# Olaf Schenk CV

## 1. Personal information


| | | |
|---|---|---|
| Università della Svizzera italiana (USI) | Email: | olaf.schenk@usi.ch |
| Faculty of Informatics | Phone: | +41 58 666 4850 |
| Via Giuseppe Buffi 13, 6900 Lugano, Switzerland | Research Webpage: | http://usi.to/ovv |
| Nationality: German | ORCID: | 0000-0001-8636-1023 |


## 2. Education & Scientific degree

| | | |
|---|---|---|
| University of Basel | Computer Science & Mathematics | Habilitation, 01/2010 |
| Swiss Fed. Inst. of Technology Zurich | Information Technology & Electrical Eng. | Ph.D., 01/1996 – 06/2001 |
| Karlsruhe Institute of Technology, Germany | Mathematics | Diploma, 10/1990–12/1995 |

## 3. Employment history

| | | |
|---|---|---|
| USI | Full Professor | 09/2016 – present |
| Panua Technologies | Director | 09/2022 – present |
| ETH Zurich | External Lecturer | 01/2020 – 09/2024 |
| Swiss National Supercomputing Centre, ETH Zurich | Advisory Position (10%) | 09/2012 – 12/2023 |
| USI | Associate Professor | 01/2012 – 08/2016 |
| University of Basel | Senior Research Associate | 01/2006 – 12/2011 |
| IBM Thomas Watson Research Center, Yorktown, USA | Postdoctoral Fellow | 01/2005 – 12/2005 |
| University of Basel | Postdoctoral Fellow | 04/2001 – 12/2004 |

## 4. Institutional responsibilities (committee member, unless stated differently, subset)

- USI: Director of *Institute of Computing* (since 09/2024), Director of *Data Science M.S. Program* (since 09/2026), Director of *Computational Science M.S. Program* (09/2015 - 08/2026), Director of *Informatics Ph.D. Program* (09/2016 - 08/2019), *Committee member M.S. Programs* (since 09/2018), *Faculty Hiring Committee* (08/2016 – 10/2017); University of Basel: *Committee member BSc program on CSE* (01/2005 – 12/2011).

## 5. Ongoing research projects, previous SNF and other projects, and own budget (subset)

In 14 years at USI, my funding requests have been awarded over 6M CHF including: SNF, DFG, Innosuisse, Platform for Advanced Scientific Computing (PASC), EU-FP7, and industrial funding. Full list of project is available at http://usi.to/ovv. Here is a selected subset:

| | | | |
|---|---|---|---|
| Next-Generation Anticipatory Intelligence for Power Markets | Innosuisse | 09/2026 - 08/2028 | 605K $ |
| Numerical Algorithms, Frameworks, and Scalable Technologies for Extreme-Scale Computing | SNF | 09/2023 - 12/2026 | 590K CHF |
| EUMaster4HPC - European Master for HPC | EU | 01/2023 - 12/2026 | 37K CHF |
| Next HPC generation of approximate Bayesian inference | KAUST | 07/2020 - 06/2023 | 405K $ |
| Can economic policy mitigate climate-change? | SNF | 12/2019 - 11/2023 | 247K CHF |
| Big data driven controls and performance assessment | Innosuisse | 07/2019 - 06/2020 | 47K CHF |
| High performance balanced graph partitioning | SNF | 04/2019 - 03/2023 | 247K CHF |
| Heterogeneous agent models on HPC platforms | PASC | 07/2017 - 06/2020 | 150K CHF |
| Future Swiss electrical infrastructure | Innosuisse | 07/2017 - 12/2020 | 390K CHF |
| Dual-phase steels - from micro to macro properties | SNF/DFG | 01/2016 - 12/2018 | 178K CHF |
| PASC16 conference | SNF | 06/2016 - 09/2016 | 16K CHF |
| Extreme-scale electrothermal simulations of nano-devices | SNF | 04/2014 - 03/2017 | 178K CHF |
| Exascale algorithms and advanced comput. techniques | EU-FP7 | 10/2013 - 09/2016 | 299K € |
| Frequency-domain full-waveform inversion | SNF | 06/2010 - 05/2012 | 229K CHF |

