orientation and Goal

Medical image processing is the key technology for modern image-based diagnostics and surgical support. Since 1993, *Bildverarbeitung für die Medizin* or "Image processing for medicine" has been organized in Germany and attended by researchers, industry partners and students from the image processing field. Throughout the years, the constantly growing number of participants have shown the increased interest and relevance of this event to the community.

The aim of the workshop is to present current research results and to deepen the discussions between medical and technical scientists, industry and users. The workshop is specifically aimed at young scientists who want to report on their bachelor's or master's projects. Contributions from European colleagues are also welcome. English and German are equal congress languages.

The topics of the workshop include all areas of medical image processing, in particular algorithms, hardware and software systems as well as their clinical application:

- Machine learning and artificial intelligence
- Convolutional neural networks and deep learning
- Imaging and acquisition
- Visible light, endoscopy, microscopy
- Image segmentation and image analysis
- Image registration and fusion
- Visualization and animation
- Anatomical atlases
- Time series analysis
- Secure exchange of medical image data
- Patient-specific simulation and planning

- Computer-aided diagnosis
- Virtual / augmented reality
- VR simulators and 3D haptic interaction
- Biomechanical modelling
- Computer-assisted intervention
- Instrument and patient location and tracking
- Computer-assisted surgical planning
- Clinical application of computer-aided systems
- Validation and Quality Assurance
- Image-based robots, surgical simulators
- Free themes

## Organizer

Division of Medical Image Computing

German Cancer Research Center (DKFZ)

dkfz.de/de/mic

## Supporting Societies

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Informatik in den Lebenswissenschaften e.V.
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Informatik, Biometrie und Epidemiologie e.V.
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Deutsche Arbeitsgemeinschaft für Mustererken-
nung e.V
dagm.de

Berufsverband Medizinischer Informatiker
bvmi.de

Fachgruppe Medizinische Informatik der
Deutschen Gesellschaft für Biomedizinische
Technik im Verband Deutscher Elektrotechniker
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IEEE Joint Chapter Engineering in Medicine
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ewh.ieee.org/r8/germany/emb/

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- Nils Forkert      University of Calgary, Canada
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- Heinz Handels      Universität zu Lübeck
- Tobias Heimann      Siemens Healthcare GmbH, Erlangen
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- Dagmar Kainmüller      MDC Berlin
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- Gudrun Wagenknecht      Forschungszentrum Jülich
- René Werner      UKE Hamburg
- Thomas Wittenberg      Fraunhofer IIS Erlangen
- Ivo Wolf      Hochschule Mannheim

# Conference Organization

## Conference management

Prof. Dr. Klaus Maier-Hein

Division of Medical Image Computing (MIC)

German Cancer Research Center (DKFZ), Heidelberg

k.maier-hein@dkfz-heidelberg.de

## Conference secretariat

Stefanie Strysch, Michaela Gelz, Theresa Klocke

Division of Medical Image Computing (MIC), DKFZ

office-maier-hein@dkfz-heidelberg.de | +49 6221 42 2366

## Local organization

Prof. Dr. Klaus Maier-Hein, Jasmin Metzger, Dr. Peter Neher, Dr. Beatrix Tettmann, Dr. Daniel Walther, Dimitrios Bounias, Dr. Kathrin Brunk, Maximilian Fischer, Philipp Schader, Robin Peretzke, Shuhan Xiao, Silvia Dias Almeida.

