

Steffen Frey

Born 22. November 1982

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Academic Career

- since 2020 **Assistant Professor**, *University of Groningen, Scientific Visualization and Computer Graphics (SVCG)*
- 2014 – 2020 **Postdoctoral Researcher**, *University of Stuttgart, Visualization Research Center (VISUS)*
Visionary Postdoc, *Cluster of Excellence “Data-integrated Simulation Science” (SimTech)*
- 2008 – 2014 **Dr. rer. nat.**, *Stuttgart*, date of defense: 07.11.2014, Supervisor: Prof. Thomas Ertl, “Strategies for Efficient Parallel Visualization” (*summa cum laude*), GS SimTech
- 2010 & 12 **Visiting Researcher**, *University of California, Davis, USA*, Prof. Kwan-Liu Ma, VIDI Labs
- 2005 – 2006 **Study Abroad**, *University of Kansas, Lawrence, USA*, with Science Scholarship
- 2002 – 2008 **Dipl.-Inf.**, *University of Stuttgart*, Computer Science, thesis “GPU-based Cone Beam Reconstruction of Large CT Datasets” in collaboration with Daimler AG

Awards (see appendix for conference abbreviations)

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|------|--|------|---|
| 2023 | Best Paper , <i>EGPGV</i> [16] | 2019 | Winner , <i>VIS SciVis Contest</i> [32] |
| 2023 | Teacher of the Year 22/23 (CS) , Runner up | 2019 | Honorable Mention , <i>ISAV</i> [39] |
| 2022 | Best Paper , <i>EG (Education track)</i> [21] | 2019 | Best Paper , <i>EuroVis (Short)</i> [37] |
| 2020 | Best Paper , <i>LDAV</i> [30] | 2018 | Best Paper , <i>IV</i> [42] |

Funding / Principal Investigator (PI)

- 2017 & 21 & 25 **Visualization of Multi-field Processes in Porous Media (SFB 1313)**, *German Research Foundation (DFG); project D01 in Collaborative Research Center 1313 “Interface-Driven Multi-Field Processes in Porous Media – Flow, Transport and Deformation”, three funding periods (fp) for 4-year PhD student position & hardware, one co-PI from Stuttgart—fp 1: T. Ertl, €268700, fp 2: G. Reina, €285600, fp 3: G. Reina, €326400 (fp 3 decision pending, individual project grade: “Excellent”)*
- 2024 **Perception-action integration in brain-computer interfaces, robotic task planning, and adaptive visualization (FSE)**, *FSE Resarch Grant*, two 4-year PhD positions (€375000), with co-PIs A. Sburlea and H. Kazai, Note: this successful proposal is based in part on NWO VIDI Science 2022 submission “Cognitive Model-based Optimization of Visualization for Large Scientific Data” which was rejected after the interview stage (rating: Very Good)
- 2024 **Visual Data Science to Master Complex Simulation Ensembles (SimTech)**, *DFG; project in the SimTech Cluster of Excellence*, 2-year PhD student position, Contributed as one of three collaborative applicants, lead applicant: M. Sedlmair
- 2019 **Machine Learning for Data-driven Visualization (SimTech)**, *DFG; project in SimTech*, 2-year PhD student position
- 2019 **Quantifying Visual Computing Systems (SFB TRR 161)**, *DFG; project A02 in Transregional Collaborative Research Center 161 “Quantitative Methods for Visual Computing”, fp 2*, 4-year PhD student position, €307100, co-PI with T. Ertl
- 2017 **Model-based Visual Analysis of Large Spatio-Temporal Data**, *DFG; project in SimTech*, 2-year PhD student position, co-PI with T. Ertl

Funding / CSC PhD positions China Scholarship Council

- 2021,23-25 **supported proposals of Z. Yin, Y. Xu, J. Wang, C. Li**

Funding / Proposal Involvement

- 2018 **Data-Integrated Simulation Science (SimTech)**, *Participating Researcher*, proposal for a DFG Cluster of Excellence (EXC 2075), project network 6: Machine Learning for Simulation
- 2015 **Quantifying Visual Computing Systems**, *Co-Author*, project A02 in SFB TRR 161, €280200
- 2011 **MCSimVis: Many Core Simulation and Visualization**, *involvement in proposal for 4-year PhD student position*, funded by BMBF (German Federal Ministry of Education and Research), with industry partners INTES GmbH and science+computing AG

PhD Students / Supervisory Team

- since 2025 **D. Boerema**, *Neural Task Planning for Optimizing Visualization and Robot Interaction*, FSE
- since 2025 **O. Çağrı**, *Context-specific Grasping Control and Adaptive Visual Interfaces*, FSE
- since 2025 **C. Li**, *Multi-modal Medical Image Analysis and Visualization*, CSC, double-degree with University of Science and Technology Beijing (USTB)
- since 2024 **J. Wang**, *Data- and model-driven differentiable fluid simulation*, CSC, double-degree with USTB
- since 2022 **Z. Yin**, *3D Multimodal Registration and Visualization for Augmented Reality Guided Surgery*, CSC
- 2022-25 **Y. Xu**, *Smoothed Particle Hydrodynamics Simulation in Computer Graphics*, CSC, Defense: 21th January 2025, double-degree with USTB
- 2021-25 **H. Gadirov**, *Automatic Configuration of Scientific Visualization Systems using Optimization and Machine Learning*, Defense: 14th October 2025