**6. Supervision of junior researchers**

Since 2012 I advised 4 Postdocs, 15 PhD students, 30 MSc students, 10 BSc students, and served on the committee of 5 PhD students (external member) and 12 PhD students (internal member). Below is a sublist of advised internal PhD students: Alberto Finardo (2026-), Lorenzo Migliari (2025-), Daniel Vega (2024-), Malik Lechekhab (PhD 2024), Tim Holt (PhD 2024), L. Gaedke-Merzhäuser (PhD 2024), D. Pasadakis (PhD 2023), A. Eftekhari (PhD 2021), R. Janalik (PhD 2021), J. Kardos (PhD 2020), F. Verbosio (PhD 2018), M. Rietmann (PhD 2015), J. Huber (PhD 2013), M. Sathe (PhD 2012), M. Christen (PhD 2012). Most of my PhD and postdoctoral students are now working in the Swiss industry in companies such as EY, Disney Research, NVIDIA, Google, DXT, CSCS.

**7. Teaching activities (summary since 2012)**

I am offering the following core courses within the Bachelor of Computational Science & Engineering at ETH Zurich, the Master of Computational Science, the Master of Financial Technology and Computing, the Master of Artificial Intelligence, the Master of Informatics at USI: HPC Lab (ETH Zurich), Numerical Computing (USI), High Performance Computing (USI), Software Atelier: Simulation, Data Science & Computing (USI), Effective HPC & Data Analytics (USI, CSCS/ETH).

**8. Memberships in panels and boards, individual scientific reviewing activities (subset)**

- Associate editor ACM Transactions on Mathematical Software (since 2019), SIAM Journal on Scientific Computing (2012-2017), Guest Editor Special Issue Parallel Computing (2012, 2014, 2016, 2018)
- SIAM/ACM/IEEE Service: Editor-in-Chief Reappointment Committee for Computing in Science and Engineering (IEEE CiSE) (2019), Committee Chair SIAM/SC Career Prize (2018), Committee Chair SIAM SIAG/CSE Best Paper Prize (2018), Committee Chair SIAM SIAG/SC Best Paper Prize (2016).
- Advisory Boards: Computational Engineering M.S. at University of Erlangen-Nuremberg, Germany (since 2018), Swiss Platform for Advanced Scientific Computing Core Program (PASC) (since 2017), Project Leadership Team of PASC (2012–2016), Board Member Swiss SCCER Future Swiss Electrical Infrastructure (since 2013), International evaluation committee member Technical University of Ostrava (2020).
- Grant reviewer SNSF, ERC, PRACE, DFG, Gauss Centre, Belgium Research Foundation, ETH Zurich, Czech Science Foundation, French National Research Agency, FAU.

**9. Active memberships in scientific societies**

- SIAM Fellow (Class of 2020), ACM, ACM SIGHPC (Special Interest Group in High Performance Computing), Senior member IEEE, IEEE Computer Society.

**10. Organization of conferences (subset)**

- General Chair: SIAM Conference on Parallel Processing for Scientific Computing (2018, 700 pp.), ACM Platform for Advanced Scientific Computing Conference (2015, 250 pp.; 2016, 300 pp.; 2017, 350 pp.), International Workshop on Parallel Matrix Algorithms&Applications (2010-2018; $\sim$150 pp.).
- Conference Steering Committees: ACM PASC (2018-), SIAM/SIAG SC Paper Proceedings (2019-).

I served on over 100 program committees of conferences over the last ten years including all major conferences on applied/industrial mathematics and computing such as SIAM PP (2014-2026), IEEE International Parallel & Distributed Processing Symposium (2010, 2014, 2016-2026), ACM/IEEE Conference on High Performance Computing, Networking, Storage and Analysis SC (2008-2026).