Division of Medical Image Computing (MIC), DKFZ

orga-2022@bvm-workshop.org | +49 6221 42 3547

# BVM Committee

**Prof. Dr. Thomas M. Deserno**

Peter L. Reichertz Institute for Medical Informatics, Technical University of Braunschweig and Hannover Medical School

**Prof. Dr. Heinz Handels**

Institute for Medical Informatics, University of Lübeck

**Prof. Dr. Andreas Maier**

Chair for Pattern Recognition, Friedrich-Alexander-University Erlangen-Nuremberg

**Prof. Dr. Klaus Maier-Hein**

Division of Medical Image Computing (MIC), German Cancer Research Center (DKFZ), Heidelberg
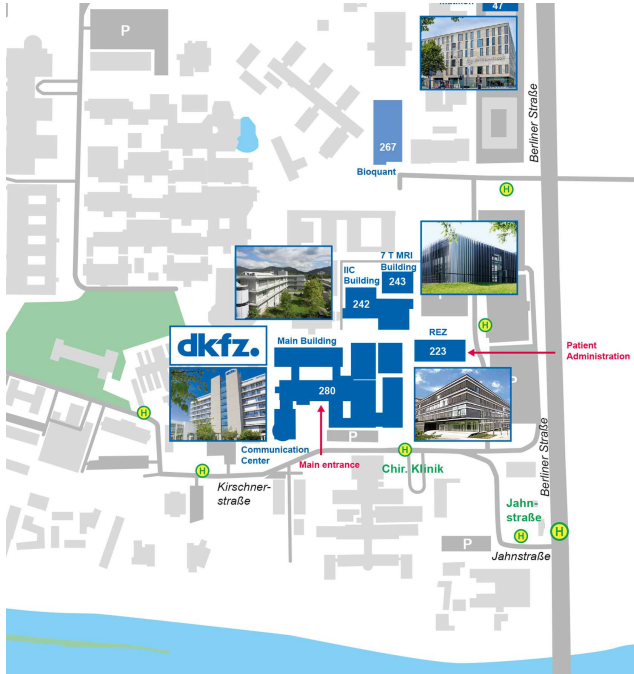
**Prof. Dr. Christoph Palm**

Regensburg Medical Image Computing (ReMIC), Ostbayerische Technische Hochschule Regensburg

**Prof. Dr. Thomas Tolxdorff**

Institute of Medical Informatics of the Charité – Universitätsmedizin Berlin

# Venue

Communication Center,
German Cancer Research Center
Im Neuenheimer Feld 223
69120 Heidelberg



## How to reach the DKFZ Communication Center by tram:

Tram stops can be seen right next to the central train station:

- Take either a No. 21 or No. 24 tram towards Handschuhsheim.

- Get off at the "Jahnstraße" stop.

- Cross the street.

- Turn right to Im Neuenheimer Feld and then left to enter the campus (Kirschnerstrasse).

- Go on until you see the Communication Center building on the right side,

next to the DKFZ main building.

# Presentation Types

## LECTURES

Current research results will be presented in scientific lectures (12+3 min) and then discussed. The digital presentations should be handed in at the media checkin up to 60 minutes before the start of the respective session. All information on the presentations are listed in the program booklet, including: time, title and presenting author.

## POSTER AND SOFTWARE DEMONSTRATIONS

Poster presentations (DIN A0/portrait format) and software demonstrations provide an opportunity for intensive discussions of the submitted works.
Posters will begin to be displayed in the Communication Center foyer during the coffee/lunch break before the corresponding poster session. All the information about posters and software demonstrations are listed in the program booklet, including: session, time, title and presenting author.

## CONFERENCE PROCEEDINGS

All contributions were published in the conference proceedings and are also available on USB sticks that can be collected during the event.

Bildverarbeitung für die Medizin 2022. (2022). In K. Maier-Hein, T. M. Deserno, H. Handels, A. Maier, C. Palm, & T. Tolxdorff (Eds.), Informatik aktuell. Springer Fachmedien Wiesbaden. https://doi.org/10.1007/978-3-658-36932-3

## JOURNAL PUBLICATIONS

It is planned to publish excellent scientific contributions from the BVM 2022 in a special issue of a renowned international journal.

# Awards

Selected contributions will be awarded at the BVM 2022. A total of four prize categories were created: BVM Award 2022; BVM lecture award; BVM poster award; 1st, 2nd and 3rd places for BVM best scientific work.

