Dr. Ulrike Boehm — Curriculum Vitae

Contact Information

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Summary

Physicist, optical scientist & data scientist with a passion for community building/engagement, outreach, and teaching: I have over ten years of experience designing, building, and running advanced light microscopy systems, analyzing microscopy data, and developing image acquisition & analysis workflows. Furthermore, I have been highly engaged in community building/engagement, outreach, and teaching activities focusing on community service, women/diversity in science, open science, and microscopy for more than 15 years.

Research Interests

- Microscope design, development, and application across a wide range of biological models
- Development of image and data processing and analysis tools
- Machine learning and its application in microscopic image analysis
- Statistical methods for large datasets
- Open software and hardware tools for imaging and microscopy

Positions

Research Specialist 2019 - present
Janelia Research Campus, Ashburn, VA, USA

- Design, construction, modification, and troubleshooting of advanced light microscopes (iPALM, Lattice Light Sheet Microscope, SiMView Light Sheet Microscope, Aberration Corrected Multi-focal Microscope, MOSAIC, FIB-SEM, cryo-SIM, etc.)
- Support of (inter)national scientists with their imaging experiments via technical consultations and during their data acquisition at the instruments of Janelia's Advanced Imaging Center and Janelia's Light Microscopy Core, and at various other imaging modalities on campus
- Troubleshooting of sample preparation
- Development and implementation of new image and data analysis strategies for Janelians and users from around the world
- Review of proposal drafts, and proposals submitted to the Advanced Imaging Center
- Design and realization of microscopy and data analysis workshops, symposia, and conferences

Postdoctoral Research Fellow 2017 - 2018
National Institutes of Health, National Cancer Institute, Bethesda, MD, USA

- Design and construction a microscope for live-cell 5-color single-molecule transcription imaging in eukaryotic cells at high resolution in time and space to capture promoter-enhancer interactions
- Development of advanced fluorescence labeling strategies for the genome based on dCas9 (CAS-FISH)
- Computational modeling and data analysis of 4D genome data

Ph.D. Student 2010 - 2016
Max Planck Institute for Biophysical Chemistry, Göttingen, Germany
Department of NanoBiophotonics (Prof. Dr. Stefan W. Hell)
Dissertation title: "4Pi-RESOLFT nanoscopy"
Advisor: Prof. Dr. Stefan W. Hell

- Running of various imaging experiments (samples: block copolymers, synaptic vesicles) on an isoSTED microscope
- Design and construction of a two-color STED microscope
- Design and construction of a 4Pi-RESOLFT nanoscope, including optical and acquisition system.
- Development of acquisition software
- System/sample testing and optimization

Master Student 2009
Max Planck Institute of Biochemistry, Martinsried/Munich, Germany
Department of Molecular Structural Biology (Prof. Dr. Wolfgang Baumeister)
Dissertation title: "Correlative microscopy at liquid nitrogen temperature"
Advisors: Dr. Jürgen M. Plitzko, Prof. Dr. Wolfgang Baumeister

- Development and testing of a cryo transfer shuttle (CryoStage^2) for the reliable transfer of amorphous frozen-hydrated samples from a fluorescence to an electron microscope for correlative microscopy
- Further development and testing of the software based on scale-invariant feature transform (SIFT) for the correlative microscopy approach

Undergraduate Researcher - various research assistant positions 2005 - 2008

- Evaluation of the mechanical properties of actin filaments in combination with different actin-binding proteins at the Physics Department of the Technical University of Munich, Germany - Prof Andreas Bausch (2008)
- Study of HEK cells with FLIC-microscopy at the Max Planck Institute of Biochemistry, Martinsried, Germany - Prof Peter Fromherz (2008)
- Analysis of Multi-SANS data (with MIRA) and data of Cytochrome C (with the Neutron Spin Echo RESEDA) at the Research Neutron Source Heinz Maier-Leibnitz (FRM II), Munich, Germany - Dr. Robert Georgii and Prof Peter Böni (2007)
- Study of surfaces and DNA with an AFM at the Physics Department of the Technical University of Munich, Germany - Prof Thorsten Hugel (2006)
- Performance evaluation of an animal PET scanner at the university hospital "Rechts der Isar", Munich, Germany - Prof Sibylle Ziegler (2006)
- Data analysis of water levels of the Baltic Sea at the Leibnitz Institute for Baltic Sea Research, Warnemünde, Germany - Dr. Torsten Seifert (2005)