**11. Prizes, awards, fellowships, and honors**

- SIAM Fellow (Class of 2020), recognized for advances in the development of robust parallel sparse matrix algorithms and their effective use in large-scale science and engineering applications.
- Research awards: Innovative and Novel Computational Impact of Theory and Experiment (INCITE) DOE Leadership Computing Award with Prof. J. Tromp (Princeton) (2013, 2014), IBM Faculty Award (2007).
- SIAM SIAG/SC Best Paper Award (2024), IEEE HPEC Best Paper Award (2023, 2024), IEEE Best Poster Award (2025), IEEE SDS Best Poster Award (2024)
- Honor: SIAM SIGEST Honor with Prof. M. Bollhöfer (TUB) and Prof. Römer (Univ. Warwick) (2008).
- SIAM Chair (2020-2021), Vice-Chair (2018-2019), and Program Director (2016-2017) of the SIAM special interest group on supercomputing. Nominated by a committee, elected by all SIAM members.
- SIAM Chair (2020-2021), Vice-Chair (2018-2019), and Program Director (2016-2017) of the SIAM special interest group on supercomputing. Nominated by a committee, elected by all SIAM members.

# Major Scientific Achievements

O. Schenk is an internationally visible and recognized expert of high-performance algorithms for scientific computing. He has performed research in various renowned places as ETH Zurich, IBM Thomas Watson Research Center, KIT, and other Swiss universities (University of Basel, USI). He is leading research projects in developing numerical algorithms and libraries for large-scale parallel machines. His research concerns algorithmic and architectural problems in the field of computational mathematics, scientific computing, and HPC with a strong emphasis on applications in computational science and data analytics. He is particularly interested in computational mathematics, as well as software for computational science and data analytics applications on emerging HPC architectures. To this end, his research connects several relevant subfields of computer science with the needs of computational science and HPC. He drives research toward extreme-scale computing in computational algorithms, application software, programming, and software tools. The results of this work are typically integrated into scientific codes that demonstrate the application-targeted use of these algorithms and programming models. The goal of his research is to make advances both in algorithmic design and in programming models to tackle what will otherwise be a series of major obstacles to using crucial components of many scientific codes at exascale, namely, sparse matrix solvers, parallel nonlinear optimization solvers, finite-element solvers, and their constituents. Below, some of his research contributions are highlighted for the period 2020–2026 and some unique and important research aspects will be addressed.

## Computational Mathematics

The first major research innovation was the design and implementation of novel sparse **selected inversion factorization algorithm** published and used e.g. in J14, J17, and applied to various applications from statistics J5 and nanoelectronics device simulation in C11, C14. He is the principal author of the sparse direct solver software PARDISO, which is a high-performance, robust, and easy to use software package for solving large sparse systems of linear equations. The software is used by thousands of users on a daily basis. A previous version is part of Intel's Mathematical Kernel Library (MKL) since 2006 and the solver is not only used by leading open-source CSE software packages such as Trilinos (from Sandia National Laboratories), and PETSc (from Argonne National Laboratory), but also by leading commercial CSE companies such as Ansys, Comsol, and CST. As part of Intel's MKL, the software is now installed on almost all supercomputing architectures from the TOP500 list. The selected inversion **HPC software** can be used as a serial package, in a shared-memory multiprocessor environment, or as a scalable parallel solver in a message-passing environment, where each MPI process can either be serial or multithreaded.

He also recently initiated a connection to data analytics to advance the popular data-analytics R-INLA package J5 that provides a tool for computationally **efficient Bayesian modeling**. The swift uptake of this framework for Bayesian modeling is rooted in the computational efficiency of the approach and catalyzed by the growing demand in the Big Data era. It has also been used to extend a large study published in *Nature*,

which concludes that fighting malaria in Africa has prevented nearly 700 million cases since 2000 (Bhatt et al., 2015). The study based on R-INLA made it to the **BBC News**[1] where the director general of the **World Health Organisation** (WHO), Dr. Margaret Chan, was interviewed and commented on it.