PhD Students / Supervision Involvement

- 2020-25 **H. Tarner (Duisburg-Essen)**, *Interactive Evaluation and Contextualization of Software Performance*, co-examiner
- 2020-24 **A. Gupta (Dresden & MPI-CBG)**, *Interactive In Situ Visualization of Large Volume Data*
- 2021-25 **A. Straub (Stuttgart)**, *Visualization of Multiphase Flow at Interfaces*, SFB 1313
- 2018-19,25 **M. Heinemann (Stuttgart)**, *Interactive Visualization of Droplet Dynamic Processes*, SFB 1313
- 2018-20 **S. Scheller (Stuttgart)**, *unfinished*, SFB 1313
- 2017-22 **G. Tkachev (Stuttgart)**, *Prediction and Similarity Models for Visual Analysis of Spatiotemporal Data*, SimTech, co-examiner
- 2016-21 **V. Bruder (Stuttgart)**, *Performance quantification of visualization systems*, SFB TRR 161, co-examiner
- 2014-18 **O. Fernandes (Stuttgart)**, *unfinished*

Service / Conference & Journal Organization

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| since 2020 LDAV , Steering Committee | 2021 LDAV , Poster Chair |
| since 2024 JDSSV , Associate Editor | 2021 PacificVis , Poster Co-Chair |
| since 2024 LDAV , Symposium Chair | since 2020 EGPGV , Steering Committee |
| since 2023 EGPGV , Chair of Steering Committee | 2020 EGPGV , Symposium Chair |
| 2023 BigVis , Paper Chair | 2019 EGPGV , Program Co-Chair |
| 2022 & 23 LDAV , Paper Chair | 2018 QiVC , Poster Chair |
| 2022 & 23 PacificVis , <i>VisNotes Co-Chair</i> | since 2016 WOIV , Organizer |

Service / Program Committee

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| 2025 VIS (Uncertainty Workshop) | 2020 & 22 ICPR | 2018-2021 ISAV |
| 2021 & 25 VIS (Short Papers) | 2020 BigVis | 2018-21 VMV |
| since 2020 VisAI | 2019-22 VINCI | 2018-20 INFOCOMP |
| since 2019 SIBGRAP | 2018 & 23 SC | 2018 SC Asia |
| since 2018 VIS | 2018-23 SEAAA | 2017-20 EuroVis (Short Papers) |

2017-18 **ISC**
2016-21 **ISVC**

2016-21 **LDAV**
2016 & 17 **SA Asia Vis**

Service / Boards, Committees & Societies

- 2025 **CS program audit (RUG)**, *Teaching Staff Member*
- 2021 & 23 **Appointment Committee for Assistant Professors**, *Groningen*
- 2021-23 **Curriculum Committee Focus Group**, *Data track & Visual Computing, BSc CS (RUG)*
- since 2021 **Programme Committee Computing Science**, *Groningen*
- since 2020 **"Fachgruppe Visualisierung"**, *German Informatics Society*
- 2018-20 **Co-Speaker of task force "Software and data"**, *Stuttgart, SFB 1313*
- 2017 **Appointment Committee for SimTech Professorship in Machine Learning**, *Stuttgart*

Service / PhD Co-Examiner

- 2025 **Duisburg-Essen**, *H. Tärner*
- 2021 & 22 **Stuttgart**, *V. Bruder & G. Tkachev*
- since 2021 **Groningen**, *G. Hettinga, J. Wang, R. van Veen, F. Vernier, G. Swaroop & X. Wang*

Teaching / Courses in Groningen

- since 20/21 **Course**, *Algorithms and Data Structures in C*, BSc, 5 ECTS, Coordinator & Lecturer
- since 21/22 **Course**, *Scientific Visualization*, MSc, 5 ECTS, Coordinator & Lecturer
- since 21/22 **Course**, *Computer Graphics*, BSc, 5 ECTS, Second Evaluator
- since 21/22 **Course**, *Advanced Computer Graphics*, MSc, 5 ECTS, Second Evaluator
- since 24/25 **Course**, *Introduction to Computing Science*, BSc, 5 ECTS, Second Evaluator
- 20/21-23/24 **Course**, *Introduction to Computing Science*, Tutor

Teaching / Courses in Stuttgart (Co-Lecturer) Lectures & Seminars

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| SS 2015–20 | Lec , <i>Scientific Visualization</i> , MSc | WS 2017/18 | Sem , <i>Multifield Problems</i> , MSc/PhD |
| WS 2019/20 | Sem , <i>Advanced Rendering</i> , MSc | WS 2016/17 | Sem , <i>High-Performance Visualization</i> , MSc |
| SS 2019 | Sem , <i>Realistische Echtzeitgrafik</i> , BSc | WS 2015/16 | Sem , <i>Virtual Reality</i> , MSc |
| WS 2018/19 | Sem , <i>Particle Visualization</i> , MSc | WS 2015/16 | Lec , <i>Programming for Media CS</i> , BSc |
| SS 2018 & 19 | Lec , <i>Simulation Technology B</i> , MSc | SS 2015 | Sem , <i>SimTech</i> , MSc/PhD |
| WS 2017/18 | Sem , <i>Multifield Visualization</i> , MSc | | |

Teaching / BSc & MSc Students (since 2021, 1st and 2nd supervisor role)