Education

MicroMasters in Statistics and Data Science 2020 - 2021
Massachusetts Institute of Technology / MITx, Cambridge, MA, USA

Ph.D. in Physics 2010 - 2015
Heidelberg University, Heidelberg, Germany

Diploma in Physics 2004 - 2009
Technical University of Munich, Munich, Germany

Honors & Awards

Helmsley Fellowship, Helmsley Charitable Trust 2017

66th Lindau Nobel Laureate Meeting, Participant 2016

Excellence Award, Max Planck Society 2010

Oskar Karl Forster Scholarship, Technical University of Munich 2009

Study Career Scholarship, Technical University of Munich 2008

Publications

20. Rigano A., ..., **Boehm U.** et al., *Micro-Meta App: an interactive tool for collecting microscopy metadata based on community specifications.* Nature Methods 18, p1489–1495 (2021). DOI:10.1038/s41592-021-01315-z
19. Hammer M., Huisman M., Rigano A., **Boehm U.** et al., *Towards community-driven metadata standards for light microscopy: tiered specifications extending the OME model.* Nature Methods 18, p1427–1440 (2021). DOI:10.1038/s41592-021-01327-9
18. **Boehm U.***, Nelson G.* et al., *QUAREP-LiMi: A community-driven initiative to establish guidelines for quality assessment and reproducibility for instruments and images in light microscopy.* Journal of Microscopy, p1-18 (2021). DOI:10.1111/jmi.13041

17. **Boehm U.**, Galbraith C. *Extending the performance capabilities of isoSTED.* Biophysical Journal, p3237-3239 (2021). doi:https://doi.org/10.1016/j.bpj.2021.07.005

16. Rigano A., ..., **Boehm U.** et al., *Micro-Meta App: an interactive software tool to facilitate the collection of microscopy metadata based on community-driven specifications.* bioRxiv, p1-23 (2021). DOI:10.1101/2021.05.31.446382

15. **Boehm U.***, Nelson G.* et al., *QUAREP-LiMi: a community endeavor to advance quality assessment and reproducibility in light microscopy.* Nature Methods, p1-4 (2021). DOI:10.1038/s41592-021-01162-y

14. Huisman M., Hammer M., Rigano A., **Boehm U.** et al., *A perspective on Microscopy Metadata: data provenance and quality control.* arXiv, p1-15 (2021). DOI:https://arxiv.org/abs/1910.11370

13. Hammer M., Huisman M., Rigano A., **Boehm U.** et al., *Towards community-driven metadata standards for light microscopy: tiered specifications extending the OME model.* bioRxiv, p1-27 (2021). DOI:110.1101/2021.04.25.441198

12. Rigano A., **Boehm U.** et al., *WU-BIMAC/NBOMicroscopyMetadataSpecs: 4DN-BINA-OME (NBO) Microscopy Metadata Specifications.* zenodo, (2021). DOI:10.5281/zenodo.4710731

11. **Boehm U.***, Nelson G.* et al., *QUAREP-LiMi: A community-driven initiative to establish guidelines for quality assessment and reproducibility for instruments and images in light microscopy.* arXiv, p1-17 (2021). DOI:https://arxiv.org/abs/2101.09153

10. Galbraith J., Aaron J., **Boehm U.**, Chew T.-L. and Galbraith C., *Resolving the 3D Nanoarchitecture of the Actin Cytoskeleton.* Microscopy and Microanalysis, p1 (2020). DOI:10.1017/S1431927620016736

9. Brown-Harding H., Cordelieres F., Poujol C., **Boehm U.**, Collinson L., *A 'lockdown post' from facility managers across the world.* FocalPlane, p1 (2020). DOI:10.1242/focalplane.1244