## Scientific Computing and High-dimensional Datasets

In terms of applied mathematics and computational finance, he recently started to analyse the problem of estimating sparse inverse covariance matrices for high-dimensional datasets using the regularized Gaussian maximum likelihood method. This problem is particularly challenging as the required computational resources increase superlinearly with the dimensionality of the dataset. In J9, he introduced a performant and scalable algorithm which builds on the current advancements of second-order, maximum likelihood methods. The routine leverages the intrinsic parallelism in the linear algebra operations and exploits the underlying sparsity of the problem. Numerical examples conducted on a 5,320 node Cray XC40 system at the Swiss National Supercomputing Center show that, in comparison to the state-of-the-art algorithms, the proposed routine provides significant strong-scaling speedup with almost ideal scalability up to thousand of computing nodes. The developed framework is used to approximate the **sparse inverse covariance matrix** for synthetic datasets with up to 100 million dimensions. Details on sparse inverse covariance matrices can be found in the papers in J6, J9, J18, J19.

## Extreme Scale High-Performance Computing

In many application areas, there is a great interest in solving **nonlinear optimization** problems of extremely large sizes. For example, if the constraints of the problem correspond to discretized PDEs, then the accuracy of a solution with respect to this infinite-dimensional problem is directly related to the size of the largest discrete approximate problem that can be solved. The storage and factorization of explicit derivative matrices is intractable, so researchers and practitioners are often forced to seek alternatives to existing optimization techniques. The recent extension of **interior point optimization solvers** for large-scale nonconvex optimization problems can be considered as another important research contribution. These optimization algorithms are matrix-free since they do not require the factorization of derivative matrices. Instead, they use iterative linear system solvers, but they can still handle nonconvexity in the optimization problem. Within this context, he recently proposed with my colleagues from Argonne National Laboratory in B1, J1, a scalable software framework for solving two-stage stochastic optimization problems under an uncertainty paradigm. The stochastic programming requires thousands of simultaneous scenarios, giving problems with billions of variables that need to be solved in an operationally defined time interval. The large-scale numerical experiments performed on the "Titan" XK7 machine from Oak Ridge National Laboratory and "Piz Daint" XC30 machine from the Swiss National Supercomputing Centre show that the developments in B1, C1 make it possible to solve realistically sized examples from power grid control with thousands of scenarios in times that are considerably under one hour. To the best of his knowledge, this was not possible prior to the research summarized in B1. These techniques are now used within the DOE Exascale Project "ExaSGD – Optimizing Stochastic Grid Dynamics at Exascale" which is one of the application projects in the US Exascale Computing Program, sponsored by the US Department of Energy effort of bringing exascale computing to science and engineering applications. Details on the research on **large-scale numerical optimization** can be found in the papers, e.g., in J21, J1, C6, and in the patents P1 and P2

## Service Activities and Community Engagement

As part of his service activities for the research community he is delighted to transfer his research into teaching activities. For example, he was influential as an organizer in the set-up of the annual USI-CSCS Summer School on Efficient High-Performance Computing and Data Analytics and the Gene Golub SIAM Summer School on High-Performance Data Analytics. Both summer schools attracted high-qualified applications of

[1] `http://www.bbc.com/news/health-34260339`

over 150 PhD students each from all over the world in 2019. The short videos [2] could serve as an attractive way to disseminate the content of the program to a wider audience. He also has been coordinating the Swiss Platform for Advanced Scientific Computing (PASC)[3]. He played an instrumental role in initiating the new PASC conference series (as a chair for the first four conferences from 2014–2017 and now as a steering committee member). The PASC conference is now supported by ACM. In 2019, the conference set a new attendance record with 430 scientists, industry representatives, and experts present. Finally, he strongly supports the statement that "Without a close collaboration between applied mathematicians, computer scientists, and application scientists, we will not be able to develop a computational science discovery environment capable of exploiting the computational resources that will be available at the exascale (Quote from DOE report "Applied Mathematics Research for Exascale Computing", March 2014).

