

Curriculum Vitae

Sven Klumpe

Max-Planck-Institute of Biochemistry, Germany
Am Klopferspitz 18, 82152 Martinsried, Germany

MOBILE +49 1577 1519081
EMAIL klumpe@biochem.mpg.de
ORCID 0000-0002-8350-6503

Research topics

- *In situ* Structural Biology
- Cryo-FIB technology and software development
- Structural Biology of Transposons in Development
- Membrane remodelling, transport, and maintenance
- Molecular simulations and integrative model building

Education

2019-2023 PhD (Dr. rer. nat.) MPI of Biochemistry and Technical University of Munich, Germany
2016-2018 Master of Science, Biochemistry, Technical University of Munich, Germany
2012-2016 Bachelor of Science, Biochemistry, Technical University of Munich, Germany

Previous Positions

From 4/2025 IMP & IMBA Fellow research group leader, Research Institute of Molecular Pathology and Austrian Academy of Sciences Institute of Molecular Biotechnology Austria, Vienna, Austria
2024-2025 Postdoctoral Fellow, MPI of Biochemistry, Germany
2016-2018 Research Assistant Theoretical Chemistry, Technical University of Munich, Supervisor: Prof. Dr. Ville Kaila
2016 Research Project Marine Biology, Biologia Molecular Marina BIOMMAR, Universidad de los Andes, Supervisor: Prof. Dr. Juan Armando Sanchez. Supported by the German National Merit Foundation.
2015-2016 Research Project Theoretical Chemistry, Institut Parisien de Chimie Moleculaire, Universite Pierre et Marie Curie, Supervisor: Dr. Etienne Derat. Supported by the Erasmus+ program.

Fellowships and Distinctions

2024 MPI of Biochemistry Junior Scientist Publication Award 2024
2023 Poster Prize, EMBO Workshop: In Situ Structural Biology
2021 Best Talk Award, 29th IMPRS Life Science Seminar 2021
2020 *Mentor's choice* and *Most voted project* award Copenhagen Biohackathon 2020 , <https://github.com/sklumpe/BioHackathon2020>
2016-2019 Fellowship of the **German National Merit Foundation** (Studienstiftung des Deutschen Volkes), Member of the Life Science College *Biophysical Chemistry and Biophysics*, Supervisor: Prof. Dr. Matthias Weiss & Prof. Dr. Holger Kress)
2018 *First-Runner-Up & Best Manufacturing Project*, International Genetically Engineered Machines (iGEM) Team Munich, <http://2018.igem.org/Team:Munich/Team>
2017 *First-Runner-Up, Best Diagnostics Project & Best Software Project*, International Genetically Engineered Machines (iGEM) Team Munich, <http://2017.igem.org/Team:Munich>
2012 GDCh high school award for extraordinary results in Chemistry & Highest Abitur diploma grade (1.0)

Presentations and Seminars

asterisks (*) indicate virtual talks

2025 (prosp.) Speaker, Birkbeck EMBO Course "CryoEM and Image Processing".
2025 Genentech CryoEM group meeting, **Invited Talk**
2025 Chan Zuckerberg Imaging Institute, **Invited Talk**
2025 EMBO In Situ Structural Biology Workshop, EMBL Heidelberg, **Talk**
2024 Croucher Advanced Studies Institute, Hong Kong, **Invited Talk**
2024 Centre for Structural Systems Biology, BioImaging Seminar Series, **Invited Talk**
2024 Challenges in Structural Biology, Lake Arrowhead, UCLA, **Invited Talk**
2024 Molecular and Cellular Structural Biology Lecture Series, University of Basel, **Invited Talk**
2024 Ramundo Lab Retreat, Italy, **Invited Talk / Workshop**
2024 Vienna BioCenter Symposium, **Invited Talk**
2024 PICO 2024 Conference on Aberration-Corrected TEM, Poster
2024 EMBO Practical Course "In Situ Structural Biology by cryo-FIB and cryo-ET", **Talk**
2024 PFIB User Meeting, Imperial College London, **Invited Talk**
2024 Diamond Light Source, **Invited Talk**
2024 Structural Biology Division, Oxford University, **Invited Talk**
2024 MPI PFIB Meeting, MPI für Eisenforschung GmbH, Düsseldorf
2023 Vienna Cryo-EM autumn school & symposium, **Instructor & Invited Talk**
2023 Microscopy and Microanalysis 2023, **Invited Talk**