8. **Boehm U.**, Hell S.W., Schmidt, R., *4Pi-RESOLFT nanoscopy.* Nature Comm. 7 (10504), p1-8 (2016). DOI:10.1038/ncomms10504

7. **Boehm U.**, *4Pi-RESOLFT nanoscopy.* PhD Thesis, Heidelberg University (2016) DOI: 10.11588/HEIDOK.00020200

6. **Boehm U.**, Schmidt R., Hell S.W., *Live-cell 4pi nanoscopy.* European Biophysics Journal with Biophysics Letters 2015 Jul 1 (Vol. 44, pp. S75-S75). 233 SPRING ST, NEW YORK, NY 10013 USA: SPRINGER.

5. Ullal C.K., Primpke S., Schmidt R., **Boehm, U.**, Egner A., Vana P, Hell S.W., *Flexible Microdomain Specific Staining of Block Copolymers for 3D Optical Nanoscopy.* Macromolecules, 44, p7508–7510 (2011). DOI: 10.1021/ma201504f

4. Ullal C., Schmidt R., **Boehm U.**, Primpke S., Vana P, Hell W.S., *STED Microscopy as a Characterization Tool for Three Dimensionally Nanostructured Block Copolymer Thin Films.* APS. 2011 Mar;2011:A43-002.

3. Rigort A., Bäuerlein F.J., Leis A., Gruska M., Hoffmann C., Laugks T., **Boehm U.**, Eibauer M., Gnaegi H., Baumeister W. and Plitzko J.M., *Micromachining tools and correlative approaches for cellular cryo-electron tomography.* J. Struct. Biol. 172, p169–179 (2010). DOI:10.1016/j.jsb.2010.02.011

2. Rigort A., Mathisen C., **Boehm U.**, Leis A., Lich B., Hayles M., Laugks T., Baumeister W. and Plitzko J.M., *Integrative Cryo-Correlative Microscopy Approaches.* Microscopy and Microanalysis. Vol 16(S2), p186–187 (2010). DOI:10.1017/S1431927610058216

1. **Boehm U.**, *Korrelative Mikroskopie bei Flüssigstickstoff-Temperatur.* Diploma Thesis, Technical University of Munich (2010)

∗ These authors contributed equally to this work

Peer Review

Angewandte Chemie (International ed.)
Biophysical Journal
Biophysical Reports
Frontiers in Bioinformatics
Journal of Cell Science
Journal of Microscopy
Nature Methods
Review Commons
STAR Protocols

Presentations

Advanced Imaging Methods Workshop 2022 *(invited)* 2022
UC Berkeley, Berkeley, CA, United States of America

Chromatin Imaging/Nuclear Architecture SubGroup *(invited)* 2021
Harvard & MIT, Boston, MA, United States of America

Janelia Advisory Committee Meeting 2021
Better Science through Open Science and Collaborative Teams *(invited)*
Janelia Research Campus, Ashburn, VA, United States of America

Junior Scientist Workshop on Biological Optical Microscopy *(invited)* 2019
Janelia Research Campus, Ashburn, VA, United States of America

Transcription Seminar *(invited)* 2019
Albert Einstein College of Medicine, New York, NY, United States of America

Microscopy Seminar *(invited)* 2019
Havard Medical School, Boston, MA, United States of America

Microscopy Lunch Seminar *(invited)* 2019
UMass Medical School, Worcester, MA, United States of America

Single Biomolecules Meeting 2018
Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, United States of America

NIH Light Microscopy Interest Group Seminar *(invited)* 2018
NIH, Bethesda, MD, United States of America

Chan Zuckerberg Initiative Imaging Workshop *(invited)* 2017
CZ Biohub, San Francisco, CA, United States of America

Chesapeake Bay Area Single Molecule Biology Meeting 2017
Johns Hopkins University, Baltimore, MD, United States of America

Frontiers in Imaging Science Conference 2017
Janelia Research Campus, Ashburn, VA, United States of America

Single Molecule Biophysics Conference 2017
Aspen Center for Physics, Aspen, CO, United States of America

