



**Karolinska  
Institutet**



**UNIVERSITÀ DEGLI STUDI DI MILANO**

October 20, 2024

*Via Festa del Perdono 7*

*20122 Milano, Italia*

*Ricercatore Tenure Track*

*s.c. 05/BIOS-07, ssd BIOS-07/A*

*Codice: 5629*

Dear University of Milan,

With great enthusiasm and excitement, I hereby apply for the position as **Tenure-Track Researcher (RTT)** within the Department of Medical Biotechnology and Translational Medicine with focus on the integration of multiscale imaging data for the study of biochemical mechanisms at the basis of cellular functions. As a trained biophysicist and molecular cell biologist with strong background in host-pathogen interactions and advanced microscopy techniques the advertised position matches perfectly with my scientific profile and my dream to establish an independent research group to decipher how host-pathogen interactions hijack the cellular machinery using an interdisciplinary approach at the intersection of biochemistry, physics, and medicine.

My research has always been driven by the curiosity of how life works on a molecular scale and how pathogens can manipulate this thin line between health and disease. During my biology studies and PhD in life sciences, I had the chance to acquire in-depth knowledge about super-resolution microscopy of microbes and biophysical techniques to study host-pathogen interactions across scales. As a postdoc at Karolinska Institutet, I developed new high-throughput screening platforms with translational potential improving pandemic preparedness. Furthermore, I was awarded the Marie Skłodowska-Curie postdoctoral fellowship and KI virus research grant to pursue my own scientific research questions in nano infection microbiology.

Emerging microbial pathogens, such as viruses, bacteria, and fungi are among the major challenges for humanity and their fast spread and adaptations demand for a comprehensive understanding of their precise molecular interactions with their host. Only recently, researchers start to understand the full complexity of molecular interactions between lipids, proteins, glycans, and nucleic acids and their physiological implications. Moreover, we do not have a clear picture how pathogens fine-tune fundamental parameters of physics within biological complex systems to decide over health and disease.

To overcome this bottleneck, my independent research group will develop new tools combining techniques of synthetic biology, molecular cell biology, advanced high-resolution microscopy, and biophysics to decipher hidden molecular interactions between proteins, lipids, glycans and nucleic acids of host and pathogen. In addition, my team will put special focus on understanding the role of glycocalyx components for host-virus interactions and explore its potential as a new drug target.

To perform this ambitious, translational, and highly interdisciplinary research project, the University of Milan is located within the perfect scientific landscape. The infrastructure and technology platforms of the campus will be priceless for my planned research and provide key expertise for this project and beyond.

Sincerely yours,

**Dr. Jan Schlegel**

**Dr. Jan Schlegel**

*Karolinska Institutet / SciLifeLab – Tomtebodavägen 23B – 171 65 Solna, Sweden*

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# Dr. Jan Schlegel

## Curriculum Vitae

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### Education

- Since 01/01/2023 **Marie Skłodowska-Curie Postdoctoral Fellow**, *Karolinska Institutet / SciLifeLab, Department of Women's and Children's Health*, Solna, Sweden.
- 01/07/2021 - 31/12/2022 **Postdoctoral Researcher**, *Karolinska Institutet / SciLifeLab, Department of Women's and Children's Health*, Solna, Sweden.
- 01/01/2021 - 31/06/2021 **Postdoctoral Researcher**, *Julius-Maximilians-University, Department of Biotechnology and Biophysics*, Würzburg, Germany.
- 01/01/2016 - 31/10/2020 **PhD Life Sciences**, *Julius-Maximilians-University, Department of Biotechnology and Biophysics*, Würzburg, Germany.
- 01/10/2013 - 12/11/2015 **Master of Science**, *Julius-Maximilians-University, Department of Biotechnology and Biophysics*, Würzburg, Germany.
- 01/10/2010 - 24/06/2013 **Bachelor of Science**, *Julius-Maximilians-University, Department of Cell and Developmental Biology*, Würzburg, Germany.