2023	GRC / GRS 3DEM, Maine, Discussion Leader
2023	European FIB Network Meeting, Zürich, Switzerland, Talk
2023	ETH Zürich, Invited Seminar
2023	Stanford Seminar with Jürgen M. Plitzko, Invited Seminar
2023	Chan Zuckerberg Imaging Institute Meeting “Hardware Frontiers for CryoET”, Invited Talk
2023	MPI für Eisenforschung GmbH, Düsseldorf, Germany, Invited Talk
2023	Vienna BioCenter Seminar, Vienna, Austria, Invited Seminar
2023	EMBO Workshop: In Situ Structural Biology Conference, Heidelberg, Poster Presentation, Poster Prize
2023	Stanford EM-X Seminar with Jürgen M. Plitzko, Online Talk
2022	9 th Electron Tomography Congress 2022, Talk
2022	EMBL Heidelberg, Invited Visit
2022	Life Science Advisory Board Meeting, Thermo Fisher Scientific, Invited Seminar
2022	Gordon Research Conference & Seminar 3DEM, Poster Presentation
2022	Ringberg Retreat Department “Molecular Sociology” Martin Beck, MPI Biophysics, Seminar
2022	Vanderbilt University, Department for Structural Biology, Invited Seminar
2022	Utrecht University, Department for Structural Biochemistry, Seminar (*)
2021	Computational Methods in Photosynthesis 2021, Talk (*)
2021	Gordon Research Conference and Seminar 3DEM, Poster Presentation & Talk, New Hampshire, USA
2021	Microscopy & Microanalysis Conference, Talk (*)
2021	19 th International Conference on Cell and Molecular Biology of Chlamydomonas, Talk , Six-Fours-les Plague, France
2020	EMBO Workshop: In Situ Structural Biology, Poster presentation + Short Talk (*)
2018	Synthetic Biology III “IGEM session”, Invited Talk , Landshut, Germany
2018	7 th Murnau Conference, Poster presentation
2017	Summer academy of the German National Merit Foundation, <i>Drug Design</i> , Germany
2016	Summer academy of the German National Merit Foundation, <i>Biological Circuits</i> , Germany

Teaching

2024	Instructor, EMBO Practical Course <i>In Situ Structural biology by Cryo-ET of FIB lamellae</i>
2023	Instructor at the Vienna Cryo-EM autumn school
2020	Teaching Assistant, <i>Biochemistry III</i> lecture series, Technical University of Munich, Germany
2017	Teaching Assistant, Tutor for <i>Electronic Structure Theory and Statistical Thermodynamics</i> , Technical University of Munich, Germany
2017	Teaching Assistant, Tutor for <i>Biophysical Chemistry</i> , Technical University of Munich, Germany
2017	Teaching Assistant, Tutor for <i>Molecular Spectroscopy</i> , Technical University of Munich, Germany
2015	Teaching Assistant, Tutor for <i>Introduction to Quantum Mechanics</i> , Technical University of Munich, Germany
2014	Teaching Assistant, Tutor for <i>Physical Chemistry: Thermodynamics and Kinetics</i> , Technical University of Munich, Germany

Publication summary

13 papers in peer-reviewed journals

4 pre-prints

3 book chapter & invited articles

Total number of citations: 699, h-index 12 (Google Scholar, accessed 29. Oct 2024)