The **BVM Award 2022**, which is endowed with €1000, is awarded for excellent bachelor's and master's theses, dissertations or post-doctoral work in the field of medical image processing, which is sponsored this year by CHILIGmbH, Heidelberg (Dossenheim). Selection was made by a dedicated committee.

The **BVM lecture award** and the **BVM poster award** are decided by the audience votes. Winners are entitled to 200€. Both voting sessions will take place using an online tool, accessible on QR codes that will be displayed during the last coffee break (Tuesday, 15:45).

Finally, the three best scientific contributions are selected for the **BVM best scientific work** by the BVM prize committee. In this booklet, the contributions awarded with a star ⭐ are nominated for the prize selection. The prizes are endowed as follows:

<div align="center">

1st prize €500
2nd prize €400
3rd prize €200

</div>

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# Keynotes

## Monday, 09:15

### Prof. Dr. Stefanie Speidel
National Center for Tumor Diseases (NCT) in Dresden
stefanie.speidel@nct-dresden.de

### The Best of Both Worlds: How Surgeon-Machine Collaboration can benefit the patient

Increasingly powerful technological developments in surgery such as modern operating rooms (OR), featuring digital and interconnected as well as robotic devices provide a huge amount of valuable data which can be used to improve patient therapy. Although a lot of data is available, it is an overwhelming challenge for physicians and the surgical outcome is extremely dependent on the experience of the surgical staff.

In this talk, I'll present our recent research regarding AI-assisted surgery with a specific focus on analysis of intraoperative data. The goal is to bridge the gap between data science, sensors and robotics to enhance the collaboration between surgeons and cyber--physical systems and to democratize surgical skills by quantifying surgical experience and make it accessible to machines. Several examples to optimize the therapy of the individual patient along the surgical treatment path are given. A focus of this talk will be synthetic data generation, intraoperative context-aware assistance as well as data-driven surgical training. Finally, remaining challenges and strategies to overcome them are discussed.

## Tuesday, 09:00

**Prof. Dr. Ullrich Köthe**
Visual Learning Lab Heidelberg, Universität Heidelberg
ullrich.koethe@iwr.uni-heidelberg.de

## Solving inverse problems with machine learning

Inverse problems - the estimation of hidden internal parameters of a system from measured observables - are ubiquitous in science and medicine. A defining characteristic of these problems is that they are usually ill-posed and have no unique solution. Traditional approaches to overcome this difficulty, e.g. regularized optimization or sampling-based Bayesian inference, are unsatisfactory for various reasons. This talk will present Bayes-Flow, a new approach for efficient Bayesian treatment of inverse problems on the basis of invertible neural networks, i.e. networks representing bijective mappings. These networks are trained using simulations of the system under study and can then be repeatedly applied to real data to estimate full posterior probability distributions of the hidden parameters of interest. The talk will explain the basic BayesFlow methodology, demonstrate various applications in image analysis and medicine, and describes ways to verify models with regard to uncertainty calibration and model misspecification detection.

## Tuesday, 14:00

### Prof. Dr. Rebecca Fahrig
Vice President of Innovation for Business Area Advanced Therapies, Siemens Healthineers
rebecca.fahrig@siemens-healthineers.com

### Improving Access to Care: Building Blocks for Remote Image-guided Interventions

One thing that the Covid-19 Pandemic has taught us is that remote medical care is not only possible, but it is also necessary to ensure that we provide equal access to care for all. Today, remote care focuses on those services that can be provided without direct patient access: monitoring of the patients' condition, and performance of preventive and control check-ups outside of medical facilities. At Advanced Therapies we are working on extending beyond "remote consultation" to "remote delivery of patient care". I will describe how we are integrating robotics with a Learning/Digital Interventional Suite, providing AI-based applications to enable safety-at-a-distance, support procedural workflow, enhance x-ray image quality, and maintain clear communication lines between the local team and the remote team. Clinical evidence needs and regulatory hurdles to bring these innovations to product will be described.