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### Postdoc II

- Title *Development of Biophysical High-Throughput Platforms for Host-Pathogen Interactions*
- Supervisor Prof. Erdinc Sezgin
- Description We developed two high-throughput platforms to study binding and biophysical properties of nanosized particles and pathogens. Subsequently, I was awarded the Marie Skłodowska-Curie fellowship to quantify nanoscale inter-leaflet asymmetry by combining expansion- and STED-microscopy.

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### Postdoc I

- Title *Super Resolution Microscopy of SARS-CoV-2 Infection*
- Supervisor Prof. Markus Sauer
- Description We studied the effect of ceramides on SARS-CoV-2 infected cells by combining CoronaFISH with structured-illumination microscopy.
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### PhD Thesis

Title	<i>Super-Resolution Microscopy of Sphingolipids and Protein Nanodomains</i>
Defence	11/12/2020
Supervisors	Prof. Markus Sauer, Dr. Ulrich Terpitz, Prof. Christian Wegener, Prof. Katrin Heinze
Description	In this work, we developed and characterized new super-resolution methods for the visualization of sphingolipids and protein nanodomains.
URL	<a href="https://opus.bibliothek.uni-wuerzburg.de/opus4-wuerzburg/frontdoor/deliver/index/docId/22959/file/Schlegel_Jan_Dissertation.pdf">https://opus.bibliothek.uni-wuerzburg.de/opus4-wuerzburg/frontdoor/deliver/index/docId/22959/file/Schlegel_Jan_Dissertation.pdf</a>

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### Masters Thesis

Title	<i>Analysis of the Internalization and Optogenetic Activation of a Rhodopsin-Tandemprotein in NG108-15 Cells by means of Fluorescence Microscopy</i>
Supervisors	Dr. Ulrich Terpitz & Prof. Markus Sauer
Description	In this work, we presented a new optogenetic tool which allows high spatiotemporal control of intracellular calcium levels by light.

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### Bachelor Thesis

Title	<i>Functional and Structural Characterization of Transmembrane Proteins in Cell Models</i>
Supervisors	Dr. Susanne Fenz & Prof. Markus Engstler
Description	In this work, we developed a biomimetic cell model consisting of endoplasmic reticulum derived giant proteoliposomes.

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## Collaborations

- Prof. Ilya Levental  
Molecular Physiology and Biological Physics, University of Virginia, USA
- Dr. Leo Hanke  
Department of Medicine, Karolinska Institutet, SWEDEN
- Dr. Elita Avota  
Institute for Virology and Immunobiology, University of Würzburg, GERMANY
- Prof. Oscar Fernandez-Capetillo  
Department of Medical Biochemistry and Biophysics, Karolinska Institutet, SWEDEN  
Genomic Instability Group, Spanish National Cancer Research Centre (CNIO), SPAIN
- Prof. Jürgen Seibel  
Institute for Organic Chemistry, University of Würzburg, GERMANY
- Prof. Markus Sauer  
Department of Biotechnology and Biophysics, University of Würzburg, GERMANY
- Prof. Gisou van der Goot  
Laboratory of Cell and Membrane Biology, École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND
- Prof. Hjalmar Brismar  
Biological Physics, KTH Royal Institute of Technology, SWEDEN
- Prof. Federico Pietrocola  
Department of Biosciences and Nutrition, Karolinska Institutet, SWEDEN

## Conferences and Workshops

- 1 -

September, 2024 **9th International Congress of the Molecular Biology Association of Turkey. İzmir, Turkey**  
**Poster:** "A Multiparametric and High-Throughput Platform for Host-Virus Binding Screens".

- 2 -

September, 2024 **EMBO Young Scientists' Forum. İzmir, Turkey**  
**Talk:** "A Multiparametric and High-Throughput Platform for Host-Virus Binding Screens".

- 3 -

July, 2024 **Distinguished Science Symposium - Max Planck Institute for the Science of Light. Erlangen, Germany**  
**Invited Talk:** "From molecules to pandemics: deciphering the biophysical code of host-virus interactions".