Google Scholar <https://scholar.google.com/citations?user=0xs-E9wAAAAJ&hl=en>

ORCID 0000-0002-8350-6503

Pre-prints

1. Sachweh J, Börmel M, **Klumpe S**, Becker A, Taniguchi R, Kubanska MA, Pintschovius V, Kaindle E, Plitzko JM, Wilfing F, Beck M[#], Hampoelz B[#] (2024) “The small GTPase Ran defines Nuclear Pore Complex Assymetry” *bioRxiv*. DOI: [10.1101/2024.10.10.617378](https://doi.org/10.1101/2024.10.10.617378)
2. Velazco A, Glen T, **Klumpe S**, Pennington A, Zhang J, Smith JLR, Glynn C, Bowles W, Kobylinska M, Fleck RA, Naismith JH, Kim JS, Darrow MC, Grange M, Kirkland AI, Dumoux M[#] (2024) “Reduction of SEM charging artefacts in native cryogenic biological samples” *bioRxiv*. DOI: [10.1101/2024.08.23.609373](https://doi.org/10.1101/2024.08.23.609373)
3. Khavnekar S, Vrbosvka V, Zarolova M, Kelley R, Beck F, **Klumpe S**, Kotecha A, Plitzko JM[#], Erdmann PS[#] (2022) “Optimizing Cryo-FIB Lamellas for sub-5Å in situ Structural Biology” *bioRxiv*. DOI: [10.1101/2022.06.16.496417](https://doi.org/10.1101/2022.06.16.496417)

