



Curriculum Vitae

Olaf Schenk

Full Professor, Institute of Computing, Faculty of Informatics, USI, Lugano, Switzerland, February 2023, SIAM Fellow

Research Interests

My research interests revolve around the central topic of "High Performance Computing for Computational Science and Engineering". In this context one can identify three sub-branches that I am actively working on: (1) performance modeling, simulation, and optimization of **large-scale parallel applications**, (2) **data-integrated simulation science** and, (3) advanced **software for computational science and data analytics applications on emerging HPC architectures**. The mission is to foster a synergistic advancement of scientific computing and computational data science through teaching, research and outreach. It will co-evolve multiple computing modes and advance mathematics, algorithms and software to address the challenges presented by scientific and societal problems.

Current Positions

- 2012–present **Full Professor of Computing** **USI**
Research and teaching on computing, data science, and HPC, advising Postdocs, and PhD, MSc, and BSc students in the Advanced Computing Laboratory at the Institute of Computing, Faculty of Informatics, Università della Svizzera italiana (USI), Switzerland. ([📄 Link](#))
- 2012–present **Associate Advisor** **CSCS/ETH Zurich**
Advisor Position (20%) at the Swiss National Supercomputing Centre on scientific computing support and scientific computing engagement. ([📄 Link](#))
- 2020–present **External Lecturer** **ETH Zurich**
Responsible for the course *High Performance Computing Lab* which is offered within the BSc of Computational Science and Engineering (7 ECTS, Spring semester) at ETH Zurich. ([📄 Link](#))
- 2022–present **Director** **Panua Technologies Sagl**
Founder & Director at Panua Technologies Sagl, a company based in Lugano that creates customized high-end software solutions for large-scale prediction, simulation, optimization, and graph analytics. ([📄 Link](#))

Awards and Honors

- 2018 **SIAM Fellow** **Philadelphia, USA**
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.
- 2014 **INCITE Award** **Oak Ridge Leadership Computing Facility, USA**
"[...] for researchers to make transformational advances in science and technology through large allocations of computer time and [...] at the Argonne and Oak Ridge Leadership Computing Facility centers, operated by the US Department of Energy Office of Science.", 100,000,000 CPU h. (with J. Tromp, Princeton, USA)

- 2013 **INCITE Award** **Oak Ridge Leadership Computing Facility, USA**
 “[...] for researchers to make transformational advances in science and technology through large allocations of computer time and [...] at the Argonne and Oak Ridge Leadership Computing Facility centers, operated by the US Department of Energy Office of Science.”, 100,000,000 CPU h. (with J. Tromp, Princeton, USA)
- 2008 **SIAM SIGEST Honor** **Philadelphia, USA**
 “SIGEST highlights a recent paper from one of SIAM’s specialized research journals, chosen on the basis of exceptional interest to the entire SIAM community and revised and condensed as needed for greater accessibility.” (with M. Bollhöfer, Braunschweig University of Technology, Germany and R. Römer, University of Warwick, United Kingdom)
- 2007 **IBM Faculty Award** **Yorktown Heights, USA**
 “To qualify for this internationally competitive award [...] candidates must have an outstanding reputation for contributions in their field or, in the case of junior faculty, show unusual promise.”, \$40,000

Positions and Experience

Research

- 2016–present **Full Professor of Computing** **USI**
 Research and teaching on computing, data science, and HPC, advising Postdocs, and PhD, MSc, and BSc students in the Advanced Computing Laboratory at the Institute of Computing, Faculty of Informatics, USI, Switzerland.
- 2012–2016 **Associate Professor of Computational Science** **USI**
 Research and teaching on computational science and HPC, advising Postdocs, and PhD, MSc, and BSc students in the Advanced Computing Laboratory at the Institute of Computational Science, Faculty of Informatics, USI, Switzerland.
- 2005–2011 **Senior Researcher** **University of Basel, Switzerland**
 Principle Investigator for several academic and industrial research projects (total financial volume: CHF 3,976,000) on computational science and HPC, advised 3 PhD and 9 MSc students in the Department of Mathematics and Computer Science, and (co)taught 9 courses on the BSc and MSc levels in computer science.
- 2001–2004 **Postdoctoral Fellow** **University of Basel, Switzerland**
 Parallel programming and HPC research. Scientific advisor: Prof. Helmar Burkhart.
- 2002–2003 **Visiting Researcher** **IBM Thomas J. Watson Research Center, Yorktown, USA**
 Research on parallel programming, sparse matrix algorithms, and HPC. Scientific host: Anshul Gupta
- 1996–2000 **Research Assistant / PhD Student** **ETH Zurich, Switzerland**
 Research on semiconductor device simulation, solver, and HPC in the Department of Information Technology and Electrical Engineering, Scientific advisor: Prof. Wolfgang Fichtner