- 4 -

May, 2024 **International Membrane Biophysics Meeting - From Model Membranes to Cellular Membranes. Drübeck, Germany**  
**Talk:** "A Multiparametric and High-Throughput Platform for Host-Virus Binding Screens".

- 5 -

March, 2024 **SciLifeLab Workshop on Dynamical Microscopy. Stockholm, Sweden**  
**Talk:** "Lattice Light-Sheet Imaging".

- 6 -

January, 2024 **Microbiology meets Imaging - Rudolf Virchow Center. Würzburg, Germany**  
**Invited Talk:** "From Molecules to Pandemics: Deciphering the Biophysical Code of Host-Pathogen Interactions".

- 7 -

October, 2023 **FEBS Special Meeting 2023 - Sphingolipid Biology. Funchal, Madeira**  
**Flash Talk:** "A Multiparametric and High-Throughput Platform for Host-Virus Binding Screens".

- 8 -

August, 2023 **20th Smögen Summer Symposium on Virology. Smögen, Sweden**  
**Talk:** "A Multiparametric and High-Throughput Platform for Host-Virus Binding Screens".

- 9 -

January, 2022 **Biophysical Chemistry, Molecular Biology and Cybernetics of Cell Functions. Klosters, Switzerland**  
**Junior Talk:** "Multi-Parametric and High-Throughput Screening for Host-Virus Binding".

- 10 -

September, 2022 **Biomembrane Days. Berlin, Germany**  
**Poster:** "A Multi-Parametric and High-Throughput Screening for Host-Virus Binding".

- 11 -

December, **ASCB Cell Bio Virtual. Virtual**  
2021 **Poster and Talk:** "A Multi-Parametric and High-Throughput Screening for Host-Virus Binding".

- 12 -

September, **Single Molecule Spectroscopy and Super-resolution Microscopy in the Life Sciences.**  
2019 **Berlin, Germany**  
**Flash Talk:** "Super-resolution Microscopy of Sphingolipids in Health and Disease".

- 13 -

September, **EMBO Workshop: Lipid function in health and disease. Dresden, Germany**  
2019 **Poster:** "Super-resolution Microscopy of Sphingolipids in Health and Disease".

- 14 -

June, 2019 **Seminars in Lipid Signalling - SFB 1039. Frankfurt am Main, Germany**  
**Invited Talk:** "Super-resolution Microscopy of Sphingolipids in Health and Disease".

- 15 -

August, 2018 **Single Biomolecules. Cold Spring Harbor, New York, USA**  
**Poster:** "Investigating ceramide-dynamics in living cells by super-resolution microscopy".

- 16 -

January, 2018 **Biophysical Chemistry, Molecular Biology and Cybernetic of Cell Functions. Klosters, Switzerland**  
**Junior Talk:** "Characterization and visualization of ceramides with molecular resolution".

- 17 -

December, **3<sup>rd</sup> Meeting of the GRK 2098. Essen, Germany**  
2017 **Talk:** "Sphingolipids in Health and Disease"..

- 18 -

November, **CRISPR Genome Editing: Design & Strategy. Cambridge, United Kingdom.**  
2017

- 19 -

August, 2017 **7<sup>th</sup> Single Molecule Localization Microscopy Symposium. London, United Kingdom**  
**Poster:** "Characterization and Visualization of Ceramides with Molecular Resolution".

- 20 -

January, 2017 **Biophysical Chemistry, Molecular Biology and Cybernetic of Cell Functions. Klosters, Switzerland**  
**Poster:** "Super-resolution imaging of filamentous fungi".

- 21 -

September, ***Biophysics by the Sea. Alcúdia, Spain***

2016 **Poster:** "GPCR-mediated internalization of Channelrhodopsin enables optogenetic control of intracellular calcium concentration.

- 22 -

June, 2016 ***1<sup>st</sup> French Optogenetic Club. Institut Albert Bonniot. La Tronche, France***

**Talk:** "Optogenetic Control of Intracellular Calcium".

- 23 -

January, 2016 ***Biophysical Chemistry, Molecular Biology and Cybernetic of Cell Functions. Klosters, Switzerland***

**Poster Prize:** "GPCR-mediated internalization of Channelrhodopsin enables optogenetic control of intracellular calcium concentration".