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# Tutorials

## Sunday, 14:00
### Room: K1/K2
### All tutorials take place in parallel

### Tutorial 1: Known operator learning and hybrid machine learning in medical imaging: The past, the present and the future

In this tutorial, we perform a review of the state-of-the-art of hybrid machine learning in medical imaging. We start with a short summary of the general developments of the past in machine learning and how general and specialized approaches have been in competition in the past decades. A particular focus will be the theoretical and experimental evidence pro and contra hybrid modelling. Next, we inspect several new developments regarding hybrid machine learning with a particular focus on so-called known operator learning and how hybrid approaches gain more and more momentum across essentially all applications in medical imaging and medical image analysis. As we will point out by numerous examples, hybrid models are taking over in image reconstruction and analysis. Even domains such as physical simulation and scanner and acquisition design are being addressed using machine learning grey box modelling approaches. Towards the end of the article, we will investigate a few future directions and point out relevant areas in which hybrid modelling, meta learning, and other domains will likely be able to drive the state--of-the-art ahead.

### Presenters:

Prof. Dr. Seung Hee Yang,
Dr. Vincent Christlein,
Prof. Dr. Andreas Maier
Pattern Recognition Lab, University of Erlangen-Nuremberg

## Sunday, 14:00

### Room: Lecture Hall

All tutorials take place in parallel

### Tutorial 2: Advanced Deep Learning

The remarkable rise of deep learning has led to an overwhelming number of publications being introduced weekly into discourse. This tutorial intends to highlight a selection of some of the most interesting research topics for the medical image computing (MIC) community and present it in a structured and understandable form. It is intended to cover recent developments related to common tasks in the community (e.g. segmentation, detection) and will also discuss methods that are currently gaining traction and that are likely to become even more relevant in the future, such as multi-task learning, active learning, self-supervised learning, causal learning, federated learning and transformers. Basic knowledge of neural networks and deep learning is recommended.

### Presenters:

Carsten Lüth,
Saikat Roy,
Tassilo Wald,
Shuhan Xiao,
Ünal Akünal,
Prof. Dr. Klaus Maier-Hein
Division of Medical Image Computing, German Cancer Research Center

## Sunday, 14:00
### Room: H1.00.028
**All tutorials take place in parallel**

### Tutorial 3: Hands-on Medical Image Registration

In this BVM tutorial, we start by giving a brief overview of the current research in learning-based image registration and useful datasets and benchmarks - with focus on open-source and public accessible resources. Next, we will introduce two hands-on implementation tasks that can be performed on-site and give insight to both aforementioned research directions: GPU-accelerated iterative optimisation and learning to directly predict displacement fields. Gaining new experience and expertise in this inherently multidisciplinary topic can be beneficial to many in our community, especially for the next generation of young scientists, engineers and clinicians who often have only been exposed to a subset of these methodologies and applications.

We will guide participants to understand and implement published algorithms using provided medical challenge data. We aim to provide an opportunity for the participants to bridge the gap between expertises in medical image registration and deep learning, as well as to start a forum to discuss know-hows, challenges and future opportunities in this area. The tutorial can be run in the cloud (e.g. Google colab), please bring your own laptop for active participation.

### Presenters:

Fenja Falta,
Hellena Hempe,
Laura Graf,
Niklas Hermes,
Mona Schumacher,
Prof. Dr. Matthias Heinrich
Institute of Medical Informatics, University of Lübeck

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# Long Program

## Sunday, 26<sup>th</sup> June

| TIME | AGENDA POINT | LOCATION |
|---|---|---|
| 13:30 | Registration | Registration desk |
| 14:00 - 16:45 | **Tutorials**<br>Known operator learning and hybrid machine learning in medical imaging: The past, the present and the future | Room **K1/K2** |
| | Advanced Deep Learning | Room **Lecture hall** |
| | Hands-on: Medical Image Registration | Room **H1.00.028** |
| 17:15 | City Tour — Meeting point: Old bridge | |
| 17:30 | Running event — Meeting point: Bismarckplatz | |
| 19:00 | Program Committee dinner | Kulturbrauerei |