All publications

* equal contribution, # corresponding author

1. **Klumpe S[#]**, Senti KA, Beck F, Sachweh J, Hampoelz B, Ronchi P, Yeroslaviz A, Briggs JAG, Brennecke J[#], Beck M[#], Plitzko JM[#] (2024) “In-cell structure and snapshots of *copia* retrotransposons in intact tissue by cryo-electron tomography” *bioRxiv*. DOI: [10.1101/2024.02.21.581285](https://doi.org/10.1101/2024.02.21.581285), *Cell* accepted in principle
2. Schioetz OS*, Klumpe S*, Plitzko JM[#], Kaiser CJO[#] (2024) Cryo-electron tomography: en route to the molecular anatomy of organisms and tissues *Biochem Soc Trans* BST20240173
3. McCafferty CL[#], **Klumpe S[#]**, Amaro RE[#], Kukulski W[#], Collinson L[#], Engel BD[#] (2024) Integrating cellular electron microscopy with multimodal data to explore biology across space and time. *Cell* 187(3): 563–584. DOI: [10.1016/j.cell.2024.01.005](https://doi.org/10.1016/j.cell.2024.01.005)
4. Schioetz OS*, Kaiser CJO*, **Klumpe S[#]**, Morado DR, Poege M, Schneider J, Beck F, Thompson C, Plitzko JM[#] (2023) “Serial Lift-Out – Sampling Molecular Anatomy in Whole Organisms” *Nat Meth* Accepted manuscript.
5. Dumoux M[#], Glen T, Smith JLR, Ho EML, Perdigo LMA, Pennington A, **Klumpe S**, Yee NBY, Farmer D, Lai PYA, Bowles W, Kelley R, Plitzko JM, Wu L, Basham M, Clare DK, Siebert CA, Darrow MC, Naismith JH, Grange M[#] (2022) “Cryo-plasma FIB/SEM volume imaging of biological specimens” *eLife* 12:e83623. DOI: [10.7554/eLife.83623](https://doi.org/10.7554/eLife.83623)
6. Hung KYS, **Klumpe S***, Eisele MR*, Elsasser S*, Tian G*, Sun S, Moroco JA, Cheng TC, Joshi T, Seibel T, Van Dalen D, Feng XH, Lu Y, Ovaa H, Engen JR, Lee BH[#], Rudack T[#], Sakata E[#], Finley D[#] (2022) “Allosteric control of Ubp6 and the proteasome via a bidirectional switch” *Nat Commun* 13:838. DOI: [10.1038/s41467-022-28186-y](https://doi.org/10.1038/s41467-022-28186-y)
7. **Klumpe S***, Fung, HKH*, Goetz SK*, Zagoriy I, Hampoelz B, Xiaojie Z, Erdmann PS, Baumbach J, Müller CW, Beck M, Plitzko JM[#], Mahamid J[#] (2021). “A Modular Platform for Streamlining Automated Cryo-FIB Workflows.” *eLife* 10:e70506. DOI: [10.7554/eLife.70506](https://doi.org/10.7554/eLife.70506)
8. Erdmann PS[#], Hou Z*, **Klumpe S***, Khavenekar S*, Beck, F, Wilfling F, Plitzko J, Baumeister W[#] (2021) “In situ Cryo-Electron Tomography Reveals Gradient Organization of Ribosome Biogenesis in Intact Nucleoli.” *Nat Commun* 12: 5364. DOI: [10.1038/s41467-021-25413-w](https://doi.org/10.1038/s41467-021-25413-w)
9. Gupta TK*, **Klumpe S***, Gries K*, Heinz S*, Wietrzynski W*, Ohnishi N, Niemeyer J, Spaniol B, Schaffer M, Rast A, Ostermeier M, Strauss M, Plitzko JM, Baumeister W, Rudack T, Sakamoto W, Nickelsen J, Schuller JM[#], Schroda M[#] and Engel BD[#] (2021). “Structural basis for VIPP1 oligomerization and maintenance of thylakoid membrane integrity.” *Cell* 184(14): 3643-3659. DOI: [10.1016/j.cell.2021.05.011](https://doi.org/10.1016/j.cell.2021.05.011)
 - a. Highlighted on Cover
 - b. **Preview:** Deo RA, Prinz WA (2021) “ESCRTs got your Bac!” *Cell* 184(14): 3591-3592. DOI: [10.1016/j.cell.2021.06.017](https://doi.org/10.1016/j.cell.2021.06.017)
10. Zinzula L[#], Beck F, **Klumpe S**, Bohn S, Pfeifer G, Bollschweiler D, Nagy I, Plitzko JM and Baumeister W[#] (2021). “Cryo-EM structure of the cetacean morbillivirus nucleoprotein-RNA complex.” *J Struct Biol* 213(3): 107750. DOI: [10.1016/j.jsb.2021.107750](https://doi.org/10.1016/j.jsb.2021.107750)
11. Tacke S*, Erdmann PS*, Wang Z, **Klumpe S**, Grange M, Plitzko JM[#] and Raunser S[#] (2021). “A streamlined workflow for automated cryo focused ion beam milling.” *J Struct Biol* 213(3): 107743. DOI: [10.1016/j.jsb.2021.107743](https://doi.org/10.1016/j.jsb.2021.107743)
12. Liu Z*, Gao J*, Cui Y*, **Klumpe S**, Xiang Y, Erdmann PS[#] and Jiang L[#] (2021). “Membrane imaging in the plant endomembrane system.” *Plant Physiol* 185(3): 562-576. DOI: [10.1093/plphys/kiab040](https://doi.org/10.1093/plphys/kiab040)
13. Zinzula L[#], Basquin J, Bohn S, Beck F, **Klumpe S**, Pfeifer G, Nagy I, Bracher A, Hartl FU and Baumeister W[#] (2021). “High-resolution structure and biophysical characterization of the nucleocapsid phosphoprotein dimerization domain from the Covid-19 severe acute respiratory syndrome coronavirus 2.” *Biochem Biophys Res Commun* 538: 54-62. DOI: [10.1016/j.bbrc.2020.09.131](https://doi.org/10.1016/j.bbrc.2020.09.131)
14. Schrepfer P, Ugur I, **Klumpe S**, Loll B[#], Kaila VRI[#] and Bruck T[#] (2020). “Exploring the catalytic cascade of cembranoid biosynthesis by combination of genetic engineering and molecular simulations.” *Comput Struct Biotechnol J* 18: 1819-1829. DOI: [10.1016/j.csbj.2020.06.030](https://doi.org/10.1016/j.csbj.2020.06.030)
15. Katzmeier F*, Aufinger L*, Dupin A*, Quintero J*, Lenz M, Bauer L, **Klumpe S**, Sherpa D, Durr B, Honemann M, Styazhkin I, Simmel FC[#] and Heymann M[#] (2019). “A low-cost fluorescence reader for in vitro transcription and nucleic acid detection with Cas13a.” *PLoS One* 14(12): e0220091. DOI: [10.1371/journal.pone.0220091](https://doi.org/10.1371/journal.pone.0220091)