## Leadership Roles

- Supervision: 2 PhD, 4 master and 3 bachelor students
- Reviewing: Biophysical Journal, Communication Biology, ACS Applied Bio Materials, Nanoscale Advances
- Public Engagement: Annually at Tekniska Museum, Highschool Students, Nerd Night Presentation
- Mentoring: 2 master students
- KI Postdoc Association: Community Building, Diversity & Inclusion
- Ambassador: KI Marie Skłodowska-Curie Bootcamp

## Academic Distinctions

- 2023 Marie Skłodowska-Curie Postdoctoral Fellowship
- 2022 KI Foundation for virus research grant
- 2020 Doctoral thesis graded with distinction *summa cum laude* on 11th December 2020
- 2016 Poster Prize: "GPCR-mediated internalization of Channelrhodopsin enables optogenetic control of intracellular calcium concentration"

## Further Education and Certificates

- 2017 Methods Course: CRISPR Genome Editing
- 2017 Scientific Writing
- 2017 Good Scientific Practice
- 2015 Methods Course: Flow Cytometry
- 2015 Methods Course: Mass Spectrometry
- 2015 Intercultural Competence
- 2013 iGEM

## Computer skills

- Basic HTML, ChemDraw, Gimp
- Intermediate PYTHON, L<sup>A</sup>T<sub>E</sub>X, OpenOffice, Linux, Microsoft Windows, Imaris, Origin, Statistical Analysis with R, GraphPad Prism, SnapGene, Inkscape
- Advanced Image Processing and Macro Programming with Fiji

## Languages

- Mother tongue **German**
- Advanced **English, Italian** *Con conversationally fluent*
- Basic **French, Swedish** *Basic words and phrases*

## Private Contact Details

Jan Schlegel  
Sveavägen 164B  
11346 Stockholm, Sweden  
Phone: +49 151 684 808 66  
Email: schlegel.jan@outlook.de

## List of Publications

## Under Review

1. Pablo Carravilla \*, Luca Andronico \*, Jan Schlegel \*, Yagmur B. Urem, Ellen Sjule, Franziska Ragaller, Florian Weber, Cenk O. Gurdap, Yavuz Asciglu, Taras Sych, Joseph Lorent, Erdinc Sezgin: "Measuring plasma membrane fluidity using confocal microscopy" *Under Review in Nature Protocols* 2024, \* equal contribution

## Preprints

1. Milka Doktorova \*, Jessica L. Symons \*, Xiaoxuan Zhang, Hong-Yin Wang, Jan Schlegel, Joseph H. Lorent, Frederick A. Heberle, Erdinc Sezgin, Edward Lyman, Kandice R. Levental, Ilya Levental: "Cell Membranes Sustain Phospholipid Imbalance Via Cholesterol Asymmetry" *bioRxiv*. 2023, doi: <https://doi.org/10.1101/2023.07.30.551157> \* equal contribution