# Olaf Schenk Research Output List (last five years, 2020–2026)

Full publication list is available at http://usi.to/ovv

### 1. Peer-reviewed publications in international scientific journals

[J23] D. V. Rodriguez, S. Omlin, D. Pasadakis, O. Schenk, Generating Architecture-Agnostic Performance Tests from Functional Unit Tests. **ACM Trans. Model. Perform. Eval. Comput. Syst.**, Vol. 11, No. 1-2, Article 1, April 2026, DOI: doi.org/10.1145/3801098

[J22] A. Eftekhari, D. Folini, A. Friedl, F. Kübler, S. Scheidegger, O. Schenk, Building Interpretable Climate Emulators for Economics, **The Economic Journal**, 2025, DOI: doi.org/10.1093/ej/ueaf131

[J21] J. Kardoš, W. Edeling, D. Suleimenova, D. Groen, and O. Schenk, Sensitivity analysis of high-dimensional models with correlated inputs, **Journal of Computational Science**, ISSN 1877-7503 Volume 91, 2025, DOI: doi.org/10.1016/j.jocs.2025.102681

[J20] P. Bouvry, M. Brorsson, R. Canal, A. Eftekhari, S. Hoefinger, D. Smets, H. Koestler, T. Kozubek, E. Krishnasamy, J. Llosa, A. Lukas-Rother, X. Martorell, D. Pleiter, A. Proykova, M. R. Sancho, O. Schenk, C. Silvano, The European master for HPC curriculum, **Journal of Parallel and Distributed Computing**, Volume 201, 2025, ISSN 0743-7315, DOI: doi.org/10.1016/j.jpdc.2025.105081

[J19] A. Eftekhari, L. Gaedke-Merzhäuser, D. Pasadakis, M. Bollhöfer, S. Scheidegger, O. Schenk, Algorithm 1042: Sparse Precision Matrix Estimation with SQUIC, **ACM Transactions on Mathematical Software**, Volume 50, Issue 2, 2024, DOI: doi.org/10.1145/3650108

[J18] L. Gaedke-Merzhaeuser, E. Krainski, R. Janalik, and H. Rue, H and O. Schenk, Integrated Nested Laplace Approximations for Large-Scale Spatio temporal Bayesian Modeling, **SIAM Journal on Scientific Computing**, vol. 46, no. 4,. pp. B448-B473, 2024, DOI: doi.org/10.1137/23M1561531

[J17] H. Harbrecht, M. Multerer, O. Schenk, C. Schwab, Multiresolution kernel matrix algebra, **Numerische Mathematik**, Volume 156, pages 1085–1114, 2024, DOI: doi.org/10.1007/s00211-024-01409-8

[J16] E. Vecchi, J. Kardoš, M. Lechekhab, A. Waechter, I. Horenko, O. Schenk, Structure-exploiting interior-point solver for high-dimensional entropy-sparsified regression learning, **Journal of Computational Science**, Volume 76, 2024, ISSN 1877-7503, DOI: doi.org/10.1016/j.jocs.2024.102208

[J15] D. Pasadakis, M. Bollhoefer, O. Schenk, Sparse Quadratic Approximation for Graph Learning, **IEEE Transactions on Pattern Analysis and Machine Intelligence**, Volume: 45, Issue: 9, 2023, DOI: doi.org/10.1109/TPAMI.2023.3263969

[2] http://youtu.be/3enmB6hzBGM and https://youtu.be/ZBlXAaBHBUc (produced by Multimedia Services of ETH Zurich)
[3] `http://www.pasc-ch.org/`

[J14] L. Gaedke-Merzhäuser, J. Van Niekerk, O. Schenk, H. Rue, Parallelized integrated nested Laplace approximations for fast Bayesian inference, **Statistics and Computing**, pages 1-20, 2023, DOI: doi.org/10.1007/s11222-022-10192-1

[J13] C. Alappat, G. Hager, O. Schenk and G. Wellein, Level-based Blocking for Sparse Matrices: Sparse Matrix-Power-Vector Multiplication, **IEEE Transactions on Parallel and Distributed Systems**, vol. 34, no. 2, pp. 581-597, 2023, DOI: doi.org/10.1109/TPDS.2022.3223512

[J12] J. Kardoš, D. Kourounis, O. Schenk, BELTISTOS: A robust interior point method for large-scale optimal power flow problems, **Electric Power Systems Research**, Volume 212, 2022, DOI: doi.org/10.1016/j.epsr.2022.108613