- RUG **MSc**, *E. Waterink (1st, 2022), J. Boonstra (1st, 2022), S. Rouzbahani (1st, 2022), H. Stegenga (2nd, 2021), A. Feltham (1st, 2023), D. Boerema (1st, 2024), S. Bruin (2nd, 2022), J. M. van Eijk (2nd, 2025)*
- RUG **BSc**, *H. Stegenga (2nd, 2021), W. V. de la Houssaije [21, 17] (2nd, 2021), C. van Wezel [21, 17] (2nd, 2021), A. Thioux (1st, 2022), M. R. Westra (1st, 2022), P. J. Blok (2nd, 2022), R. Rosema (2nd, 2022), B. Yilmaz (2nd, 2022), J. R. van der Zwaag (2nd, 2022), L. van der Wal [6] (1st, 2023), T. Couperus (2nd, 2023), V. Gaya (2nd, 2023), T. de Vries (2nd, 2023), P. Blesinger [6] (1st, 2024), A. Georgiadou (2nd, 2024), I. Bodola (2nd, 2024), A. Aaen (2nd, 2024), C. Panagioutou (1st, 2025), C. N. Iacob (1st, 2025), J. Trooster (1st, 2025), P.-T. Mocanu (2nd, 2025), B. W. Robertson (2nd, 2025), A. van Smoorenburg (2nd, 2025), L. D. Grandis (1st, 2025)*
- RUG **MSc (Intern)**, *E. Waterink [27] (1st, 2021), A. Bredenbals (2nd, 2022), J. de Baat (1st, 2023), M. R. Westra (1st, 2023), S. J. Hilhorst (1st, 2023), L. Manuel (1st, 2024), T. Couperus (2nd, 2024), L. v. d. Wal (1st, 2025)*
- RUG **Honors College**, *A. Dibajeh (1st, 2022), E. Landsaat (1st, 2022), S. J. van Schagen (1st, 2022)*

Stuttgart **MSc**, A. Zeyfang (2021), M. Kleber (2025), N. Hauf (2025)

Invitations / Presentations

- 2024 **DEEA**, *Visualization of Large Spatio-Temporal Data Collections*
- 2024 **RUG Applied AI Symposium**, *Machine Learning for Large Data Visualization*
- 2024 **RUG Seminar on Computational and Numerical Mathematics**, *Methods and Design Approaches for Fluid Dynamics Visualization*
- 2023 **TU Eindhoven Visualization Seminar**, *Scientific Visualization from an Optimization Perspective*
- 2022 **BigVis**, *Visual Mapping, Comparison and Exploration of Large Multifield Data*
- 2021 **Pretty Porous Lecture Series (SFB 1313)**, *Visualization of Multifield Data — Layouts, Features, and Systems*
- 2017 **NVIDIA GTC**, *Fast Flow-based Distance Quantification and Interpolation for High-Resolution Density Distributions*
- 2017 **China-Germany Visualization Workshop**, *High Performance Visualization of Volume and Time Series Data*
- 2015 **ISC (Workshop)**, *Reduced Representations for In-Situ Visualization*
- 2014 **GI BDVC**, *Quantifying Visual Computing Systems*
- 2013 **ParCo (Workshop)**, *Parallel Interactive Visualization: Strategies and Examples*
- 2009 **NVIDIA GTC**, *Memory Saving Fourier Transform on GPUs*

Invitations / Other

- 2022 **Dagstuhl Seminar**, *Anticipatory Human-Machine Interaction*
- 2018 **Dagstuhl Seminar**, *In Situ Visualization for Computational Science*
- 2012 **High Performance Visualization: Enabling Extreme-Scale Scientific Insight**, *book chapter*

Professionalization and Training Courses

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|---|--|
| 2026 Academic Leadership , <i>registered</i> | 2021 Dutch Language
0>A1, A1>A2, A2>B1 |
| 2023 University Teaching Qualification (UTQ) | 2021 How to select PhD students |
| 2023 Coaching PhD students | 2021 ERC Starting and Consolidator |
| 2022 Vidi Grant Writing Training | |

Outreach

- 2025 **European Researchers' Night**, *Interactive Demonstration*, Presentation of VRT and WRT
- 2024 **Periodiek**, *Article*, Tursun, C., **Frey, S.**, Kosinka, J., "On Foveated Rendering," Periodiek, no. 1, 2024
- 2024 **Zpannend Zernike**, *Interactive Demonstration*, Presentation of Virtual Volume Raycaster (WRT)
- 2024 **European Researchers' Night**, *Interactive Demonstration*, Virtual Ray Tracer in VR
- 2023 **European Researchers' Night**, *Interactive Demonstration*, Virtual Ray Tracer (VRT)
- 2022 & 23 **Zpannend Zernike**, *Interactive Demonstration*, VRT
- 2022 **Zpannend Zernike**, *Interactive Demonstration*, Webtool for heat data visualization
- 2020 **"Pretty Porous—Alles Porös" Science Exhibition**, *Interactive Demonstrator*, Integrated porous media simulation and visualization at Planetarium Stuttgart, 18th June–30th August 2020

List of Publications

(peer-reviewed; corresponding conference talks indicated—presented by me unless otherwise noted)

- [1] Du, F., Zhang, Y., Ji, Y., Wang, X., Yao, C., Kosinka, J., **Frey, S.**, Telea, A., Ban, X., ``GaussFluids: Reconstructing Lagrangian Fluid Particles from Videos via Gaussian Splatting". In: *Pacific Graphics 2025*. to appear, Paper ID: 1342. 2025.

