

CURRICULUM VITAE

Dr. rer. nat. Matthias Elgeti

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ACADEMIC APPOINTMENTS

- 3/2023
- present **Research Group Leader “Biomolecular EPR spectroscopy and signal transduction”**
Interdisciplinary Center for Bioinformatics, University of Leipzig, Leipzig, Germany
Institute for Drug Discovery, University of Leipzig Medical School, Leipzig, Germany
Institute for Medical Physics and Biophysics, University of Leipzig Medical School, Leipzig, Germany
- 7/2021
- 3/2023 **Assistant Research Professor & Principal Investigator**
Stein Eye Institute, University of California, Los Angeles
- 11/2018
- 6/2021 **Project Scientist**
Hubbell Laboratory, University of California, Los Angeles

EDUCATION & TRAINING

- 11/2013
- 11/2018 **Postdoctoral Training**, Hubbell Laboratory, University of California, Los Angeles
Elucidation of common structure/function relationships of GPCR signaling based on the rhodopsin model system by means of EPR spectroscopy.
- 11/2012
- 10/2013 **Postdoctoral Training**, Hofmann/Heck Laboratory, Charité – Universitätsmedizin Berlin
Development of a titration assay to determine binding affinities of conformational states in equilibrium.
- 11/2006
- 10/2012 **Ph.D. in Biophysics**, Humboldt Universität zu Berlin – *summa cum laude*
Advisors: Drs. KP Hofmann/ FJ Bartl. Thesis title: “*Spectroscopic investigations of visual rhodopsin*”
- 10/2005
- 9/2006 **Diploma in Physics** (minor in Mathematics), Freie Universität Berlin – *very good*
Advisor: Dr. M Heyn. Thesis title: “*Investigation of the effect of UV light on the conformation of light-activated rhodopsin.*”
- 2002 **Pre-diploma in Physics** (minor in Chemistry), Georg August Universität Göttingen

GRANTS, FELLOWSHIPS & AWARDS

- 1/2024
- 12/2027 **SFB 1423**, Collaborative Research Center
Principal Investigator, Total €280.000 (€70.000/year)
German Research Foundation
“The role of conformational dynamics for Y receptor activation”
- 10/2023
- 6/2027 **Hyp*Mol**, Transregional Collaborative Research Center, Principal Investigator
Total €265.000 (€70.000/year)
German Research Foundation
“Flavomaquettes with observer spin label for hyperpolarized EPR”
- 4/2021
-3/2023 **R01 GM137081**, Principal Investigator
Total \$1,599,000 (\$319.800/year), accepted for 2 years
National Institute of General Medical Sciences (NIGMS)
“Exploring the Conformational Landscape of G protein Coupled Receptors”
- 2018 **Travel Award**, 18th International Conference on Retinal Proteins
Toronto, Canada

- 2014 [Postdoctoral Research Fellowship](#), German Research Foundation (DFG),
 - 2015 “Developing a common framework of structure/function relationships for G protein coupled receptors using site-directed spin labeling and EPR-spectroscopy”.
- 2012 **Poster Prize**, 15th International Conference on Retinal Proteins
 Monte Verita – Ascona, Switzerland
- 2006 **Student Research Fellowship**, Charité - Universitätsmedizin Berlin
 “Time-resolved FTIR spectroscopy of rhodopsin deactivation”

SELECTED PUBLICATIONS (*co-first author, ‡corresponding author)

Zhao J, **Elgeti M**^{*‡}, O’Brien ES, Sár CP, El Daibani A, Heng J, Sun X, White E, Che T, Hubbell WL, Kobilka BK, Chen C. (2024) Ligand Efficacy Modulates Conformational Dynamics of the μ -Opioid Receptor. *Nature*, 1–7.

Khan F, **Elgeti M**^{*‡}; Grandfield S, Paz A, Marcoline FV, Wright EM, Grabe M, Hubbell WL, Abramson J (2023) Membrane Potential Increases Outward-facing Accessibility and Transport Rate of the Sodium-Glucose Transporter. *Nature Communications*, 14 (1), 7511.

Chen M, Kálai T, Cascio D, Bridges MD, Whitelegge JP, **Elgeti M**, Hubbell WL (2023) A Highly Ordered Nitroxide Side Chain for Distance Mapping and Monitoring Slow Structural Fluctuations in Proteins. *Applied Magnetic Resonance*.

Elgeti, M[‡] and Hubbell, WL. (2021) DEER Analysis of GPCR Conformational Heterogeneity. *Biomolecules*, 11:778.