[J11] I. Horenko, E. Vecchi ,J. Kardos, O. Schenk, A. Waechter, T. O'Kane, P. Gagliardini, S. Gerber, On cheap entropy-sparsified regression learning, **Proceedings of the National Academy of Sciences (PNAS)**, pages 1-13, 2022, DOI: doi.org/10.1073/pnas.2214972120

[J10] J. Kardos, T. Holt, V. Fazio, L. Fabietti, F. Spazzini, O. Schenk, Massively Parallel Data Analytics for Smart Grid Applications, **Sustainable Energy, Grids and Networks**, pages 1-17, June 2022, DOI: doi.org/10.1016/j.segan.2022.100789

[J9] A. Eftekhari, L. Gaedke-Merzhäuser, D. Pasadakis, M. Bollhoefer, S. Scheidegger, O. Schenk, Large-Scale Precision Matrix Estimation With SQUIC, **Social Science Research Network**, Elsevier, pages 1-15, June 2022, DOI: doi.org/10.2139/ssrn.3904001

[J8] D. Pasadakis, C. L. Alappat, O. Schenk, G. Wellein, Multiway p-spectral graph cuts on Grassmann manifolds, **Machine Learning**, 111, 791–829, 2022, DOI: doi.org/10.1007/s10994-021-06108-1

[J7] M. Bollhöfer, O. Schenk, F. Verbosio, High Performance Block Incomplete LU Factorization, **Applied Numerical Mathematics**, pages 265-282, Volume 162, April 2021,
DOI: doi.org/10.1016/j.apnum.2020.12.023

[J6] A. Eftekhari, D. Pasadakis, S. Scheidegger, M. Bollhöfer, O. Schenk, Block-Enhanced Precision Matrix Estimation for Large-Scale Datasets, **Journal of Computational Science**, pages 1-39, Volume 53, July 2021, DOI: doi.org/10.1016/j.jocs.2021.101389

[J5] J. van Niekerk, H. Bakka, H. Rue, and O. Schenk,, New frontiers in Bayesian modeling using the INLA package, **Journal of Statistical Software**, pages 1-39, November 2021,
DOI: doi.org/10.18637/jss.v100.i02

[J4] P. Sanan, D. May, B. Bollhöfer, O. Schenk, Pragmatic Solvers for 3D Stokes and Elasticity Problems with Heterogeneous Coefficients: Evaluating Modern Incomplete LDLT Preconditioners, **Solid Earth Discussions**, pages 1-23, 2020, DOI: doi.org/10.5194/se-2020-79

[J3] A. Klawonn, M. Lanser, M. Uran, O. Rheinbach, O. Schenk, G. Wellein, J. Schröder, and D. Balzani, R. Janalik, Towards A Virtual Laboratory - Computation of Forming Limit Curves, **Lecture Notes in Computational Science and Engineering, Springer**, pages 1-42, vol 136, 2020,
DOI: doi.org/10.1007/978-3-030-47956-5_13

[J2] C. Alappat, G. Hager, O. Schenk, J. Thies, A. Basermann, A. Bishop, H. Fehske, G. Wellein, A Recursive Algebraic Coloring Technique for Hardware-Efficient Symmetric Sparse Matrix-Vector Multiplication **ACM Transactions on Parallel Computing**, Vol. 7, No. 3, Article 19, June 2020, DOI: doi.org/10.1145/3399732

[J1] J. Kardos, D. Kourounis, and O. Schenk, Two-Level Parallel Augmented Schur Complement Interior-Point Algorithms for the Solution of Security Constrained Optimal Power Flow Problems **IEEE Transactions on Power Systems**, pages 1340 - 1350, Volume: 35 , Issue: 2 , March 2020 DOI: doi.org/10.1109/TPWRS.2019.2942964

## 2. Edited Proceedings and Journal Special Issues

none

## 3. Peer-reviewed publications in conference proceedings

[C15] V. Maillou, M. Bollhofer, O. Schenk, A. N. Ziogas, M. Luisier, Parallel Quadratic Selected Inversion in Quantum Transport Simulation, In **Proceedings of the ACM International Conference on Supercomputing**, Belfast, 2026, DOI: accepted, in press