Education

- 2010 **Habilitation in Applied Informatics and Scientific Computing** **University of Basel**
 “Venia Docendi” at Department of Mathematics and Computer Science **Basel, Switzerland**
- 1996–2000 **PhD in Electrical Engineering and Information Technology (Dr. sc. techn.)** **ETH Zurich**
 Committee members: Wolfgang Fichtner, Martin Gutknecht **Zurich, Switzerland**
- 1990–1995 **Diploma Technomathematik (Computational Mathematics)** **KIT Karlsruhe** **Karlsruher**
Institute of Technology, Karlsruhe, Germany

Current Significant Leadership and Service Positions

- 2012–present **Associate Advisor Position at the Swiss National Supercomputing Centre** **CSCS**
 Associate advisor on scientific computing support and scientific computing engagement.
- 2014–present **Steering Committee** **ACM PASC**
 Steering Committee ACM PASC conference, the ACM PASC Conference series is an international and interdisciplinary platform for the exchange of knowledge in scientific computing and computational science with a strong focus on methods, tools, algorithms, application challenges, and novel techniques and usage of HPC.

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- 2018–present **Advisory Board Master Computational Engineering** **University of Erlangen-Nuremberg**
Member of the Advisory Board for the Master Computational Engineering at University of Erlangen-Nuremberg, Germany.
- 2019–present **Associate Editor** **ACM Transaction of Mathematical Software**
Associate Editor of the journal ACM Transaction of Mathematical Software.
- 2019–present **Scientific Council** **IT4Innovations**
Member of Scientific Council of IT4Innovations, the Czech National Supercomputing Center, Ostrava, Czech Republic

Selected Invited Keynote or Seminar Talks

Only listing keynote or invited seminar talks since 2012, not counting normal conference or workshop presentations (only subset):

- Plenary **Conference on Fast Direct Solvers, Department of Mathematics** **Purdue University, USA**
Title: Towards Scalable Selected Inversion Factorization Algorithms, Oct. 2020
- Plenary **Invited Seminar** **Los Alamos National Laboratory, USA**
Title: Advancing HPC direct solvers with applications in large-scale power grid optimization, Feb. 2020
- Plenary **Invited Workshop** **Huawei European Research Symposium, Paris**
Title: Advancing HPC direct solvers with applications in large-scale power grid optimization, Oct. 2019
- Plenary **Invited Workshop** **ParNum 2019, Dubrovnik**
Title: Advancing HPC direct solvers with applications in large-scale power grid optimization, Oct. 2019
- Plenary **Conference on Fast Direct Solvers, Department of Mathematics** **Purdue University, USA**
Title: Towards Scalable Selected Inversion Factorization Algorithms, Nov. 2018
- Semi-Plenary **ISC 2017 High Performance Conference, Session on Algorithms for Extreme Scale in Practice** **Frankfurt, Germany**
Title: Towards Extreme Scalable Selected Inversion Algorithm for Green's Function Calculation in Nanoelectronic Device Simulation, June 2017
- Keynote **HPCSE17** **University of Ostrava & IT4Innovations National Supercomputing Center, Czech Republic**
Title: Algorithms for Extreme Scale in Practice, May 2017
- Distinguished Lecturer **Supercomputing Division, Information Technology Center, The University of Tokyo** **Tokyo, Japan**
Title: Direct solvers for sparse matrices: Introduction, applications and supercomputing, Dec. 2016
- Keynote **1st International Symposium on Research and Education of Computational Science (RECS),** **University of Tokyo** **Tokyo, Japan**
Title: PASC, CSCS, ICS - Three initiatives to advance research and education in computational science in Switzerland, Dec. 2016
- Invited Seminar **Zurich Initiative on Computational Economics** **Zurich, Switzerland**
Applications of Large-Scale Nonlinear Optimization at the Petascale: Achievements and Perspectives in Switzerland, February 2016
- Keynote **First Annual Meeting of Applied Mathematics: Frontier Aspects of Applied Mathematics** **National Taiwan University, Taipei, Taiwan**
Extreme-Scale Stochastic Optimizations: HPC, Numerics and Applications, December 2015
- Invited Seminar **Zurich Initiative on Computational Economics** **Zurich, Switzerland**
Applications of Large-Scale Nonlinear Optimization at the Petascale: Achievements and Perspectives in Switzerland, February 2015
- Invited Seminar **Pacific Institute for the Mathematical Sciences** **Vancouver, Canada**
Performance Engineering of Seismic Simulations for Future Exascale Architectures, January 2015
- SCAIM UBC **Scientific Computing, Applied & Industrial Mathematics Seminar** **Vancouver, Canada**
Performance Engineering & Sparse Matrices: Introduction, Applications and Supercomputing, January 2015