Lerch, MT, Matt RA, Masureel M, **Elgeti M**, Kumar KK, Hilger D, Foy B, Kobilka BK, Hubbell WL (2020) Viewing Rare Conformations of the β_2 -Adrenergic Receptor with Pressure-Resolved DEER Spectroscopy. *Proceedings of the National Academy of Sciences of the U.S.A.* 117:31824–31.

McMahon C, Staus DP, Wingler LM, Wang J, Skiba MA, **Elgeti M**, Hubbell WL, Rockman HA, Kruse AC, Lefkowitz RJ (2020). Synthetic Nanobodies as Angiotensin Receptor Blockers. *Proceedings of the National Academy of Sciences of the U.S.A.* 117:20284–91.

Wingler LM, **Elgeti, M**^{*}, Hilger, D, Latorraca, NR, Lerch, MT, Staus, DP, Dror, RO, Kobilka, BK, Hubbell, WL, Lefkowitz, RJ (2019). Angiotensin Analogs with Divergent Bias Stabilize Distinct Receptor Conformations. *Cell* 176:468-78.

Elgeti, M[‡], Kazmin, R, Rose, AS, Szczepek, M, Hildebrand, PW, Bartl, FJ, Scheerer, P, Hofmann, KP (2018). The Arrestin-1 Finger Loop Interacts with Two Distinct Conformations of Active Rhodopsin. *The Journal of Biological Chemistry* 293:4403–10.

Kazmin R, Rose, AS, Szczepek, M, **Elgeti, M**, Ritter, E, Piechnick, R, Hofmann, KP, Scheerer, P, Hildebrand, PW, Bartl, FJ (2015). The Activation Pathway of Human Rhodopsin in Comparison to Bovine Rhodopsin. *The Journal of Biological Chemistry* 290:20117–27.

Sommer ME, **Elgeti, M**, Hildebrand, PW, Szczepek, M, Hofmann, KP, Scheerer, P (2015). Structure-Based Biophysical Analysis of the Interaction of Rhodopsin with G protein and Arrestin. *Methods in Enzymology* 556:563–608.

Szczepek, M, Beyrière, F, Hofmann, KP, **Elgeti, M**, Kazmin, R, Rose, AS, Bartl, FJ, von Stetten, D, Heck, M, Sommer, ME, Hildebrand, PW, Scheerer, P (2014). Crystal Structure of a Common GPCR-Binding Interface for G protein and Arrestin. *Nature Communications* 5:4801.

Rose AS, **Elgeti, M**, Zachariae, U, Grubmüller, H, Hofmann, KP, Scheerer, P, Hildebrand, PW (2014). Position of Transmembrane Helix 6 Determines Receptor G protein Coupling Specificity. *Journal of the American Chemical Society* 136:11244–7.

Elgeti, M[‡], Rose, AS, Bartl, FJ, Hildebrand, PW, Hofmann, KP, Heck, M (2013). Precision vs Flexibility in GPCR Signaling. *Journal of American Chemical Society* 135:12305–12.

Elgeti, M[‡], Kazmin, R, Heck, M, Morizumi, T, Ritter, E, Scheerer, P, Ernst, OP, Siebert, F, Hofmann, KP, Bartl, FJ (2011). Conserved Tyr223(5.58) Plays Different Roles in the Activation and G-protein Interaction of Rhodopsin. *Journal of the American Chemical Society* 133:7159–65.

Ritter E, **Elgeti, M**, Bartl FJ (2008). Activity Switches of Rhodopsin. *Photochemistry Photobiology* 84:911–20.

Elgeti, M, Ritter E, Bartl FJ (2008). New Insights into Light-Induced Deactivation of Active Rhodopsin by SVD and Global Analysis of Time-Resolved UV/Vis- and FTIR-Data. *Zeitschrift für Physikalische Chemie* 222:1117–29.

Ritter E, **Elgeti, M***, Hofmann KP, Bartl FJ (2007). Deactivation and Proton Transfer in Light-Induced Metarhodopsin II/Metarhodopsin III Conversion: A Time-Resolved Fourier Transform Infrared Spectroscopic Study. *The Journal of Biological Chemistry* 282:10720–30.