## Peer-Reviewed Publications

1. Florian Weber, Sofii Iskarak, Franziska Ragaller, Jan Schlegel, Birgit Plochberger, Erdinc Sezgin, Luca A. Andronico: "VISION — an open-source software for automated multi-dimensional image analysis of cellular biophysics" *Journal of Cell Science*. 2024, doi: <https://doi.org/10.1242/jcs.262166>
2. Franziska Ragaller \*, Ellen Sjule, Yagmur Balim Urem, Jan Schlegel, Rojbin El, Dunja Urbancic, Iztok Urbancic, Hans Blom, Erdinc Sezgin: "Quantifying fluorescence lifetime responsiveness of environment-sensitive probes for membrane fluidity measurements" *The Journal of Physical Chemistry B*. 2024, doi: <https://doi.org/10.1021/acs.jpcc.3c07006>
3. Bartłomiej Porebski, Wanda Christ, Alba Corman, Martin Haraldsson, Myriam Barz, Louise Lidemalm, Maria Häggblad, Juliana Ilmain, Shane C. Wright, Matilde Murga, Jan Schlegel, Malin Jarvius, Maris Lapins, Erdinc Sezgin, Gira Bhabha, Volker M. Lauschke, Jordi Carreras-Puigvert, Miguel Lafarga, Jonas Klingström, Daniela Huhn, Oscar Fernandez-Capetillo: "Discovery of a novel inhibitor of macropinocytosis with antiviral activity" *Molecular Therapy*. 2024, doi: <https://doi.org/10.1016/j.ymthe.2024.06.038>
4. Thomas Klein \*, Julia Grüner \*, Maximilian Breyer, Jan Schlegel, Nicole Michelle Schottmann, Lukas Hofmann, Kevin Gauss, Rebecca Mease, Christoph Erbacher, Laura Finke, Alexandra Klein, Katharina Klug, Franziska Karl-Schöller, Bettina Vignolo, Sebastian Reinhard, Tamara Schneider, Katharina Günther, Julian Fink, Jan Dudek, Christoph Maack, Eva Klopocki, Jürgen Seibel, Frank Edenhofer, Erhard Wischmeyer, Markus Sauer, Nurcan Üçeyler: "Small fibre neuropathy in Fabry disease: a human-derived neuronal in vitro disease model and pilot data" *Brain Communications* 2024, doi: <https://doi.org/10.1093/braincomms/fcae095> \* equal contribution
5. Chiara Annunziata, Francesca Castoldi, Jan Schlegel, Hazel X. Ang, Mina Ristovska, Stefania Melini, Robert Welch, Christian G. Riedel and Federico Pietrocola: "A versatile method for the identification of senolytic compounds" *Cell Stress*. 2023, doi: 10.15698/cst2023.12.292
6. Taras Sych, Jan Schlegel, Hanna MG Barriga, Miina Ojansivu, Leo Hanke, Florian Weber, R Beklem Bostancioglu, Kariem Ezzat, Herbert Stangl, Birgit Plochberger, Jurga Laurencikiene, Samir El Andaloussi, Daniel Fürth, Molly M Stevens, Erdinc Sezgin: "High-throughput measurement of the content and properties of nano-sized bioparticles with single-particle profiler" *Nature Biotechnology*. 2023, doi: 10.1038/s41587-023-01825-5