Book Chapters & Invited Articles

1. Erdmann PS[#], **Klumpe S**, Plitzko JM (2021). Chapter 23 – Elektronenmikroskopie. Book Chapter in Bioanalytik. Edited by Lottspeich F and Kurreck J, Springer Berlin. DOI:
2. **Klumpe S[#]**, Kuba J, Schioetz OH, Erdmann PS, Rigort A, Plitzko JM (2022) “Recent Advances in Gas Injection System-Free Cryo-FIB Lift-Out Transfer for Cryo-Electron Tomography of Multicellular Organisms and Tissues.” *Microscopy Today*. DOI: [10.1017/S1551929521001528](https://doi.org/10.1017/S1551929521001528)
 - a. Highlighted on Cover
3. **Klumpe S**, Erdmann PS[#] (2023) *In Situ* Cryo-Electron Tomography and Advanced Micromanipulator Techniques. In: Förster, F., Briegel, A. (eds) Cryo-Electron Tomography. Focus on Structural Biology, vol 11. Springer, Cham. DOI: [10.1007/978-3-031-51171-4_5](https://doi.org/10.1007/978-3-031-51171-4_5)

Conference Proceedings

1. **Klumpe S[#]**, Schioetz OH, Kaiser CJO, Luchner M, Brenner J, Plitzko JM (2023) “Developments in cryo-FIB Sample Preparation: Targeting in Cryo-Lift-Out Preparation of Tissues and Machine Learning Models for Fully Automated On-Grid Lamella Preparation”. *Microscopy and Microanalysis*. 29(1): 511-513. DOI: [10.1093/micmic/ozad067.243](https://doi.org/10.1093/micmic/ozad067.243)
2. Brenner J[#], **Klumpe S**, Wilfling F, Plitzko JM (2023) “Towards Temporal Resolution in Correlative Cryo-electron Tomography”. *Microscopy and Microanalysis*. 29(1): 1937-1938. DOI: [10.1093/micmic/ozad067.1003](https://doi.org/10.1093/micmic/ozad067.1003)

3. Vrbovska V, **Klumpe S**, Thompson C, Rigort A, Mitchels J, Franke T, Müllerová M, Kasáková A, Hovorka M (2023) “Fluorescence-guided Cryo-lift-out using an Integrated Fluorescence Light Microscope and an Optimized Sample-needle Attachment Procedure” *Microscopy and Microanalysis*. 29(1): 1051-1052. DOI: [10.1093/micmic/ozad067.538](https://doi.org/10.1093/micmic/ozad067.538)
4. Plitzko JM[#], **Klumpe S**, Schioetz OH, Bieber A, Capitanio C, Kuba J, Rigort A (2022) “On the Road to Correlative Cryo-Lift-Out, Fully Automated Waffles and Beyond – Make the Most out of your Tissue Sample”. *Microscopy and Microanalysis*. 28(1): 1292-1295. DOI: [10.1017/S143192762200530X](https://doi.org/10.1017/S143192762200530X)
5. Plitzko JM, Erdmann P, **Klumpe S**[#] (2021) “Deposition-free Cryo-FIB Lift-Out Transfer for Cryo-Electron Tomography Specimen Preparation”. *Microscopy and Microanalysis*. 27(1): 3032-3034. DOI: [10.1017/S1431927621010527](https://doi.org/10.1017/S1431927621010527)

Mentoring

2023	Daily Advisor M. Sc. Thesis Adrian Müller
2022	Daily Advisor Internship, Peter Takacs
2022	Daily Advisor Research Assistant Marina Luchner, now PhD student at University of Oxford, UK
2020	Daily Advisor M.Sc. Thesis Annika Elimelech, now PhD student at Bavarian NMR center, TUM
2020	Daily Advisor M. Sc. Thesis Sarah Brajkovic, now Research Assistant at Chair of Bioanalytics, TUM
2020	Daily Advisor B.Sc. Thesis, Benedikt Müller, now M. Sc. Student at TUM
2019	Daily Advisor Internship Carolin Klose, now PhD Student at TUM (joint with Victoria Trinkaus)