## Monday, 27<sup>th</sup> June

| TIME | | | AGENDA POINT | | LOCATION |
|---|---|---|---|---|---|
| 07:00 | | | **Running event** | | Meeting point: Bismarckplatz |
| 08:30 | | | Registration and Welcome Coffee | | Registration desk & Foyer |
| 09:00 | | | **Opening/ Welcome** | | |
| 09:15 | | | **KEYNOTE Prof. Dr. Stefanie Speidel**<br>Keynote chair: Christoph Palm | | Lecture hall |
| 10:00 | | | **Session 1:** Segmentation I<br>Session chair: Gudrun Wagenknecht & Michael Götz | | Lecture hall |
| 10:00 | ⭐ | L1 | Unsupervised Segmentation of Wounds in Optical Coherence Tomography Images Using Invariant Information Clustering | Julia Andresen<br>University of Lübeck | |
| 10:15 | | L2 | Iterative 3D CNN based Segmentation of Vascular Trees in Liver CT | Mona Schumacher<br>University of Lübeck | |
| 10:30 | | L3 | Robust Liver Segmentation with Deep Learning across DCE-MRI Contrast Phases | Annika Hänsch<br>Fraunhofer MEVIS | |
| 10:45 | | L4 | Light-weight semantic segmentation and labelling of vertebrae in 3D-CT scans | Hellena Hempe<br>University of Lübeck | |
| 11:00 | | | Coffee break | | |

| TIME | | AGENDA POINT | LOCATION |
|---|---|---|---|
| **11:20** | | **Session 2:** Segmentation II<br>Session chair: Dagmar Kainmüller & Tobias Heimann | Lecture hall |
| 11:20 | ⭐ L5 | Few-shot Unsupervised Domain Adaptation for Multi-modal Cardiac Image Segmentation | Mingxuan Gu<br>Friedrich-Alexander-University of Erlangen-Nürnberg |
| 11:35 | L6 | Unsupervised Anomaly Detection in the Wild | David Zimmerer<br>German Cancer Research Center |
| 11:50 | ⭐ L7 | Epistemic and Aleatoric Uncertainty Estimation for PED Segmentation in Home OCT Images | Timo Kepp<br>University of Lübeck |
| 12:05 | ⭐ L8 | Quality monitoring of federated Covid-19 lesion segmentation | Camila González<br>Technical University Darmstadt |
| 12:20 | | Lunch break | **DKFZ tour**    Meeting point:<br>Registration desk |
| **13:20** | | **Poster session I** | Foyer |
| **14:20** | | **Session 3:** Detection<br>Session chair: Mattias Heinrich & Karl Rohr | Lecture hall |
| 14:20 | L9 | Detection of Large Vessel Occlusions using Deep Learning by Deforming Vessel Tree Segmentations | Florian Thamm<br>Friedrich-Alexander-University of Erlangen-Nürnberg |
| 14:35 | L10 | nnDetection: A Self-configuring Method for Medical Object Detection | Michael Baumgartner<br>German Cancer Research Center |
| 14:50 | L11 | Machine Learning-Based Detection of Spherical Markers in CT Volumes | Disha Dinesh Rao<br>Friedrich-Alexander-University of Erlangen-Nürnberg |
| 15:05 | L12 | A Keypoint Detection and Description Network Based on the Vessel Structure for Multi-Modal Retinal Image Registration | Aline Sindel<br>Friedrich-Alexander-University of Erlangen-Nürnberg |
| 15:20 | | Coffee break | |
| **15:40** | | **Poster session II** | Foyer |
| **17:00** | | GMDS/GI-AG Medical Image and Signal Processing meeting<br>Room: **K1/K2** | **Running event**    Meeting point:<br>Bismarckplatz |
| **19:00** | | **Social Networking & Get-Together on the Neckar** | Weiss Flotte<br>Neckarstaden 25, 69117 |