7. Daniela Brenner \*, Nina Geiger \*, Jan Schlegel, Viktoria Diesendorf, Louise Kersting, Julian Fink, Linda Stelz, Sibylle Schneider-Schaulies, Markus Sauer, Jochen Bodem, Jürgen Seibel: "Azido-Ceramides, a Tool to Analyse SARS-CoV-2 Replication and Inhibition-SARS-CoV-2 Is Inhibited by Ceramides" *International Journal of Molecular Sciences*. 2023, doi: 10.3390/ijms24087281 \*equal contribution
8. Jan Schlegel, Bartłomiej Porebski, Luca Andronico, Leo Hanke, Steven Edwards, Hjalmar Brismar, Ben Murrell, Gerald M. McInerney, Oscar Fernandez-Capetillo, and Erdinc Sezgin: "A Multiparametric and High-Throughput Platform for Host–Virus Binding Screens" *Nano Letters*. 2023, doi: 10.1021/acs.nanolett.2c04884
9. Christine Sternstein, Jan Schlegel, Markus Sauer, Jürgen Seibel: "Bioorthogonal azido-S1P works as substrate for S1PR1" *Journal of Lipid Research*. 2023, doi: <https://doi.org/10.1016/j.jlr.2022.100311>
10. Nina Geiger \*, Louise Kersting \*, Jan Schlegel \*, Linda Stelz, Sofie Fähr, Viktoria Diesendorf, Valeria Roll, Marie Sostmann, Eva-Maria König, Sebastian Reinhard, Daniela Brenner, Sibylle Schneider-Schaulies, Markus Sauer, Jürgen Seibel, Jochen Bodem: "The Acid Ceramidase Is a SARS-CoV-2 Host Factor" *Cells*. 2022, doi: 10.3390/cells11162532 \*equal contribution
11. Sibylle Schneider-Schaulies, Fabian Schumacher, Dominik Wigger, Marie Schöl, Trushnal Waghmare, Jan Schlegel, Jürgen Seibel, Burkhard Kleuser: "Sphingolipids: Effectors and Achilles Heels in Viral Infections?" *Cells*. 2021, doi: 10.3390/cells10092175
12. Stephanie Haack, Sarah Baiker, Jan Schlegel, Markus Sauer, Tim Sparwasser, Daniela Langenhorst, Niklas Beyersdorf: "Superagonistic CD28 stimulation induces IFN- $\gamma$  release from mouse T helper 1 cells in vitro and in vivo" *European Journal of Immunology*. 2021, doi: 10.1002/eji.202048803
13. Simon Peters, Lena Kaiser, Julian Fink, Fabian Schumacher, Veronika Perschin, Jan Schlegel, Markus Sauer, Christian Stigloher, Burkhard Kleuser, Jürgen Seibel, Alexandra Schubert-Unkmeir: "Click-correlative light and electron microscopy (click-AT-CLEM) for imaging and tracking azido-functionalized sphingolipids in bacteria" *Scientific Reports*. 2021, doi: 10.1038/s41598-021-83813-w
14. Julian Fink \*, Fabian Schumacher \*, Jan Schlegel \*, Philipp Stenzel, Dominik Wigger, Markus Sauer, Burkhard Kleuser, Jürgen Seibel: "Azidosphinganine enables metabolic labeling and detection of sphingolipid de novo synthesis" *Organic & Biomolecular Chemistry*. 2021, doi: 10.1039/d0ob02592e \*equal contribution
15. Ralph Götz \*, Tobias C. Kunz \*, Julian Fink, Franziska Solger, Jan Schlegel, Jürgen Seibel, Vera Kozjak-Pavlovic, Thomas Rudel, Markus Sauer: "Nanoscale imaging of bacterial infections by sphingolipid expansion microscopy" *Nature Communications*. 2020, doi: 10.1038/s41467-020-19897-1 \*equal contribution
16. Esther Weiss \*, Jan Schlegel \*, Ulrich Terpitz, Michael Weber, Joerg Linde, Anna-Lena Schmitt, Kerstin Hünig, Lothar Marischen, Joachim Bauer, Claudia Löffler, Oliver Kurzai, Charles Oliver Morton, Markus Sauer, Hermann Einsele #, and Juergen Loeffler #. „Reconstituting NK Cells After Allogeneic Stem Cell Transplantation Show Impaired Response to the Fungal Pathogen *Aspergillus fumigatus*" *Frontiers in Immunology - Microbial Immunology*. 2020, doi: 10.3389/fimmu.2020.02117 \*equal contribution, # shared last authorship
17. Felix Wäldchen \*, Jan Schlegel \*, Ralph Götz, Michael Luciano, Martin Schnermann, Sören Doose, Markus Sauer: "Whole-cell imaging of plasma membrane receptors by 3D lattice light-sheet dSTORM" *Nature Communications*. 2020 \*equal contribution
18. Jan Schlegel, Markus Sauer: "Super-resolution microscopy of sphingolipids" *Methods in Molecular Biology* (Springer). 2020