Reviewing activity

2023-now	Microscopy & Microanalysis, Nature Methods, Nature Communications, Journal of Open-Source Software, Ultramicroscopy
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Funding

2024	Instruct-ERIC R&D proposal, 15 000 €, project id: 3485
2019	GCS Supercomputer SuperMUC, Gauss Center for Supercomputing e.V. , project id: pn56ri

Miscellaneous

2025	Gordon Research Seminar on “Three-dimensional electron microscopy (3DEM)”, Chair
2024	EMBO Practical Course <i>In Situ Structural biology by Cryo-ET of FIB lamellae</i> , Course organizer
2022	Chair LMB-MPIB PhD Symposium, Cambridge, United Kingdom
2020-2021	PhD Representative Max-Planck-Institute for Biochemistry, Martinsried, Germany
2014-2016	Student council member, Faculty of Chemistry, Technical University of Munich, Garching, Germany

Memberships

Since 2023	Microscopy Society of America (MSA)
Since 2021	German Society for Molecular Biology and Biochemistry (Gesellschaft für Biochemie und Molekularbiologie)

Publications

1. Katzmeier, F., Aufinger, L., Dupin, A., Quintero, J., Lenz, M., Bauer, L., . . . Heymann, M. (2019). A low-cost fluorescence reader for in vitro transcription and nucleic acid detection with Cas13a. *PLOS ONE*, 14(12), e0220091. doi:10.1371/journal.pone.0220091
2. Schrepfer, P., Ugur, I., Klumpe, S., Loll, B., Kaila, V. R. I., & Bruck, T. (2020). Exploring the catalytic cascade of cembranoid biosynthesis by combination of genetic engineering and molecular simulations. *Comput Struct Biotechnol J*, 18, 1819-1829. doi:10.1016/j.csbj.2020.06.030
3. Gupta, T. K., Klumpe, S., Gries, K., Heinz, S., Wietrzynski, W., Ohnishi, N., . . . Engel, B. D. (2021). Structural basis for VIPP1 oligomerization and maintenance of thylakoid membrane integrity. *Cell*, 184(14), 3643-3659 e3623. doi:10.1016/j.cell.2021.05.011
4. Liu, Z., Gao, J., Cui, Y., Klumpe, S., Xiang, Y., Erdmann, P. S., & Jiang, L. (2021). Membrane imaging in the plant endomembrane system. *Plant Physiol*, 185(3), 562-576. doi:10.1093/plphys/kiaa040
5. Tacke, S., Erdmann, P., Wang, Z., Klumpe, S., Grange, M., Plitzko, J., & Raunser, S. (2021). A streamlined workflow for automated cryo focused ion beam milling. *J Struct Biol*, 213(3), 107743. doi:10.1016/j.jsb.2021.107743
6. Zinzula, L., Basquin, J., Bohn, S., Beck, F., Klumpe, S., Pfeifer, G., . . . Baumeister, W. (2021). High-resolution structure and biophysical characterization of the nucleocapsid phosphoprotein dimerization domain from the Covid-19 severe acute respiratory syndrome coronavirus 2. *Biochem Biophys Res Commun*, 538, 54-62. doi:10.1016/j.bbrc.2020.09.131
7. Zinzula, L., Beck, F., Klumpe, S., Bohn, S., Pfeifer, G., Bollschweiler, D., . . . Baumeister, W. (2021). Cryo-EM structure of the cetacean morbillivirus nucleoprotein-RNA complex. *J Struct Biol*, 213(3), 107750. doi:10.1016/j.jsb.2021.107750

McCafferty, C. L., Klumpe, S., Amaro, R. E., Kukulski, W., Collinson, L., & Engel, B. D. (2024). Integrating cellular electron microscopy with multimodal data to explore biology across space and time. *Cell*, 187(3), 563–584.
<https://doi.org/10.1016/j.cell.2024.01.005>