Uni Basel	Numerical Analysis Seminar	University of Basel, Switzerland
	Performance Engineering & Sparse Matrices: Introduction, Applications and Supercomputing, Dec. 2014	
Keynote ISP2S2	JST/CREST International Symposium on Post Petascale System Software	Kobe, Japan
	Performance Engineering for Large-Scale Stochastic Optimizations on Petascale Architectures, Dec. 2014	
Keynote Ex- aStencils'14	SPPEXA Workshop ExaStencils 2014	Technical University of Dresden, Germany
	High-Level Software Approaches for HPC: Overview and Case Study (declined), March 2014	
Keynote ASCETE'14	ASCETE Workshop on advanced numerical methods for earthquake and tsunami simulation on modern HPC systems	Sudelfeld, Germany
	Seismic Structured Grid Simulations on Many-Core Architectures, May 2014	
ZICE'14	Zurich Initiative on Computational Economics	Zurich, Switzerland
	Applications of Large-Scale Nonlinear Optimization at the Petascale: Achievements and Perspectives in Switzerland, February 2014	
Semi- Keynote HPCSE13	HPCSE13 University of Ostrava & IT4Innovations National Supercomputing Center, Czech Republic	
	Interior Point Methods for Large-Scale Stochastic Optimization on High-Performance Computers, May 2013	
Keynote HPCAdvisory Council'12	HPC Advisory Council Switzerland Conference	Lugano, Switzerland
	Large-Scale PDE-Constrained Optimization on HPC Architectures: Applications, Algorithms and Software, March 2012	
Keynote Teratec Forum'12	Teratec International meeting for Simulation and HPC	Ecole Polytechnique, France
	Exascale Computing Research Challenges, June 2012	
Semi- Keynote ACSS'12	Accelerating Computational Science Symposium 2012	Washington, DC, USA
	Large-Scale Seismic Imaging on HPC Architectures: Applications, Algorithms and Software, May 2012	

CSE Software Impact

Software	PARDISO Sparse Matrix Solver Software	
	The fastest multi-threaded sparse direct matrix solver software for arbitrary matrices. The software has been integrated into the Intel Math Kernel Library, installed on almost every supercomputer in the TOP500 list, used by > ten thousand users. One paper cited >1500 since 2005. Available from www.pardiso-project.org	
Optimization Algorithm	Parallel Solver and Interior-Point Optimizations	
	Proposed algorithms and linear solver reference implementation that are now used in virtually every interior-point implementation, e.g., in IPOPT (Wilkinson Prize for Numerical Software in 2011).	

External Funding

Total: raised \approx **CHF 5'136'792** for USI in funding from government and industry since 2012 (start at USI), Olaf Schenk's portion of the funding in shown in brackets.

2022-2025	Swiss National Science Foundation	USI
	CHF 1'550'000 (USI: CHF 247'050) on " Numerical Algorithms, Frameworks, and Scalable Technologies for Extreme-Scale Computing", PI: O. Schenk, Co-PI: M. Bollhöfer (TUB).	
2025-2023	EuroHPC JU	USI
	Euro 7'000'000 (USI: Euro 561'812) on "First European Master's degree programme in High Performance Computing " PI: O. Schenk (USI), Partner: eight other European Universities, Lugano.	
2020-2023	Innosuisse	USI
	CHF 1'546'687 (USI: CHF 778'398) on "High Performance Data Analytics Framework for Power Market Simulation" PI: O. Schenk (USI), Partner: DXT Commodities SA, Lugano.	
2019-2023	KAUST Competitive Research Grants	USI
	US\$ 1'010'000 (USI: US\$ 408'050) on "Preparing for next-generation approximate Bayesian inference using R-INLA", PI: H. Rue (King Abdullah University of Science and Technology), Co-PI: O. Schenk (USI).	