- [2] Frank, J., Straub, A., Shiber, S., Amini, P., Marcello, D. C., Diehl, P., Ertl, T., Sadlo, F., **Frey, S.**, ``Visualizing the Mass Transfer Flow in Direct-Impact Accretion". In: *Monthly Notices of the Royal Astronomical Society* (2025). to appear, Manuscript ID: MN-25-1515-MJ.R1.
- [3] **Frey, S.** ``AGri: Adaptive Thumbnails For Grid-based Visualizations". In: *Proceedings of the IEEE Visualization Conference (Short Papers)*. To appear, with talk at IEEE VIS 25. 2025.
- [4] Gadirov, H., Roerdink, J. B., **Frey, S.**, ``FLINT: Learning-based Flow Estimation and Temporal Interpolation for Scientific Ensemble Visualization". In: *IEEE Transactions on Visualization and Computer Graphics* (2025). with talk at IEEE VIS 2025 (H. Gadirov), pp. 1–16. doi: 10.1109/TVCG.2025.3561091.
- [5] Tarner, H., Gralka, P., Reina, G., Beck, F., **Frey, S.**, ``Visually Enriching and Comparing Runtime Performance of Visualization Pipelines". In: *Journal of Visualization* (2025). To appear, with talk at JapanVis 25.
- [6] Wal, L., Blesinger, P., Kosinka, J., **Frey, S.**, ``VVRT: Virtual Volume Raycaster". In: *EuroVis 2025 - Education Papers*. with talk at EuroVis 2025 (L. Wal, P. Blesinger), The Eurographics Association, 2025. doi: 10.2312/eved.20251021.
- [7] Wang, J., Wang, H., Wang, X., Zhang, Y., Kosinka, J., **Frey, S.**, Telea, A., Ban, X., ``Peridynamics-Based Simulation of Viscoelastic Solids and Granular Materials". In: *Proc. CASA/AniNex*. with talk at CASA 2025 (J. Wang), Springer, 2025.
- [8] Bauer, R., Ngo, Q. Q., Reina, G., **Frey, S.**, Sedlmair, M., ``Voronoi Cell Interface-Based Parameter Sensitivity Analysis for Labeled Samples". In: *Computer Graphics Forum* 44.3 (2025). doi: 10.1111/cgf.70122.
- [9] **Frey, S.** ``Sca2Gri: Scalable Gridified Scatterplots". In: *Computer Graphics Forum* 44.3 (2025). with talk at EuroVis 25. doi: 10.1111/cgf.70141.
- [10] Gadirov, H., Wu, Q., Bauer, D., Ma, K.-L., Roerdink, J., **Frey, S.**, ``HyperFLINT: Hypernetwork-based Flow Estimation and Temporal Interpolation for Scientific Ensemble Visualization". In: *Computer Graphics Forum* 44.3 (2025). with talk at EuroVis 2025 (H. Gadirov), doi: 10.1111/cgf.70134.
- [11] Shen, L., Zhang, Y., **Frey, S.**, Telea, A., Kosinka, J., Wang, X., Ban, X., ``Visual simulation of bone cement blending and dynamic flow". In: IEEE Computer Society, 2024, pp. 6226–6233. doi: 10.1109/BIBM62325.2024.10822238.
- [12] Zhang, Y., Long, S., Xu, Y., Wang, X., Yao, C., Kosinka, J., **Frey, S.**, Telea, A., Ban, X., ``Multiphase Viscoelastic Non-Newtonian Fluid Simulation". In: *Computer Graphics Forum* 43.8 (2024), e15180. doi: 10.1111/cgf.15180.
- [13] Straub, A., Karadimitriou, N., Reina, G., **Frey, S.**, Steeb, H., Ertl, T., ``Visual Analysis of Displacement Processes in Porous Media using Spatio-Temporal Flow Graphs". In: *IEEE Transactions on Visualization and Computer Graphics* 30.1 (2024). with talk at IEEE VIS 2023 (A. Straub), pp. 759–769. doi: 10.1109/TVCG.2023.3326931.
- [14] Bauer, R., Ngo, Q. Q., Reina, G., **Frey, S.**, Flemisch, B., Hauser, H., Ertl, T., Sedlmair, M., ``Visual Ensemble Analysis of Fluid Flow in Porous Media Across Simulation Codes and Experiment". In: *Transport in Porous Media* (2023). doi: 10.1007/s11242-023-02019-y.
- [15] Gupta, A., Günther, U., Incardona, P., Reina, G., **Frey, S.**, Gumhold, S., Sbalzarini, I. F., ``Efficient Raycasting of Volumetric Depth Images for Remote Visualization of Large Volumes at High Frame Rates". In: *2023 IEEE 16th Pacific Visualization Symposium (PacificVis)*. with talk at PacificVis 2023 (A. Gupta), 2023, pp. 61–70. doi: 10.1109/PacificVis56936.2023.00014.
- [16] Gupta, A., Incardona, P., Brock, A., Reina, G., **Frey, S.**, Gumhold, S., Günther, U., Sbalzarini, I. F., *Parallel Compositing of Volumetric Depth Images for Interactive Visualization of Distributed Volumes at High Frame Rates*. with talk at EGPGV 2023 (A. Gupta), The Eurographics Association, 2023. doi: 10.2312/pgv.20231082.
- [17] Wezel, C. S., Verschoore de la Houssaije, W. A., **Frey, S.**, Kosinka, J., ``Virtual Ray Tracer 2.0". In: *Computers & Graphics* 111 (2023), pp. 89–102. doi: 10.1016/j.cag.2023.01.005.
- [18] Bruder, V., Larsen, M., Ertl, T., Childs, H., **Frey, S.**, ``A Hybrid in Situ Approach for Cost Efficient Image Database Generation". In: *IEEE Transactions on Visualization and Computer Graphics* 29.9 (2023). with talk at IEEE VIS 2023, pp. 3788–3798. doi: 10.1109/TVCG.2022.3169590.
- [19] Tarner, H., Bruder, V., **Frey, S.**, Ertl, T., Beck, F., *Visually Comparing Rendering Performance from Multiple Perspectives*. with talk at VMV 2022 (H. Tarner), The Eurographics Association, 2022. doi: 10.2312/vmv.20221211.
- [20] Tkachev, G., Cutura, R., Sedlmair, M., **Frey, S.**, Ertl, T., ``Metaphorical Visualization: Mapping Data to Familiar Concepts". In: *Extended Abstracts of the 2022 CHI Conference on Human Factors in Computing Systems*. CHI EA '22. with talk at Alt.Chi (G. Tkachev), New York, NY, USA: Association for Computing Machinery, 2022, pp. 1–10. doi: 10.1145/3491101.3516393.