# Tuesday, 28th June

| TIME | AGENDA POINT | | LOCATION |
|---|---|---|---|
| 08:30 | Registration and Welcome Coffee | | Registration desk & Foyer |
| 09:00 | **KEYNOTE Prof. Dr. Ullrich Köthe** <br> Keynote chair: Klaus Maier-Hein | | Lecture hall |
| 09:45 | **Session 4:** Registration/ Detection <br> Session chair: Jan Modesitzki & Ralf Floca | | Lecture hall |
| 09:45 ⭐ L13 | Training Deep Learning Models for 2D Spine X-rays Using Synthetic Images and Annotations Created from 3D CT Volumes | Richin Sukesh <br> Friedrich-Alexander-University of Erlangen-Nürnberg | |
| 10:00 L14 | RobIn: Robust intensity-based angle initialization for 2D-3D pelvis registration | Stephanie Häger <br> Fraunhofer MEVIS | |
| 10:15 L15 | Learning an airway atlas from lung CT using semantic inter-patient deformable registration | Fenja Falta <br> University of Lübeck | |
| 10:30 L16 | Guided Filter Regularization for Improved Disentanglement of Shape and Appearance in Diffeomorphic Autoencoders | Hristina Uzunova <br> German Research Center for Artificial Intelligence | |
| 10:45 | Coffee break | | |
| 11:00 | **Session 5:** Surgical Data Science / Virtual Reality <br> Session chair: Sandy Engelhardt & Nassir Navab | | Lecture hall |
| 11:00 L17 | Automatic Path Planning for Safe Guide Pin Insertion in PCL Reconstruction Surgery | Florian Kordon <br> Friedrich-Alexander-University of Erlangen-Nürnberg | |
| 11:15 L18 | Heads Up: A Study of Assistive Visualizations for Localisation Guidance in Virtual Reality | Jan N Hombeck <br> University of Jena | |
| 11:30 L19 | Support Point Sets for Improving Contactless Interaction in Geometric Learning for Hand Pose Estimation | Niklas Hermes <br> University of Lübeck | |
| 11:45 L20 | Automatic Switching of Organ Programs in Interventional X-ray Machines using Deep Learning | Arpitha Ravi <br> Friedrich-Alexander-University of Erlangen-Nürnberg | |
| 12:00 | Lunch break | **Program Committee meeting** <br> Room: **K1/K2** | **DKFZ tour**   Meeting point: Registration desk |
| 13:00 | **Poster session III** | | |
| 14:00 | **KEYNOTE Prof. Dr. Rebecca Fahrig** <br> Keynote chair: Thomas Deserno | | |

| TIME | | AGENDA POINT | LOCATION |
|---|---|---|---|
| **14:45** | | **Session 6:** Surgical Data Science / Simulation / Data Science | Lecture hall |
| | | Chairperson: Lena Maier-Hein & Heinz Handels | |
| 14:45 | L21 | Ermittlung der Geometrie von Amputationsstümpfen mittels Ultraschall | Carina Krosse |
| | | | Technische Hochschule Ulm |
| 15:00 | L22 | Monte Carlo Dose Simulation for In-Vivo X-Ray Nanoscopy | Fabian Wagner |
| | | | Friedrich-Alexander-University of Erlangen-Nürnberg |
| 15:15 | L23 | How to generate patient benefit with Surgical Data Science: Results of an international Delphi process | Matthias Eisenmann |
| | | | German Cancer Research Center |
| 15:30 | L24 | Stop training your model, read me first: The importance of dataset choice. Lessons learned from COVID-19 X-ray imaging models | Beatriz Garcia Santa Cruz |
| | | | University of Luxembourg |
| 15:45 | | Coffee break Voting for best BVM Lecture and Poster | Foyer |

**16:00**       **Awards & Closing**       Lecture hall

### Laudatio Prof. Dr. rer. nat. Thomas Tolxdorff

### BVM Award: Hristina Uzunova, University of Lübeck
"Generative Deep Learning Models for the Automatic Analysis and Synthesis of Medical Image Data Featuring Pathological Structures"