[C14] M. Lechekhab, D. Pasadakis, R. Käppeli, A. Eftekhari, O. Schenk, GraphLab.jl: A Julia Framework for Graph Partitioning In **Proceedings of the JuliaCon Conferences**, Julia Conf'26, pages, 8(85), 196, 2026, DOI: doi.org/10.21105/jcon.00196

[C13] X. Niu, G. Meyer, D. Pasadakis, A. J. Yzelman, O. Schenk, Incremental Sparse Tensor Format for Maximizing Efficiency in Tensor-Vector Multiplications, In **IEEE International Conference on Cluster Computing Workshops (CLUSTER Workshops)**, Edinburgh, United Kingdom, 2025, pp. 1-2, DOI: 10.1109/CLUSTERWorkshops65972.2025.11164206

[C12] D. Folini, A. Eftekhari, A. Friedl, F. Kübler, S. Scheidegger, O. Schenk, Build your own! From tailored box-model climate emulators to pattern scaling, In **Proceedings European Geosciences Union General Assembly 2025 (EGU25)**, Vienna, Austria, 2025, DOI: 10.5194/egusphere-egu25-10007

[C11] L. Gaedke-Merzhäuser, V. Maillou, F. R. Avellaneda, O. Schenk, P. Moraga, M. Luisier, A. Nikolaos Ziogas, and H. Rue, Accelerated Spatio-Temporal Bayesian Modeling for Multivariate Gaussian Processes, In **Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis (SC '25)**, in Association for Computing Machinery, New York, NY, USA, 949–972, 2025, DOI: 10.1145/3712285.3759832

[C10] V. Maillou, L. Gaedke-Merzhäuser, A. Nikolaos Zioga, O. Schenk, and M. Luisier, Parallel Selected Inversion of Block-Tridiagonal with Arrowhead Matrices, In **2025 IEEE International Conference on Cluster Computing (CLUSTER)**, United Kingdom, 2025, pp. 1-12, DOI: 10.1109/CLUSTER59342.2025.11186484

[C9] H. Rim, J. Kardos, O. Schenk, Forecasting Renewable Energy at European Markets, In **in Proceedings SIGENERGY Energy Inform.**, Rev. 4, pp. 187–189, 2024, DOI: 10.1145/3717413.3717430

[C8] M. Lechekhab, D. Pasadakis, O. Schenk, Multilevel Diffusion Based Spectral Graph Clustering, In **Proceedings 2024 IEEE High Performance Extreme Computing Conference (HPEC)**, Wakefield, MA, USA, 2024, pp. 1-7, DOI: 10.1109/HPEC62836.2024.10938528

[C7] J. Schmidt, D. Pasadakis, M. Sathe, O. Schenk, GAMLNet: a graph based framework for the detection of money laundering, In **Proceedings 2024 11th IEEE Swiss Conference on Data Science (SDS)**, Zurich, Switzerland, 2024, pp. 241-245, DOI: 10.1109/SDS60720.2024.00043

[C6] H. Rim, O. Schenk, J. Kardoš, Forecasting Renewable Energy at European Markets, In **13th DACH+ Conference on Energy Informatics. ACM SIGEnergy Energy Informatics Review. 13th DACH+ Conference on Energy Informatics.**,Lugano, Switzerland, October, 2024.

[C5] T. A. B. Holt, S. Abhyankar, T. Kuruganti, O. Schenk, S. Peles, Data-Driven Unit Commitment Refinement - a Scalable Approach for Complex Modern Power Grids, In **in Proceedings The Hawaii International Conference on System Sciences**, University of Hawaii, HICSS 2024.

[C4] J. Jami, J. Kardoš, O. Schenk, H. Koestler, Data-Driven Unit Commitment Refinement - a Scalable Approach for Complex Modern Power Grids, In **in Proceedings The Hawaii International Conference on System Sciences**, University of Hawaii, HICSS 2024.