- 2019-2023 **Swiss National Science Foundation SINERGIA** **USI**
CHF 1'550'000 (USI: CHF 247'050) on "Can economic policy mitigate climate change?", PI: F. Kuebler (University of Zurich), Co-PI: O. Schenk (USI).
- 2019-2020 **Innosuisse** **USI**
CHF 47,242 (USI: CHF 47,242) on "Big Data driven controls and performance assessment" PI: O. Schenk (USI), Partner: Research Center for Energy Networks, ETH Zurich.
- 2018-2022 **Swiss National Science Foundation** **USI**
CHF 247'050 (USI: CHF 247'050) on "Balanced Graph Partition Refinement using the Graph p-Laplacian", PI: O. Schenk (USI).
- 2017-2020 **Platform for Advanced Scientific Computing (PASC)** **USI**
CHF 461,500 (USI: CHF 150,000) on "Computing Equilibria in Heterogeneous Agent Macro Models on Contemporary HPC platforms", PI: F. Kubler (University of Zurich), Co-PI: O. Schenk (USI), et. al.
- 2017-2020 **Swiss Commission for Technology&Innovation** **USI**
CHF 15,702,516 (USI: CHF 390,080) on "Computational Approaches for the Design and Operation of the Energy Management System in Future Electric Power Systems" PI: O. Schenk (USI), Partner: SwissGrid, Laufenburg.
- 2017-2018 **Swiss Commission for Technology&Innovation** **USI**
CHF 1'145'614 (USI: CHF 242,324) on "Efficient Simulation and Optimization for Reliable Intercoupled Multi-Energy Carrier Systems" PI: G. Hug (ETH Zurich), D. Kourounis (USI), O. Schenk (USI), Partner: NEPLAN, Zurich.
- 2016 **Swiss National Science Foundation** **USI**
CHF 16,000 (USI: CHF 0,000) on 3rd Platform for Advanced Scientific Computing Conference, PI: J. Hesthaven (EPFL), Co-PI: O. Schenk (USI), et. al.
- 2016-2018 **Swiss National Science Foundation** **USI**
€660,574 (USI: CHF 178,000) on Dual-Phase Steels – From Micro to Macro Properties (EXASTEEL-2), - **German Priority Programme 1648 Software for Exascale Computing**, PI: A. Klawonn (Coordinator, Cologne, Germany), Co-PI: O. Rheinbach (Freiberg, Germany), D. Balzani (Dresden, Germany), J. Schröder (Essen, Germany), O. Schenk (USI), G. Wellein (Erlangen, Germany)
- 2015-2017 **Platform for Advanced Scientific Computing (PASC)** **USI**
CHF 250,000 (USI: CHF 18,000) on Tackling Large Dynamic Stochastic Equilibrium Models with Occasionally Binding Constraints, PI: F. Kubler (University of Zurich), Co-PI: O. Schenk (USI), et. al.
- 2014-2017 **Platform for Advanced Scientific Computing (PASC)** **USI**
CHF 80,000 (USI: CHF 80,000) on PASC Conference Series 2014-2017, PI: O. Schenk (USI), Co-PI: 8 additional computational science Swiss faculty members from other Swiss universities.
- 2013-2016 **Platform for Advanced Scientific Computing (PASC)** **USI**
CHF 320,000 (USI: CHF 320,000) on HPC Application Support for the PASC Solid Earth Dynamics Community, PI: A. Fichtner (ETHZ), Co-PI: O. Schenk (USI), et. al.
- 2015-2016 **Platform for Advanced Scientific Computing (PASC)** **USI**
CHF 655,000 (USI: CHF 200,400) on ANSWERS: Accelerating Nano-Device Simulations with Extreme-Scale Algorithms and Software Co-Integration, PI: M. Luisier (ETHZ), Co-PI: O. Schenk (USI), et. al.
- 2014-2016 **Platform for Advanced Scientific Computing (PASC)** **USI**
CHF 759,000 (USI: CHF 282,492) on GeoPC: Infrastructure Development for Hybrid Parallel Smoothers for Multigrid Preconditioners, PI: Tackley (ETHZ), Co-PI: O. Schenk (USI), et. al.
- 2014-2016 **Swiss Commission for Technology and Innovation** **USI**
CHF 10,000,000 (USI: CHF 184,000) on Future Swiss Electrical Infrastructure (SCCER-FURIES), PI: M. Paolone (EPFL), Co-PI: O. Schenk (USI) et. al. (32 additional Swiss research partners).
- 2013-2016 **EU-FP7-Information and Communication Technologies** **USI**
€3,385,000 (USI: €299,000) for the EXA2CT European Project EXascale Algorithms and Advanced Computational Techniques, PI: Verachtert (Imec), Co-PI: O. Schenk (USI) et.al.