- [21] Verschoore de la Houssaije, W. A., Wezel, C. S. v., **Frey, S.**, Kosinka, J., *Virtual Ray Tracer*. with talk at Eurographics 2022)(C. Wezel), The Eurographics Association, 2022. doi: 10.2312/eged20221045.
- [22] **Frey, S.** ``Optimizing Grid Layouts for Level-of-Detail Exploration of Large Data Collections". In: *Computer Graphics Forum* 41.3 (2022). with talk at EuroVis 2022, pp. 247–258. doi: 10.1111/cgf.14537.
- [23] **Frey, S.**, Scheller, S., Karadimitriou, N., Lee, D., Reina, G., Steeb, H., Ertl, T., ``Visual Analysis of Two-Phase Flow Displacement Processes in Porous Media". In: *Computer Graphics Forum* 41.1 (2022), pp. 243–256. doi: 10.1111/cgf.14432.
- [24] Gadirov, H., Tkachev, G., Ertl, T., **Frey, S.**, ``Evaluation and Selection of Autoencoders for Expressive Dimensionality Reduction of Spatial Ensembles ". In: *ISVC '21: Proceedings of the 16th International Symposium on Advances in Visual Computing*. with talk at ISVC 2021)(H. Gadirov), Berlin, Heidelberg: Springer-Verlag, 2021, pp. 373–383. doi: 10.1007/978-3-030-90439-5_18.
- [25] Heinemann, M., **Frey, S.**, Tkachev, G., Straub, A., Sadlo, F., Ertl, T., ``Visual analysis of droplet dynamics in large-scale multiphase spray simulations". In: *Journal of Visualization* (2021). doi: 10.1007/s12650-021-00750-6.
- [26] Tkachev, G., **Frey, S.**, Ertl, T., ``S4: Self-Supervised learning of Spatiotemporal Similarity". In: *IEEE Transactions on Visualization and Computer Graphics* (2021), pp. 1–1. doi: 10.1109/TVCG.2021.3101418.
- [27] Waterink, E., Kosinka, J., **Frey, S.**, ``Visual Analysis of Popping in Progressive Visualization". In: *Smart Tools and Apps for Graphics - Eurographics Italian Chapter Conference*. Ed. by Patrizio Frosini, Daniela Giorgi, Simone Melzi, and Emanuele Rodolà. with talk at STAG 2021)(E. Waterink), The Eurographics Association, 2021. doi: 10.2312/stag.20211485.
- [28] Winter, D. A. M., Weishaupt, K., Scheller, S., **Frey, S.**, Raoof, A., Hassanizadeh, S. M., Helmig, R., ``The Complexity of Porous Media Flow Characterized in a Microfluidic Model Based on Confocal Laser Scanning Microscopy and Micro-PIV". In: *Transport in Porous Media* 136.1 (1, 2021), pp. 343–367. doi: 10.1007/s11242-020-01515-9.
- [29] **Frey, S.** ``Temporally Dense Exploration of Moving and Deforming Shapes". In: *Computer Graphics Forum* 40.1 (2021), pp. 7–21. doi: 10.1111/cgf.14092.
- [30] Frieß, F., Braun, M., Bruder, V., **Frey, S.**, Reina, G., Ertl, T., ``Foveated Encoding for Large High-Resolution Displays". In: *IEEE Transactions on Visualization and Computer Graphics* 27.2 (2021). with talk at LDAV 2020)(F. Frieß), pp. 1850–1859. doi: 10.1109/TVCG.2020.3030445.
- [31] Tkachev, G., **Frey, S.**, Ertl, T., ``Local Prediction Models for Spatiotemporal Volume Visualization". In: *IEEE Transactions on Visualization and Computer Graphics* 27.7 (2021). with talk at PacificVis 2020)(G. Tkachev), pp. 3091–3108. doi: 10.1109/TVCG.2019.2961893.
- [32] Schatz, K., Müller, C., Gralka, P., Heinemann, M., Straub, A., Schulz, C., Braun, M., Rau, T., Becher, M., **Frey, S.**, Reina, G., Sedlmair, M., Weiskopf, D., Ertl, T., Diehl, P., Marcello, D., Frank, J., Müller, T., ``2019 IEEE Scientific Visualization Contest Winner: Visual Analysis of Structure Formation in Cosmic Evolution". In: *IEEE Computer Graphics and Applications* (2020). doi: 10.1109/MCG.2020.3004613.
- [33] Schneider, M., Flemisch, B., **Frey, S.**, Hermann, S., Iglezakis, D., Ruf, M., Schembera, B., Seeland, A., Steeb, H., ``Datenmanagement im SFB 1313". In: *Bausteine Forschungsdatenmanagement* 1 (2020), pp. 28–38. doi: 10.17192/bfdm.2020.1.8085.
- [34] Childs, H., Ahern, S. D., Ahrens, J., Bauer, A. C., Bennett, J., Bethel, E. W., Bremer, P.-T., Brugger, E., Cottam, J., Dorier, M., Dutta, S., Favre, J. M., Fogal, T., **Frey, S.**, Garth, C., Geveci, B., Godoy, W. F., Hansen, C. D., Harrison, C., Hentschel, B., Insley, J., Johnson, C. R., Klasky, S., Knoll, A., Kress, J., Larsen, M., Lofstead, J., Ma, K.-L., Malakar, P., Meredith, J., Moreland, K., Navrátil, P., O'Leary, P., Parashar, M., Pascucci, V., Patchett, J., Peterka, T., Petruzza, S., Podhorszki, N., Pugmire, D., Rasquin, M., Rizzi, S., Rogers, D. H., Sane, S., Sauer, F., Sisneros, R., Shen, H.-W., Usher, W., Vickery, R., Vishwanath, V., Wald, I., Wang, R., Weber, G. H., Whitlock, B., Wolf, M., Yu, H., Ziegeler, S. B., ``A terminology for in situ visualization and analysis systems". In: *The International Journal of High Performance Computing Applications* 34.6 (1, 2020). Publisher: SAGE Publications Ltd STM, pp. 676–691. doi: 10.1177/1094342020935991.
- [35] Bruder, V., Müller, C., **Frey, S.**, Ertl, T., ``On Evaluating Runtime Performance of Interactive Visualizations". In: *IEEE Transactions on Visualization and Computer Graphics* (2019), pp. 1–1. doi: 10.1109/TVCG.2019.2898435.
- [36] Bruder, V., Kurzhals, K., **Frey, S.**, Weiskopf, D., Ertl, T., ``Space-time volume visualization of gaze and stimulus". In: *Proceedings of the 11th ACM Symposium on Eye Tracking Research & Applications*. ETRA '19. Denver, Colorado: Association for Computing Machinery, 2019. doi: 10.1145/3314111.3319812.