### BVM best scientific work prize
### BVM lecture prize
### BVM poster prize

### Welcome next BVM organizers

**17:00**       **Ending**

⭐ **Nominated for the BVM Best Scientific Work**

# Poster (P) and Software Demonstrations (S)

| Session | Poster ID | Title | 1st Author & Affiliation |
|---------|-----------|-------|--------------------------|
| I | P32 ⭐ | Initial Investigations towards Non-invasive Monitoring of Chronic Wound Healing using Deep Learning and Ultrasound Imaging | Maja Schlereth<br>Friedrich-Alexander-University of Erlangen-Nürnberg |
| I | P1 | Analysis of Celiac Disease with Multimodal Deep Learning | David Rauber<br>OTH Regensburg |
| I | P2 | Form Follows Function - Smart Network Design Enables Zero-Shot Network Reuse | Weilin Fu<br>Friedrich-Alexander-University of Erlangen-Nürnberg |
| I | P3 | C-arm positioning for spinal standard projections in different intra-operative settings | Lisa Kausch<br>German Cancer Research Center |
| I | P4 | Verbesserung des 2D U-nets für die 3D Mikrotomographie mit Synchrotronstrahlung mittels multi-axes fusing | Ivo Matteo Baltruschat<br>Deutsches Elektronen-Synchrotron |
| I | P5 | Efficient Patient Orientation Detection in Videofluoroscopy Swallowing Studies | Luisa Neubig<br>Friedrich-Alexander-University of Erlangen-Nürnberg |
| I | P6 | Towards Weakly Supervised Segmentation of Orthopaedic X-ray Images using Constrained-CNN Losses | Nikolaus Arbogast<br>Friedrich-Alexander-University of Erlangen-Nürnberg |
| I | P7 | 3D-reconstruction of the colon from monocular sequences - Evaluation by 3D printed phantom data | Ralf Hackner<br>Fraunhofer Institute for Integrated Circuits |
| I | P9 | Thrombus Detection in Non-Contrast Head CT using Graph Deep Learning | Antonia Popp<br>Friedrich-Alexander-University of Erlangen-Nürnberg |
| I | P10 | A database and neural network for highly accurate classification of single bone marrow cells | Christian Matek<br>Helmholtz Zentrum Munich |
| I | P11 | Comparison of depth estimation setups from stereoendoscopy and optical tracking for point measurements | Lukas Burger<br>Heidelberg University Hospital |
| II | P12 | M²aia - Mass spectrometry imaging applications for interactive analysis in MITK | Jonas Cordes<br>Hochschule Mannheim |
| II | P13 | Learning Features via Transformer Networks For Cardiomyocyte Profiling | Jan Plier<br>Heidelberg University |
| II | P14 | Effect of Random Histogram Equalization on Calcification Analysis Using Deep Learning | Adarsh Panambur<br>Friedrich-Alexander-University of Erlangen-Nürnberg |
| II | P15 | Longitudinal analysis of disease progression using image and laboratory data for Covid-19 patients | Verena Bentele<br>Technical University of Munich |
| II | P16 | Adipose and Muscular Tissue Removal For Direct Volume Rendering of the Visceral Region in Abdominal 3D CT Images | Nico Zettler<br>Hochschule Aalen |

⭐ **Nominated for the BVM Best Scientific Work**

# ePosters (E)

# Social Events

## City Tour in the Oldtown

To ensure that the BVM 2022 is not only a scientific, but also a social highlight for all participants, the conference will be framed by an attractive supporting program. The historical attractions of the romantic Heidelberg old town can be discovered and admired at the Special City Tour at 17:00 on Sunday evening,  guided by Prof. Dr. Hans-Peter Meinzer.

Those interested please send an email to orga-2022@bvm-workshop.org.

Meeting point is in the middle of the Old Bridge (Am Hackteufel, 69117 Heidelberg)



## Social Networking & Get-Together on the Neckar

As a social highlight, there will be networking and a get-together event on Monday evening (June 27th) aboard the Königin Silvia of the "Weißen Flotte Heidelberg".