- 2015 **Schloss Dagstuhl - Leibniz-Zentrum für Informatik** **USI**
Grant: one week at the Dagstuhl center on Advanced Stencil-Code Engineering, PI: C. Lengauer (Univ. of Passau), Co-PI: O. Schenk (USI), et. al.
- 2014-2017 **Swiss National Science Foundation** **USI**
CHF 328,000 (USI: CHF 164,000) on Towards Extreme-Scale Coupled Electrothermal Simulations of Realistic Nano-Devices, PI: O. Schenk (USI), Co-PI: A. Schenk (ETHZ).
- 2013-2016 **Platform for Advanced Scientific Computing (PASC)** **USI**
CHF 699,000 (USI: CHF 252,656) on GeoScale: A Framework for Multi-Scale Seismic Modelling and Inversion, PI: A. Fichtner (ETHZ), Co-PI: O. Schenk (USI), et. al.
- 2013 **Swiss National Science Foundation** **USI**
CHF 8,000 (USI: CHF 8,000) on 22nd International Conference on Domain Decomposition Methods, PI: R. Krause (USI), Co-PI: O. Schenk (USI), et. al.
- 2012-2013 **HP2C** **USI**
CHF 100,000 (USI: CHF 40,000) on PASC Geophysics Community Network, PI: T. Nissen-Meyer (ETHZ), Co-PI: O. Schenk (USI), et. al.
- 2013-2014 **Swiss National Science Foundation** **USI**
CHF 339,000 (USI: CHF 200,000) on Seismic Inversion for Waves in Strongly Heterogeneous Media, PI: M. Grote (University of Basel), Co-PI: O. Schenk (USI).
- 2010-2013 **HP2C** **University of Basel**
CHF 1,105,000 (Univ. of Basel: CHF 785,000) on Large-Scale Nonlinear Optimization for High Resolution 3D-Seismic Imaging, PI: O. Schenk (USI), Co-PI: Burkhart (Univ. of Basel), Grote (Univ. of Basel), Giardini (ETHZ)
- 2010-2012 **Swiss Commission for Technology and Innovation** **University of Basel**
CHF 550,000 on Automobile Simulation and Visualization on Manycores, PI: H. Burkhart (Univ. of Basel), Co-PI: O. Schenk (Univ. of Basel)
- 2010 **Schloss Dagstuhl - Leibniz-Zentrum für Informatik** **University of Basel**
Grant: one week at the Dagstuhl center on Combinatorial Scientific Computing, PI: Naumann (RWTH Aachen), Co-PI: O. Schenk (Univ. of Basel), et. al.
- 2010 **Industry – IBM** **University of Basel**
\$ 7,000 on IBM Academic Visiting Fellowship, Yorktown Heights, NY, USA, PI: O. Schenk (Univ. of Basel)
- 2010-2012 **Swiss National Science Foundation** **University of Basel**
CHF 160,000 on Multiscale Analysis and Inversion for Waves in Strongly Heterogeneous Media, PI: M. Grote (Univ. of Basel), Co-PI: O. Schenk (Univ. of Basel)
- 2009 **Industry – IBM** **University of Basel**
\$ 7,000 on IBM Academic Visiting Fellowship, Yorktown Heights, NY, USA, PI: O. Schenk (Univ. of Basel)
- 2008-2010 **Swiss National Science Foundation** **University of Basel**
CHF 160,000 on Multiscale Analysis and Simulation for Waves in Strongly Heterogeneous Media, PI: M. Grote (Univ. of Basel), Co-PI: O. Schenk (Univ. of Basel)
- 2008 **Industry – IBM** **University of Basel**
\$ 7,000 on IBM Academic Visiting Fellowship, Yorktown Heights, NY, USA, PI: O. Schenk (Univ. of Basel)
- 2007-2010 **Swiss National Science Foundation** **University of Basel**
CHF 147,000 on Large-Scale PDE-Constrained Optimization in Hyperthermia Cancer Treatment Planning, PI: H. Burkhart (Univ. of Basel), Co-PI: O. Schenk (Univ. of Basel)
- 2006-2011 **Industry – Computer Simulation Technology AG** **University of Basel**
CHF 300,000 on Fast Solvers in Large-Scale Parallel Electromagnetic Simulations, PI: O. Schenk (Univ. of Basel)
- 2007 **Industry – IBM** **University of Basel**
\$ 40,000 on IBM Faculty Award for High Performance Biomedical Simulations on the Cell Processor, PI: O. Schenk (Univ. of Basel)