- [37] Bruder, V., Schulz, C., Bauer, R., **Frey, S.**, Weiskopf, D., Ertl, T., ``Voronoi-Based Foveated Volume Rendering". In: *EuroVis 2019 - Short Papers*. Ed. by Jimmy Johansson, Filip Sadlo, and G. Elisabeta Marai. The Eurographics Association, 2019. doi: 10.2312/evs.20191172.
- [38] Fernandes, O., **Frey, S.**, Reina, G., Ertl, T., ``Visual Representation of Region Transitions in Multi-dimensional Parameter Spaces". In: *Italian Chapter Conference 2019 - Smart Tools and Apps in computer Graphics, STAG 2019, Cagliari, Italy, November 14-15, 2019*. Ed. by Marco Agus, Massimiliano Corsini, and Ruggero Pintus. Eurographics Association, 2019, pp. 89–100. doi: 10.2312/STAG.20191367.
- [39] Rau, T., Gralka, P., Fernandes, O., Reina, G., **Frey, S.**, Ertl, T., ``The impact of work distribution on in situ visualization: a case study". In: *Proceedings of the Workshop on In Situ Infrastructures for Enabling Extreme-Scale Analysis and Visualization*. ISAV '19. Denver, Colorado, USA: Association for Computing Machinery, 2019, pp. 17–22. doi: 10.1145/3364228.3364233.
- [40] Tabiai, I., Tkachev, G., Diehl, P., **Frey, S.**, Ertl, T., Therriault, D., Lévesque, M., ``Hybrid image processing approach for autonomous crack area detection and tracking using local digital image correlation results applied to single-fiber interfacial debonding". In: *Engineering in Fracture Mechanics* 216 (2019), p. 106485. doi: 10.1016/j.engfracmech.2019.106485.
- [41] Zhang, H., **Frey, S.**, Steeb, H., Uribe, D., Ertl, T., Wang, W., ``Visualization of Bubble Formation in Porous Media". In: *IEEE Transactions on Visualization and Computer Graphics* 25.1 (2019), pp. 1060–1069. doi: 10.1109/TVCG.2018.2864506.
- [42] Bruder, V., Hlawatsch, M., **Frey, S.**, Burch, M., Weiskopf, D., Ertl, T., ``Volume-Based Large Dynamic Graph Analytics". In: *2018 22nd International Conference Information Visualisation (IV)*. 2018, pp. 210–219. doi: 10.1109/IV.2018.00045.
- [43] **Frey, S.** ``Spatio-Temporal Contours from Deep Volume Raycasting". In: *Comput. Graph. Forum* (2018). with talk at EuroVis 2018, doi: 10.1111/cgf.13438.
- [44] Frieß, F., Landwehr, M., Bruder, V., **Frey, S.**, Ertl, T., ``Adaptive Encoder Settings for Interactive Remote Visualisation on High-Resolution Displays". In: *2018 IEEE 8th Symposium on Large Data Analysis and Visualization (LDAV)*. 2018, pp. 87–91. doi: 10.1109/LDAV.2018.8739215.
- [45] Bruder, V., **Frey, S.**, Ertl, T., ``Prediction-based load balancing and resolution tuning for interactive volume raycasting". In: *Visual Informatics* (2017). doi: 10.1016/j.visinf.2017.09.001.
- [46] Bußler, M., Diehl, P., Pflüger, D., **Frey, S.**, Sadlo, F., Ertl, T., Schweitzer, M. A., ``Visualization of fracture progression in peridynamics". In: *Computers and Graphics* (2017). doi: 10.1016/j.cag.2017.05.003.
- [47] Diehl, P., Bußler, M., Pflüger, D., **Frey, S.**, Ertl, T., Sadlo, F., Schweitzer, M. A., ``Extraction of Fragments and Waves After Impact Damage in Particle-Based Simulations". In: *Meshfree Methods for Partial Differential Equations VIII*. Ed. by Michael Griebel and Marc Alexander Schweitzer. Cham: Springer International Publishing, 2017, pp. 17–34. doi: 10.1007/978-3-319-51954-8_2.
- [48] Fernandes, O., **Frey, S.**, Ertl, T., ``Transportation-based Visualization of Energy Conversion". In: *Proceedings of the 12th International Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications*. Springer, 2017. doi: 10.5220/0006098200520063.
- [49] **Frey, S.**, Ertl, T., ``Fast flow-based distance quantification and interpolation for high-resolution density distributions". In: *Proceedings of the European Association for Computer Graphics: Short Papers*. EG '17. with talk, Lyon, France: Eurographics Association, 2017, pp. 37–40. doi: 10.2312/egsh.20171009.
- [50] Scharnowski, K., **Frey, S.**, Raffin, B., Ertl, T., ``Spline-based decomposition of streamed particle trajectories for efficient transfer and analysis". In: *Proceedings of the European Association for Computer Graphics: Short Papers*. EG '17. Lyon, France: Eurographics Association, 2017, pp. 41–44. doi: 10.2312/egsh.20171010.
- [51] Tkachev, G., **Frey, S.**, Müller, C., Bruder, V., Ertl, T., ``Prediction of Distributed Volume Visualization Performance to Support Render Hardware Acquisition". In: *Eurographics Symposium on Parallel Graphics and Visualization*. The Eurographics Association, 2017. doi: 10.2312/pgv.20171089.
- [52] **Frey, S.**, Ertl, T., ``Progressive Direct Volume-to-Volume Transformation". In: *IEEE Trans. Visual. Comput. Graphics (SciVis 2016)* 23.1 (2017). with talk at IEEE VIS 2016, pp. 921–930. doi: 10.1109/TVCG.2016.2599042.
- [53] **Frey, S.** ``Sampling and Estimation of Pairwise Similarity in Spatio-Temporal Data Based on Neural Networks". In: *Informatics* 4.27 (2017). doi: 10.3390/informatics4030027.
- [54] Fernandes, O., **Frey, S.**, Ertl, T., ``Interpolation-Based Extraction of Representative Isosurfaces". In: vol. 10072. 2016, pp. 403–413. doi: 10.1007/978-3-319-50835-1_37.