Labeling and Nanoscopy Conference 2016
DKFZ, Heidelberg, Germany

MPIbpc Campus Seminar *(invited)* 2016
Max Planck Institute for Biophysical Chemistry, Göttingen, Germany

NCI Departmental Seminar *(invited)* 2016
NIH, Bethesda, MD, United States of America

Departmental Seminar *(invited)* 2016

Wyss Institute at Havard University, Boston, MA, United States of America

Lunch Talk *(invited)* 2016
Havard University, Cambridge, MA, United States of America

Biophysical Society Annual Meeting 2016
Los Angeles, CA, United States of America

Seeing Is Believing Symposium 2015
EMBL, Heidelberg, Germany

Deutsche Physikerinnen Tagung *(invited)* 2015
University of Göttingen, Göttingen, Germany

Annual meeting of the European Light Microscopy Initiative (ELMI) 2015
Sitges, Spain

Focus on Microscopy (FOM) 2015
Göttingen, Germany

PROSPECTS. First Plenary Meeting 2010
Punta Negra, Majorca/Spain

Teaching

NIH FAES Imaging - From IF and FISH to Automated and Confocal Microscopy (virtual workshop), Instructor of the Image Analysis Bootcamp, 2021
National Institutes of Health, Bethesda, United States of America

Fiji Image Processing and Analysis Workshop (virtual workshop) 2021
Instructor of the Superresolution Data Handling Module,
Turku Bioscience Centre, Turku, Finland

NIH FAES Super Resolution Workshop (virtual workshop) 2021
Instructor, Foundation for Advanced Education in the Sciences (FAES)
Bethesda, United States of America

Fiji Macros Programming (virtual workshop) 2020
Instructor, Janelia Research Campus, Ashburn, United States of America

DECODE for Single Molecule Localization Microscopy (virtual workshop) 2020
at the *From Image to Knowledge with ImageJ & Friends* conference
Instructor, Janelia Research Campus, Ashburn, United States of America

NIH FAES Image Processing and Analysis workshop (virtual workshop) 2019 - 2021
Instructor, National Institutes of Health, Bethesda, United States of America

Open Science in Imaging and Microscopy (breakout session during a workshop) 2019
Instructor, Janelia Research Campus, Ashburn, United States of America

Advanced Imaging Techniques in Biomedical Sciences (summer intern journal club) 2018
Instructor, National Institutes of Health, Bethesda, United States of America

Introduction to microscopy (graduate course) 2017
Teaching assistant, University of Massachusetts Medical School, Worcester,
United States of America

Optical Microscopy & Imaging in the Biomedical Sciences 2017
(summer intern journal club)
Instructor, National Institutes of Health, Bethesda, United States of America

Advanced physics laboratory course for physics students (undergraduate course) 2011
Teaching assistant, Heidelberg University, Germany

Experimental Physics III: Optics (undergraduate course) 2011
Teaching assistant, University of Göttingen, Germany

Experimental Physics IV: Quantum, atomic and molecular physics 2010
(undergraduate course), Teaching assistant, University of Göttingen, Germany

Theoretical Physics I: Theoretical Mechanics (undergraduate course) 2009
Teaching assistant, Technical University of Munich, Germany

Theoretical Physics II: Electrodynamics (undergraduate course) 2008
Teaching assistant, Technical University of Munich, Germany

Mentoring

Janelia Buddy Program for International Scientists 2020 - present
Focus: Facilitating the transition of international scientists to Janelia in partnership with Janelia's Human Resource Department
Janelia Research Campus, Ashburn, United States of America

Mentoring of Postbac Students 2020 - present
Focus: Navigating a scientific career
Janelia Research Campus, Ashburn, United States of America

Mentoring of Ph.D., College, and High School Students 2017 - 2018
Focus: Navigating a scientific career, how to work in an optics laboratory & in-depth support with individual research projects
National Institutes of Health, Bethesda, United States of America

Mentoring of Ph.D. students and Master Students 2010 - 2016
Focus: Navigating a scientific career, how to work in an optics laboratory & in-depth support with individual research projects
Max Planck Institute for Biophysical Chemistry, Göttingen, Germany