- 2007 **Industry – IBM** **University of Basel**
\$ 3,000 on SUR Grant for HPC Cell BE Processor Cluster, PI: O. Schenk (Univ. of Basel)
- 2007-2009 **Swiss Commission for Technology and Innovation** **University of Basel**
CHF 474,000 on Computational Business Intelligence for Automotive Production Lines, PI: H. Burkhart (Univ. of Basel), Co-PI: O. Schenk (Univ. of Basel)
- 2005-2009 **Industry – Intel** **University of Basel**
\$ 270,000 on Research Fellowship Grant, PI: O. Schenk (Univ. of Basel)
- 2003-2004 **ETH Zurich Strategic Excellence Projects** **University of Basel**
CHF 494,000 (Univ. of Basel: CHF 0,000) on Large-Scale Eigenvalue Problems in Optoelectronic Semiconductor Lasers and Accelerator Cavities, PI: P. Arbenz (ETHZ), Co-PI: O. Schenk (Univ. of Basel), et.al.
- 2003-2004 **Industry – Intel** **University of Basel**
\$ 140,000 on Sparse Solution Methods for Intel’s Math Kernel Library, PI: O. Schenk (Univ. of Basel)
- 2003-2004 **Industry – Integrated Systems Engineering AG** **University of Basel**
\$ 50,000 on Recent Advances in Sparse Linear Solver Technology for Semiconductor Device Simulations Matrices, PI: O. Schenk (Univ. of Basel)
- 2003 **Industry – ZEISS** **University of Basel**
CHF 5,000 on Consulting in the area of Numerical Methods for Optoelectronic Simulations, PI: O. Schenk (Univ. of Basel)
- 2002-2003 **Swiss Commission for Technology and Innovation** **University of Basel**
CHF 378,000 on Multilevel Peconditioning Techniques for Automobile Finite-Element Simulations, PI: H. Burkhart (Univ. of Basel), Co-PI: O. Schenk (Univ. of Basel)
- 2002 **Industry – IBM** **University of Basel**
\$ 16,000 on IBM Academic Visiting Fellowship, PI: O. Schenk (Univ. of Basel)
- 2000 **Industry – NEC** **ETH Zurich**
CHF 50,000 on Parallel Direct Solution of Large Linear Equation Systems, PI: O. Schenk (ETH Zurich)
- 2000 **Industry – INPRO** **ETH Zurich**
CHF 50,000 on Solution Techniques for Sparse Matrices from Sheet Metal Forming Simulations, PI: O. Schenk (ETH Zurich)
- 2000 **Industry – COMPAQ** **ETH Zurich**
CHF 50,000 on Integration of PARDISO into COMPAQ’s Extended Mathematical Library CXML., PI: O. Schenk (ETH Zurich)

External Computing Ressources

- 2022 **CSCS** **USI**
60K CPU h. Large Development Project on Massively Parallel Global Sensitivity Analysis for Power Systems, PI: J. Kardos (USI), Co-PI: O. Schenk (USI)
- 2017 **IT4Innovations Directors Discretion** **USI**
500K CPU h. on PRACE petaflop machine (“Anselm”) on Parallelized Dimensional Decomposition for Dynamic Stochastic Economic Models, PI: O. Schenk (USI), Co-PI: S. Scheidegger (Uni Zurich)
- 2016 **IT4Innovations Directors Discretion** **USI**
100K CPU h. on PRACE petaflop machine (“Anselm”) on Computational Methods for Solving Stochastic Equilibrium Models, PI: O. Schenk (USI), Co-PI: S. Scheidegger (Uni Zurich)
- 2014 **DOE INCITE** **USI**
100M CPU h. on DOE petaflop machine CRAY XK7 (“Titan”) on Global Seismic Tomography Based on Spectral-Element and Adjoint Method, PI: J. Tromp (Princeton), Co-PI: O. Schenk (USI)
- 2013 **DOE INCITE** **USI**
100M CPU h. on DOE petaflop machine CRAY XK7 (“Titan”) on Global Seismic Tomography Based on Spectral-Element and Adjoint Method, PI: J. Tromp (Princeton), Co-PI: O. Schenk (USI)