MANUSCRIPTS IN PREPARATION

Helabad MB, Belyaeva J, **Elgeti M**. Targeting Hidden Conformational States of the Type 1 Angiotensin II Receptor. *In preparation*

Elgeti M, Wingler LM, Lefkowitz RJ, Hubbell WL. Segmental Coupling in G protein Coupled Receptors Revealed by Pressure-Resolved DEER. *In preparation*

Elgeti M. The Affinity Framework of Molecular Efficacy. *In preparation*

INVITED TALKS (selection)

9/2024 *Studying membrane protein conformational dynamics using EPR spectroscopy and integrative modeling.*
45th FGMR Annual Meeting and Joint Conference of the German, Danish, Polish, and Swedish Magnetic Resonance Communities
University of Rostock, Germany

11/2022 *Exploring the conformational landscapes of G protein coupled receptors with EPR spectroscopy*
50th Middle German Magnetic Resonance Meeting
Leipzig University

11/2020 *GPCR conformational dynamics investigated by double electron-electron resonance (DEER)*
Institute for Drug Discovery (virtual)
Leipzig University

10/2019 *Structural underpinnings of biased agonism in G protein coupled receptors*
Symposium Collaborative Research Center 1078
Free University Berlin, Germany

9/2018 *A structure/function framework of GPCR activation based on the rhodopsin model*
18th International Conference on Retinal Proteins
Hockley Valley Resort, Toronto, Canada

1/2018 *Protein flexibility and its important role in signal transduction*
Basic Sciences Seminars
University of California, Los Angeles, United States

7/2015 *Precision vs. flexibility in GPCR signaling: A case study of visual rhodopsin*
"Unifying Concepts in Catalysis" Colloquium
Technical University Berlin, Germany

10/2012 *GPCR signaling investigated by FTIR spectroscopy*
15th International Conference on Retinal Proteins

Monte Verita – Ascona, Switzerland

- 10/2010 *Signal transfer from rhodopsin to its G protein: Insights from spectroscopic and structural studies*
14th International Conference on Retinal Proteins
University of California, Santa Cruz, United States
- 6/2010 *The different roles of Tyr223^{5.58} for the activation and G protein interaction of bovine rhodopsin*
Symposium Collaborative Research Center 498
Free University Berlin, Germany

TEACHING & MENTORING

- Summer 2024 Coordinator and lecturer „**Vom Wirkstoff zum Arzneimittel**“ (11-BCH-0815)
M. Sc. Biochemistry, Leipzig University Medical School
- Winter 2023/24 Coordinator and lecturer for laboratory course “**Inorganic chemistry BIO-103**”, B. Sc. Biology, University of Leipzig
- Summer 2023 Coordinator and lecturer for laboratory course „**Fluoreszenz-Spektroskopie**”
M. Sc. Pharmacy, Leipzig University Medical School
- Summer 2023 Lecturer for Scientific Module “**Integration of Experimental Data with Artificial Intelligence for the Investigation of Membrane Proteins**” <https://research.uni-leipzig.de/vanderbilt/>
- Summer 2023 Coordinator and lecturer „**Vom Wirkstoff zum Arzneimittel**“ (11-BCH-0815)
M. Sc. Biochemistry, Leipzig University Medical School
- Winter 2022/23 Lecture and laboratory course „**EPR Spektroskopie**“
Modul Strukturanalytik, B. Sc. Biochemistry
- Summer 2017 **Supervision of Undergraduate Student Research Project** (Chem99)
“*Conformational equilibria of a ligand-free GPCR investigated by EPR spectroscopy*”
University of California, Los Angeles
- Summer 2017 “**Entering Mentoring**” **Training Program**
University of California, Los Angeles
<https://bioscience.ucla.edu/ucla-entering-mentoring-training-program/>
- Spring 2017 **Course Development and Educational Leadership Training Program**
University of California, Los Angeles
<https://www.biomedpostdoc.ucla.edu/bioscience-postdoc-educational-leadership-program/>
- 11/2006 - 11/2012 **Teaching Assistant**, Biophysics (M.Sc. program)
Humboldt University Berlin
Biophysics of signal transduction (Laboratory course)
- 11/2006 - 05/2012 **Teaching Assistant**, Medical School
Charité – Universitätsmedizin Berlin
Introduction to experimental physics (Lecture and Laboratory course)
Maintenance of the online learning platform Blackboard
- 2011 **Author/Instructor**, www.chemgapedia.de
“*Analysis of a protein microswitch using FTIR difference spectroscopy*”
Course available online at www.chemgapedia.de (in German)

ACADEMIC SERVICE

9/2023 Organizing Committee [Hyp23](#) International Conference on Hyperpolarization.

Ad hoc reviewer:

Applied Magnetic Resonance

Biomolecules

Journal of Biological Chemistry

Journal of Physical Chemistry B

Molecules

Proceedings in the National Academy of Sciences of the U.S.A

eLife - Early Career Reviewer in Structural Biology and Molecular Biophysics