19. Jan Schlegel, Simon Peters, Sören Doose, Alexandra Schubert-Unkmeir, Markus Sauer: "Super-Resolution Microscopy Reveals Local Accumulation of Plasma Membrane Gangliosides at *Neisseria meningitidis* Invasion Sites" *Frontiers in cell and developmental biology*. 2019;7:194. doi: 10.3389/fcell.2019.00194. PubMed PMID: 31572726
20. Simon Peters, Jan Schlegel, Jérôme Becam, Elita Avota, Markus Sauer, Alexandra Schubert-Unkmeir: "Neisseria meningitidis Type IV Pili Trigger  $\text{Ca}^{2+}$ -Dependent Lysosomal Trafficking of the Acid Sphingomyelinase To Enhance Surface Ceramide Levels." *Infection and Immunity*. 2019. doi: 10.1128/IAI.00410-19. PubMed PMID: 31160362.
21. Jérôme Becam, Tim Walter, Anne Burgert, Jan Schlegel, Markus Sauer, Jürgen Seibel, Alexandra Schubert-Unkmeir: "Antibacterial activity of ceramide and ceramide analogs against pathogenic *Neisseria*" *Scientific Reports*. 2017. doi: 10.1038/s41598-017-18071-w.
22. Sabrina Ziegler \*, Esther Weiss \*, Anna-Lena Schmitt, Jan Schlegel, Anne Burgert, Ulrich Terpitz, Markus Sauer, Lorenzo Moretta, Simona Sivori, Ines Leonhardt, Oliver Kurzai, Hermann Einsele & Juergen Loeffler: "CD56 is a pathogen recognition receptor on human natural killer cells" *Scientific Reports*, volume 7, Article number: 6138 (2017) \*equal contribution
23. Tim Walter \*, Jan Schlegel \*, Anne Burgert, Andreas Kurz, Jürgen Seibel, Markus Sauer: "Incorporation studies of clickable ceramides in Jurkat cell plasma membranes" *Chemical Communications*. 2017;53(51):6836–9. doi: 10.1039/c7cc01220a. PubMed PMID: 28597878. \*equal contribution
24. Anne Burgert, Jan Schlegel, Jérôme Becam, Sören Doose, Erhard Bieberich, Alexandra Schubert-Unkmeir, Markus Sauer: "Characterization of Plasma Membrane Ceramides by Super-Resolution Microscopy" *Angewandte Chemie*. 2017;56(22):6131–5. doi: 10.1002/anie.201700570. PubMed PMID: 28379629.
25. Katrin Feldbauer \*, Jan Schlegel \*, Juliane Weissbecker, Frank Sauer, Phillip G. Wood, Ernst Bamberg, Ulrich Terpitz: „Optochemokine Tandem for Light-Control of Intracellular  $\text{Ca}^{2+}$ " *PLoS ONE*. 2016;11(10):e0165344. doi: 10.1371/journal.pone.0165344. PubMed PMID: 27768773. \*equal contribution

## Overview of Previous Research and Teaching Activities

Throughout my studies I was intensively involved in teaching and research activities to acquire additional experiences in pedagogical methods and the transfer of knowledge. As a **research assistant** I supported students of biology, biomedicine, and medicine during their courses. I organized and prepared materials to enable consistent and successful courses and corrected the exams. During my studies I was involved in organizing and supervising the following detailed list of courses:

- Biotechnology
- Developmental Biology of Animals
- Physiology of Organisms: Neurophysiology
- Servicezentrum Innovatives Lehren und Studieren (ZILS)
- SFB/TR166
- SFB 1047: Insect Timing

Since I finished my bachelor studies ahead of time, I had the opportunity to perform an internship at the Max-Planck-Institute of Biophysics from June to September 2013 just before the beginning of my master studies. During that time I joined Frankfurt's international genetically engineered machine (**iGEM**) **competition** to train other students in molecular biology techniques and participate in the regional jamboree of Europe in Lyon, France.

During my postdoctoral period, I was frequently involved in **scientific outreach and public engagement events** to teach the public about science and transmit the fascination about scientific discoveries. Every year, I helped the Young Academy of Sweden to organize a public engagement event at Stockholm's Tekniska Museum to teach children about basic principles of fluorescence. Moreover, I participated in the "Nerd Night" event of the Biomedical Educational Section (BUS) of Karolinska Institutet to explain my research in an entertaining and understandable way to a mixed audience. As a MSCA ambassador, I shared my knowledge and experience on successful application for the prestigious Marie Skłodowska-Curie postdoctoral fellowship of Europe's Horizon Framework Programme to other applicants of Karolinska Institutet.