The boarding will start at 19:00 and the ship will depart at 19:30 sharp, on its three-hour round trip towards Neckarsteinach. You only need to bring yourself since everything else will be provided during the trip.

Book your ticket here: bvm-workshop.org/registrierung/

Meeting point is the Weisse Flotte, Neckarstaden 25, 69117

## Running events

As BVM is not just about talks, those who prefer a mixture of sightseeing and sports should make a note of the **BVM Running event**. Here we do not limit ourselves to sights in the old town, but can also tackle somewhat more distant sights such as the "Neckarwiesen" or the "Philosophenweg". There are always beautiful views of the old town and Heidelberg Castle. Get to know Heidelberg as usually only locals know it and **join the running tours on:**



- Sunday 17:30
- Monday 07:00
- Monday 17:30

On different routes in and around Heidelberg. We offer different distances depending on your endurance, so there is something for all running enthusiasts. Those interested can directly show up at the meeting point at the **Bismarckplatz, next to the fountain**.

## Program Committee dinner at the Kulturbrauerei

Program Committee members are cordially invited for a dinner on Sunday, 26 June, at the Kulturbrauerei Heidelberg (Leyergasse 6, 69117 Heidelberg), starting at 19:00.

## Tours at the German Cancer Research Center

There will also be **tours** for interested participants on site at the **German Cancer Research Center** during the lunch breaks. Several demonstrations of the equipments relevant to medical imaging are currently planned. Among other things, PET/CT, PET/MRI, 7T MRI or experimental CT will be presented. Interested participants can register during the BVM.

# Notes

## Sunday, 26th June

| | | |
|---|---|---|
| 08:30 | Registration | |
| 14:00 | **Tutorials** | |
| 17:15 | **City tour** <br> Meeting point: Old Bridge | **17:30 Running event** <br> Meeting point: Bismarckplatz |
| 19:00 | **Program Committee dinner** | Meeting point: Kulturbrauerei |

## Monday, 27th June

| | | |
|---|---|---|
| 07:00 | **Running event** | Meeting point: Bismarckplatz |
| 08:30 | Registration and Welcome Coffee | |
| 09:00 | **Opening/ Welcome** | |
| 09:15 | KEYNOTE Prof. Dr. Stefanie Speidel | |
| 10:00 | **Session 1:** Segmentation I | |
| 11:00 | Coffee break | |
| 11:20 | **Session 2:** Segmentation II | |
| 12:20 | Lunch break | **DKFZ tour** Meeting point: Communication Center |
| 13:20 | **Poster session I** | |
| 14:20 | **Session 3:** Detection | |
| 15:20 | Coffee break | |
| 15:40 | **Poster session II** | |
| 17:00 | GMDS/GI-AG Medical Image and Signal Processing meeting Room: **K1/K2** | **Running event** Meeting point: Bismarckplatz |
| 19:00 | **Social Networking & Get-Together on the Neckar** | |

## Tuesday, 28th June

| | | |
|---|---|---|
| 08:30 | Registration and Welcome Coffee | |
| 09:00 | **KEYNOTE Prof. Dr. Ullrich Köthe** | |
| 09:45 | **Session 4:** Registration/ Detection | |
| 10:45 | Coffee break | |
| 11:00 | **Session 5:** Surgical Data Science/ Virtual Reality | |
| 12:00 | Lunch break | **Program Commitee meeting** Room: **K1/K2** | **DKFZ tour** Meeting point: Communication Center |
| 13:00 | **Poster session III** | |
| 14:00 | **KEYNOTE Prof. Dr. Rebecca Fahrig** | |
| 14:45 | **Session 6:** Surgical Data Science/ Simulation/ Data Science | |
| 15:45 | Coffee break & Voting for best BVM Lecture and Poster | |
| 16:00 - 17:00 | **Awards & Closing** | |