[C3] J. Jami, J. Kardoš, O. Schenk, H. Koestler, AI Driven Near Real-time Locational Marginal Pricing Method: A Feasibility and Robustness Study, In **in Proceedings of Innovative Smart Grid Technologies Conference, ISGT**, Université Grenoble Alpes, France, October, 2023.

[C2] D. Pasadakis, O. Schenk, V. Vlacic, A. J. Yzelman, Nonlinear Spectral Clustering with C++ GraphBLAS, In **IEEE High Performance Extreme Computing Conference (HPEC)**, Wakefield, MA, USA, 2023, DOI: 10.48550/arXiv.2605.26975

[C1] T. A. Holt, J. Kardoš, V. Fazio, L. Fabietti, F. Spazzini, O. Schenk, High-Performance Data Analytics Techniques for Power Markets Simulation, In **Proceedings 2021 International Conference on Smart Energy Systems and Technologies (SEST)**, September, 2021.
DOI: 10.1109/SEST50973.2021.9543110

**4. Contributions to books**

[B2] M. Bollhöfer, O. Schenk, R. Janalik, S. Hamm, and K. Gullapalli. State-of-The-Art Sparse Direct Solvers. In **Grama, A., Sameh, A. (eds) Parallel Algorithms in Computational Science and Engineering. Modeling and Simulation in Science, Engineering and Technology. Birkhäuser**, Cham, July 2020, DOI: 10.1007/978-3-030-43736-7_1

[B1] J. Kardos, D. Kourounis, and O. Schenk. Parallel Structure Exploiting Interior Point Methods. In **Grama, A., Sameh, A. (eds) Parallel Algorithms in Computational Science and Engineering. Modeling and Simulation in Science, Engineering and Technology. Birkhäuser**, Cham, July 2020, DOI: 10.1007/978-3-030-43736-7_1

**5. Patents and licenses**

[P2] D. Kourounis and O. Schenk: *Method to Accelerate the Processing of Multiperiod Optimal Power Flow Problems*, February 2020, EU Patent, Published as EP3602325A1;WO2018177529A1.

[P1] D. Kourounis and O. Schenk: *Method to Accelerate the Processing of Multiperiod Optimal Power Flow Problems*, January 2020, USA Patent, Published as US2020042569A1.

**6. Oral contributions to international conferences (only invited (semi-)plenary talks)**

[I3] *Accelerated sparsity in quadratic inversion: Computational challenges in high-dimensional settings*, keynote talk, **Conference on Networks For Science, Workshop on Network, Analysis, and Learning for Science,David Brower Center**, Berkeley, USA, 10/2025.

[I2] *Towards Scalable Selected Inversion Factorization Algorithms*, keynote talk, **Conference on Fast Direct Solvers**, Purdue University, USA, 10/2021.

[I1] *Advancing HPC direct solvers with applications in large-scale power grid optimization*, keynote talk, **Invited Seminar**, Los Alamos National Laboratory, USA, 102/2020.

**7. Outreach activities**

None

**8. General contributions to science**

None

**9. Other artefacts with documented use**

The following selected mathematical HPC software have been actively developed in Olaf Schenk's research group during the last 5 years:

[A4] PARDISO — Sparse Matrix Solver Software (main author: Olaf Schenk). The fastest multi-threaded sparse direct matrix solver software for arbitrary matrices. The software has been integrated into the Intel Math Kernel Library, it is used on a daily basis by > ten thousands of users and it is installed on every supercomputer from the TOP500 list. One paper related to the software cited >1300. Available from http://www.panua.ch.

[A3] SQUIC — **S**parse **QU**adratic Approximation **I**nverse **C**ovariance Matrix Estimation. The groups of M. Bollhöfer and O. Schenk are continuously pursueing the development of the original QUIC software package (developers: Hsieh, Sustik, Dhillon, Ravikumar) in the direction of large-scale sparse matrix computation for high-performance computing. (papers: J6, J19).

[A2] In addition, Olaf Schenk's research group is contributing to other well-known high-performance computing software projects in computational science such as e.g. RINLA whichis a powerful R package designed to perform fast, approximate Bayesian inference for Latent Gaussian Models (papers: J5, J14)).