- [55] Bruder, V., **Frey, S.**, Ertl, T., ``Real-time Performance Prediction and Tuning for Interactive Volume Raycasting". In: *SIGGRAPH ASIA 2016 Symposium on Visualization*. SA '16. Macau: ACM, 2016, 7:1–7:8. doi: 10.1145/3002151.3002156.
- [56] **Frey, S.**, Ertl, T., ``Auto-tuning intermediate representations for in situ visualization". In: *2016 New York Scientific Data Summit (NYSDS)*. 2016, pp. 1–10. doi: 10.1109/NYSDS.2016.7747807.
- [57] **Frey, S.**, Ertl, T., ``Flow-Based Temporal Selection for Interactive Volume Visualization". In: *Comput. Graph. Forum* (2016). presented at EuroVIS 2017. doi: 10.1111/cgf.13070.
- [58] Schulz, C., Nocaj, A., El-Assady, M., **Frey, S.**, Hlawatsch, M., Hund, M., Karch, G., Netzel, R., Schätzle, C., Butt, M., Keim, D. A., Ertl, T., Brandes, U., Weiskopf, D., ``Generative Data Models for Validation and Evaluation of Visualization Techniques". In: *Proceedings of the Sixth Workshop on Beyond Time and Errors on Novel Evaluation Methods for Visualization*. BELIV '16. Baltimore, MD, USA: ACM, 2016, pp. 112–124. doi: 10.1145/2993901.2993907.
- [59] Blom, D. S., Ertl, T., Fernandes, O., **Frey, S.**, Klimach, H., Krupp, V., Mehl, M., Roller, S., Sternel, D. C., Uekermann, B., Winter, T., Van Zuijlen, A. H., ``Partitioned Fluid-Structure-Acoustics Interaction on Distributed Data". In: *Software for Exascale Computing - SPPEXA 2013-2015*. Ed. by Springer. Vol. 113. Springer International Publishing, 2016, Pages267–291. doi: 10.1007/978-3-319-40528-5.
- [60] Fernandes, O., Blom, D. S., **Frey, S.**, Van Zuijlen, S. H., Bijl, H., Ertl, T., ``On In-Situ Visualization for Strongly Coupled Partitioned Fluid-Structure Interaction". In: *VI International Conference on Computational Methods for Coupled Problems in Science and Engineering*. 2015.
- [61] **Frey, S.**, Sadlo, F., Ertl, T., ``Balanced sampling and compression for remote visualization". In: *SIGGRAPH Asia 2015 Visualization in High Performance Computing*. SA '15. with talk, Kobe, Japan: Association for Computing Machinery, 2015. doi: 10.1145/2818517.2818529.
- [62] Panagiotidis, A., **Frey, S.**, Ertl, T., ``Exploratory Performance Analysis and Tuning of Parallel Interactive Volume Visualization on Large Displays". In: *EuroVis - Short Papers*. Ed. by E. Bertini, J. Kennedy, and E. Puppo. The Eurographics Association, 2015. doi: 10.2312/eurovisshort.20151118.
- [63] Fernandes, O., **Frey, S.**, Sadlo, F., Ertl, T., ``Space-time volumetric depth images for in-situ visualization". In: *2014 IEEE 4th Symposium on Large Data Analysis and Visualization (LDAV)*. 2014, pp. 59–65. doi: 10.1109/LDAV.2014.7013205.
- [64] **Frey, S.**, Sadlo, F., Ma, K.-L., Ertl, T., ``Interactive Progressive Visualization with Space-Time Error Control". In: *IEEE Transactions on Visualization and Computer Graphics* 20.12 (2014). with talk at VIS14, pp. 2397–2406. doi: 10.1109/TVCG.2014.2346319.
- [65] **Frey, S.**, Sadlo, F., Ertl, T., ``Mesh Generation From Layered Depth Images Using Isosurface Raycasting". In: *ISVC '13: Proceedings of the 9th International Symposium on Advances in Visual Computing*. with talk, Rethymnon, Crete, Greece: Springer-Verlag, 2013, pp. 373–383.
- [66] **Frey, S.**, Sadlo, F., Ertl, T., ``Explorable Volumetric Depth Images from Raycasting". In: *2013 XXVI Conference on Graphics, Patterns and Images*. with talk, 2013, pp. 123–130. doi: 10.1109/SIBGRAPI.2013.26.
- [67] **Frey, S.**, Reina, G., Ertl, T., ``SIMT Microscheduling: Reducing Thread Stalling in Divergent Iterative Algorithms". In: *2012 20th Euromicro International Conference on Parallel, Distributed and Network-based Processing*. with talk, 2012, pp. 399–406. doi: 10.1109/PDP.2012.62.
- [68] **Frey, S.**, Sadlo, F., Ertl, T., ``Visualization of Temporal Similarity in Field Data". In: *IEEE Transactions on Visualization and Computer Graphics* 18.12 (2012). with talk at IEEE VIS 2012, pp. 2023–2032. doi: 10.1109/TVCG.2012.284.
- [69] Ament, M., **Frey, S.**, Sadlo, F., Ertl, T., Weiskopf, D., ``GPU-Based Two-Dimensional Flow Simulation Steering using Coherent Structures". In: *Proceedings of the Second International Conference on Parallel, Distributed, Grid and Cloud Computing for Engineering*. 2011. doi: 10.4203/ccp.95.18.
- [70] **Frey, S.**, Ertl, T., ``Load balancing utilizing data redundancy in distributed volume rendering". In: *Proceedings of the 11th Eurographics Conference on Parallel Graphics and Visualization*. EGPGV '11. with talk, Llandudno, UK: Eurographics Association, 2011, pp. 51–60. doi: 10.5555/2386230.2386238.
- [71] **Frey, S.**, Schlömer, T., Grottel, S., Dachsbacher, C., Deussen, O., Ertl, T., ``Loose capacity-constrained representatives for the qualitative visual analysis in molecular dynamics". In: *2011 IEEE Pacific Visualization Symposium*. with talk, 2011, pp. 51–58. doi: 10.1109/PACIFICVIS.2011.5742372.