Conference Organization

Advanced Imaging Methods Workshop 2022, Organizer 2022
UC Berkeley, Berkeley, CA, United States of America

OIG-ABG Educational Lectures, Organizer 2021 - present
Ashburn, VA, United States of America

Janelia+EMBL BioImaging Seminar Series, Organizer 2020 - present
Ashburn, VA, United States of America

Optical Interest Group (OIG), Organizer 2020 - present
Ashburn, VA, United States of America

Imaging Africa Microscopy Club, Organizer 2020
Ashburn, VA, United States of America

Frontiers in Imaging Science Conference, Organizer 2019
Ashburn, VA, United States of America

Labeling and Nanoscopy Conference 2018, Website and social media support 2018
Heidelberg, Germany

International Opportunities EXPO, Organizer 2018
National Institutes of Health, Bethesda, MD, United States of America

Division of International Services Immigration Symposium, Organizer 2017 - 2018
National Institutes of Health, Bethesda, MD, United States of America

I, Scientist Conference, Organizer 2017
Berlin, Germany

Labeling and Nanoscopy Conference 2016, Organizer 2016
Heidelberg, Germany

Focus on Microscopy (FOM), Social media support 2015 - 2019

PhDnet General Meeting, Organizer 2011
Bonn, Germany

Professional Services

Wiley Analytical Science Magazine, Editorial Board Member — 2021 - present
Weinheim, Germany

CZI Expanding Global Access to Bioimaging, Grant reviewer — 2021
San Francisco, United States of America

QUAREP-LiMi, Chair of the "White Paper" working group — 2020 - present
Freiburg, Germany

Frontiers in Bioinformatics, Review Editor for Computational BioImaging — 2020 - present
Lausanne, Switzerland

CZI Imaging Scientists Round 2, Grant reviewer — 2020
San Francisco, United States of America

QUAREP-LiMi, Vice-chair of the "Image Quality" working group — 2020 - present
Freiburg, Germany

German BioImaging, Committee member of the working groups for — 2020 - present
(1) Training and Knowledge Transfer and
(2) Image Data Analysis & Management

BioImaging North America (BINA), Committee member — 2020 - present
of the "Quality Control and Data Management" working group

Janelia's Optical Interest Group, Coordinator — 2020 - present
Ashburn, Virginia, United States of America

GSO German Scholars Organization e.V., Coordinator — 2020 - present
for Local Chapter of German Scientists, Ashburn

Accelerating Science and Publication in Biology (ASAPbio), Ambassador — 2018 - 2019

eLife Early-Career Advisory Group, Ambassador — 2017 - 2019

NIH Laser Safety Advisory Committee, Committee member for the NCI — 2018
National Institutes of Health, Bethesda, United States of America

NIH Visiting Fellows Committee, Chair — 2017 - 2018
National Institutes of Health, Bethesda, United States of America

NIH Light Microscopy Interest Group, Coordinator — 2016 - present
National Institutes of Health, Bethesda, United States of America

DPG Arbeitskreis für Changengleichheit, — 2016 - present
Board member & deputy spokesperson, Bad Honnef, Germany

Lindau Nobel Laureate Meeting, Freelance writer — 2016 - present
Lindau, Germany

66th Lindau Nobel Laureate Meeting, "Women in Science"-correspondent — 2016
Lindau, Germany

Lise Meitner Gesellschaft e.V., Co-founder and board member — 2011
Berlin, Germany

Max Planck PhDnet, Steering group 2011 member & deputy spokesperson — 2011
Max Planck Society, Munich, Germany

PhD/Postdoc Community, PhD/Postdoc representative — 2011 - 2014
Max Planck Institute for Biophysical Chemistry, Göttingen, Germany

Certificates & Training

Fundamentals of Statistics — 2021
An 18-week in-depth introduction course by MITx to develop and understand fundamental statistical principles on firm mathematical grounds starting from the construction of estimators and tests, as well as an analysis of their asymptotic performance.