## Acquired Funding

- **Horizon Europe Framework Programme (HORIZON)**  
Call: HORIZON-MSCA-2021-PF-01  
Amount 206,887.68€  
Title: *Nanoscale Analysis of Symmetry and Molecular Membrane Topography*
- **KI Foundation for Virus Research 2022**  
Amount: 29,524SEK  
Title: *Identifying Biophysical Principles of the Glycocalyx to Inhibit Host-Virus Interaction*

## Summary of Scientific Achievements

During my **biology studies** in Würzburg (Bachelor & Master of Science) and **PhD under supervision of Prof. Markus Sauer**, I acquired in-depth knowledge about super-resolution microscopy, host-pathogen interactions and chemical biology tools. Because of my strong collaborative activity at the intersection of biology, physics and chemistry, I **contributed to 19 peer reviewed publications** in international recognized journals during this time. In December 2020, I successfully defended my PhD thesis "Super-Resolution Microscopy of Sphingolipids and Protein Nanodomains" with the best possible grade *summa cum laude*. My most important scientific findings from my PhD are:

- Identification of CD56 as a pathogen recognition receptor on natural killer cells against the pathogenic fungi *Aspergillus fumigatus*. <sup>1</sup>
- Enrichment and importance of gangliosides during *Neisseria meningitidis* infection. <sup>2</sup>
- Development of 3D dSTORM imaging using lattice light-sheet microscopy. <sup>3</sup>
- Development of new sphingolipid analogues for expansion microscopy <sup>4</sup> and metabolic labelling using bioorthogonal click-chemistry. <sup>5</sup>

After my PhD, I intensified my research on viruses and established a pipeline for 3D super-resolution microscopy of SARS-CoV-2 infected cells as postdoctoral researcher in the laboratory of Prof. Markus Sauer. To further increase the impact of my research on host-pathogen interactions and learn new synthetic biology tools, I started as a **postdoctoral researcher at the Karolinska Institutet** in Sweden, one of the world's foremost medical universities, in July 2021. **Under supervision of Prof. Erdinc Sezgin, I developed two high-throughput techniques to analyze nanosized particles** with focus on host-virus interactions and their biophysical properties. During this time, I already contributed to **8 manuscripts** (6x published peer-reviewed, 2x under review). Moreover, I was awarded the **Marie Skłodowska-Curie postdoctoral fellowship** to develop a super-resolution microscopy technique to directly visualize and quantify trans-bilayer lipid asymmetry. In addition, I received the **KI virus research grant** to investigate the effect of glycosylations on virus-host interactions.

In summary, I **contributed to 25 publications with more than 500 citations** in total, and **acquired international competitive funding** in the field of nanoscale host-pathogen interactions and demonstrated my presentation and communication skills with **active contribution at more than 19 international conferences**. During my postdoctoral research I **acquired profound leadership and supervision experience** by actively supervising 9 students (2x PhD, 4x Maser, 3x Bachelor), reviewing for recognized international journals, contributed regularly to public engagement events, mentored 2 master students, contributed in the KI postdoc association working groups "Community Building" and "Diversity and Inclusion", and served as ambassador for the KI Marie Skłodowska-Curie bootcamp. My most important scientific findings from my postdoctoral research are:

- Development of a high-throughput single-particle profiling method to study the content and biophysical properties of nanosized particles. <sup>6</sup>
- Development of a fast and robust high-throughput platform to study host-virus binding screens under well defined and controlled parameters. <sup>7</sup>

<sup>1</sup> *Sci Rep.*, doi: 10.1038/s41598-017-06238-4, (2017)

<sup>2</sup> *Front Cell Dev Biol.*, doi: 10.3389/fcell.2019.00194, (2019)

<sup>3</sup> *Nat Commun.*, doi: 10.1038/s41467-020-14731-0, (2020)

<sup>4</sup> *Nat Commun.*, doi: 10.1038/s41467-020-19897-1, (2020)

<sup>5</sup> *Org Biomol Chem*, doi: 10.1039/d0ob02592e, (2021)

<sup>6</sup> *Nat Biotechnol*, doi: 10.1038/s41587-023-01825-5, (2023)

<sup>7</sup> *Nano Lett.*, 10;23(9):3701-3707., (2023)

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