- [72] Panagiotidis, A., Kauker, D., **Frey, S.**, Ertl, T., ``DIANA: A Device Abstraction Framework for Parallel Computations". In: *Proceedings of the Second International Conference on Parallel, Distributed, Grid and Cloud Computing for Engineering*. Stirlingshire, United Kingdom: Civil-Comp Press, 2011. doi: 10.4203/ccp.95.20.
- [73] **Frey, S.**, Ertl, T., ``PaTraCo: A Framework Enabling the Transparent and Efficient Programming of Heterogeneous Compute Networks". In: *Eurographics Symposium on Parallel Graphics and Visualization*. Ed. by James Ahrens, Kurt Debattista, and Renato Pajarola. with talk, The Eurographics Association, 2010. doi: 10.2312/EGPGV/EGPGV10/131-140.
- [74] Kauker, D., Sanftmann, H., **Frey, S.**, Ertl, T., ``Memory Saving Discrete Fourier Transform on GPUs". In: *2010 10th IEEE International Conference on Computer and Information Technology*. 2010, pp. 1152-1157. doi: 10.1109/CIT.2010.209.
- [75] Üffinger, M., **Frey, S.**, Ertl, T., ``Interactive High-Quality Visualization of Higher-Order Finite Elements". In: *Computer Graphics Forum* 29.2 (2010), pp. 337-346. doi: 10.1111/j.1467-8659.2009.01603.x.
- [76] **Frey, S.**, Ertl, T., ``Accelerating Raycasting Utilizing Volume Segmentation of Industrial CT Data". In: *Theory and Practice of Computer Graphics*. Ed. by Wen Tang and John Collomosse. with talk at TPCG09, The Eurographics Association, 2009. doi: 10.2312/LocalChapterEvents/TPCG/TPCG09/033-040.
- [77] **Frey, S.**, Müller, C., Strengert, M., Ertl, T., ``Concurrent CT Reconstruction and Visual Analysis Using Hybrid Multi-resolution Raycasting in a Cluster Environment". In: *Proceedings of the 5th International Symposium on Advances in Visual Computing: Part I*. ISVC '09. with talk, Las Vegas, Nevada: Springer-Verlag, 2009, pp. 357-366. doi: 10.1007/978-3-642-10331-5_34.
- [78] Müller, C., **Frey, S.**, Strengert, M., Dachsbacher, C., Ertl, T., ``A Compute Unified System Architecture for Graphics Clusters Incorporating Data Locality". In: *IEEE Transactions on Visualization and Computer Graphics* 15.4 (2009), pp. 605-617. doi: 10.1109/TVCG.2008.188.

Appendix: Conference & Journal Abbreviations

Abbreviation	Full Name
BigVis	Workshop on Big Data Visual Exploration and Analytics
EuroVis	Eurographics/IEEE Symposium on Visualization
EG	Conference of the European Association for Computer Graphics
EGPGV	Eurographics Symposium on Parallel Graphics and Visualization
ICPR	International Conference on Pattern Recognition
INFOCOMP	International Conference on Information and Computing Science
ISC	International Supercomputing Conference
ISAV	In Situ Infrastructures for Enabling Extreme-Scale Analysis and Visualization
ISVC	International Symposium on Visual Computing
IV	International Conference on Information Visualisation
JDSSV	Journal of Data Science, Statistics, and Visualization
LDAV	IEEE Symposium on Large Data Analysis and Visualization
PacificVis	IEEE Pacific Visualization Symposium
QiVC	International Conference on Quantification in Visual Computing
SA Asia Vis	SIGGRAPH Asia Visualization / Asia Visualization Workshop
SC	International Conference for High Performance Computing, Networking, Storage and Analysis
SC Asia	Supercomputing Asia Conference
SEAAA	EUROMICRO Conference on Software Engineering and Advanced Applications
SIBGRAPI	Conference on Graphics, Patterns and Images
VIS	IEEE Visualization Conference
VisAI	Workshop on Visualization for AI Explainability
VINCI	International Symposium on Visual Information Communication and Interaction
VMV	Vision, Modeling, and Visualization
WOIV	International Workshop on In Situ Visualization