Leadership Principles for Scientists, Engineers, and Researchers 2021
A four-month and four-course online program from MIT that empowers engineers, scientists, and researchers with the leadership insight needed to solve problems, innovate, and drive change.

Machine Learning with Python: from Linear Models to Deep Learning 2021
A 15-week in-depth introduction course by MITx to the field of machine learning, from linear models to deep learning and reinforcement learning, through hands-on Python projects.

Data Analysis for Social Scientists 2020
An 11-week course by MITx to learn methods for harnessing and analyzing data to answer questions of cultural, social, economic, and policy interest.

Probability - The Science of Uncertainty and Data 2020
A 16-week course by MITx to build foundational knowledge of data science with an introduction to probabilistic models, including random processes and the essential elements of statistical inference.

Fierce Conversations program 2020
A 6-week course offered by Howard Hughes Medical Institute about Feedback, Confrontation, Team, Delegation, Coaching, and Accountability.

LabVIEW Core 2 2020
A certificate course offered by National Instruments about the LabVIEW basics.

LabVIEW Core 1 2020
A certificate course offered by National Instruments about the LabVIEW basics.

HBS Entrepreneurship Essentials 2020
Entrepreneurship Essentials is a 4-week, 30-hour online certificate program from Harvard Business School. Entrepreneurship Essentials introduces participants to the entrepreneurial journey from finding an idea to gaining traction in the marketplace to raising capital for a venture. Participants learn an overarching framework - People, Opportunity, Context, Deal - to evaluate opportunities to manage start-ups and finance ventures.

HBS Management Essentials 2019
Management Essentials is an 8-week, 35-hour online certificate program from Harvard Business School. Management Essentials takes a distinctive, hands-on approach to management. Participants in this course learn to identify, understand, design, and shape critical organizational and managerial processes as a means of getting the work done.

HBS CORe (Credential of Readiness) 2019
CORe (Credential of Readiness) is a 150-hour certificate program on business fundamentals from Harvard Business School. The CORe is comprised of three courses - Business Analytics, Economics for Managers, and Financial Accounting - developed by leading Harvard Business School faculty and delivered in an active learning environment based on the HBS signature case-based learning model.

Scientists Teaching Science 2018
at the Office of Intramural Training and Education (OITE) at the National Institutes of Health, Bethesda, United States of America (9-week online pedagogy course)

Research Mentor Training 2018
at the Office of Intramural Training and Education (OITE) at the National Institutes of Health, Bethesda, United States of America

Business of Science for Scientists 2018
by SciPhD at the National Cancer Institute in Shady Grove, United States of America

Chromatin, Epigenetics and Gene Expression Course 2018

at the Cold Spring Harbor Laboratory (CSHL) in Cold Spring Harbor, NY, United States of America, Course instructors: Prof Karen Adelman, Dr Luciano Di Croce, Prof Geeta Narlikar, Prof Ali Shilatifard

BioTech2: Recombinant DNA Methodology 2017
at the Foundation for Advanced Education in the Sciences at the NIH (FAES), Bethesda, United States of America

Management Bootcamp for Postdocs 2017
at the Office of Intramural Training and Education (OITE) at the National Institutes of Health, Bethesda, United States of America

Ethics in Research Training for Postdocs 2017
at the Office of Intramural Training and Education (OITE) at the National Institutes of Health, Bethesda, United States of America

Workplace Dynamic Series 2016
about Self-Awareness, Conflict & Feedback, Team Skills, Diversity In A Multicultural Society at the Office of Intramural Training and Education (OITE) at the National Institutes of Health, Bethesda, United States of America

Computer Skills

Languages: Python, MATLAB, LabVIEW, R
Software: Inventor (CAD), Zemax, Imaris, Fiji, ImageJ

Professional Affiliation

American Physical Society, German Physical Society, BioImaging North America (BINA), German BioImaging Society, Network of European BioImage Analyst (NEUBIAS), Quantitative BioImaging Society

Languages

German - native language
English - fluent, spoken and written
French - basic knowledge
Swedish - basic knowledge

References

Available upon request

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