2014 **Director's Discretion project** **USI**
 2M CPU h. on DOE petaflop machine CRAY XK7 ("Titan") on Real-time Stochastic Optimization of Complex Energy Systems on High Performance Computers, PI: O. Schenk (USI)

Teaching Experience

>11 undergraduate courses, >28 graduate courses, 1 tutorial, including (co)organizing 5 CSCS-USI summer schools on HPC; **since 2012:** >11 undergraduate courses, >19 graduate courses, and including (co)organizing 5 CSCS-USI summer schools on Simulations and HPC. Detailed evaluations can be obtained upon request.

Spring 2023	High-Performance Computing Lab for CSE 29 BSc students	ETH
Fall 2022	Numerical Computing 41 BSc students (evaluation grade: 8.44 out of max. of 10)	USI
Fall 2022	High-Performance Computing 31 MSc students (evaluation grade: 8.50 out of max. of 10)	USI
Spring 2022	Effective High-Performance Computing & Data Analytics Summer School >100 MSc and PhD students	USI
Spring 2022	High-Performance Computing Lab for CSE 10 BSc students	ETH
Fall 2021	Numerical Computing 32 BSc students (evaluation grade: 7.44 out of max. of 10)	USI
Fall 2021	High-Performance Computing 35 MSc students (evaluation grade: 8.50 out of max. of 10)	USI
Spring 2021	Effective High-Performance Computing & Data Analytics Summer School >80 MSc and PhD students	USI
Spring 2021	High-Performance Computing Lab for CSE 40 BSc students	ETH
Fall 2020	Numerical Computing 32 BSc students (evaluation grade: 8.09 out of max. of 10)	USI
Fall 2020	High-Performance Computing 22 MSc students (evaluation grade: 7.63 out of max. of 10)	USI
Spring 2020	Effective High-Performance Computing & Data Analytics Summer School 50 MSc and PhD students	USI
Spring 2020	High-Performance Computing Lab for CSE 35 BSc students	ETH
Fall 2019	Numerical Computing 30 BSc students (evaluation grade: 9.2 out of max. of 10)	USI
Fall 2019	High-Performance Computing 26 MSc students (evaluation grade: 8.07 out of max. of 10)	USI
Spring 2019	Introduction to Doctoral Studies 10 PhD students	USI
Spring 2019	CSCS-USI Summer School on Effective HPC and Data Analytics ≈ 30 MSc and PhD students (evaluation grade: 4.8 out of max. of 5).	USI/CSCS
Spring 2019	Software Atelier: Simulation, Data Science & Supercomputing 10 MSc students (evaluation grade: 9.33 out of max. of 10)	USI
Fall 2018	Numerical Computing 34 BSc students (evaluation grade: 7.91 out of max. of 10)	USI
Fall 2018	High-Performance Computing 25 MSc students (evaluation grade: 8.41 out of max. of 10)	USI

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Fall 2018	Introduction to Doctoral Studies 21 PhD students	USI
Spring 2018	CSCS-USI Summer School on Effective HPC ≈ 30 MSc and PhD students (evaluation grade: 4.7 out of max. of 5).	USI/CSCS
Spring 2018	Software Atelier: Simulation, Data Science & Supercomputing 9 MSc students (evaluation grade: 9.33 out of max. of 10)	USI
Spring 2018	Introduction to Doctoral Studies 14 PhD students	USI
Fall 2017	Numerical Computing 33 BSc students (evaluation grade: 7.11 out of max. of 10)	USI
Fall 2017	High-Performance Computing 25 MSc students (evaluation grade: 8.9 out of max. of 10)	USI
Fall 2017	Privatissimum 9 BSc students (evaluation grade: 8.4 out of max. of 10)	USI
Spring 2017	CSCS-USI Summer School on Effective HPC ≈ 20 MSc and PhD students (evaluation grade: 4.8 out of max. of 5).	USI/CSCS
Spring 2017	Software Atelier: Simulation, Data Science & Supercomputing 5 MSc students (evaluation grade: 8.5 out of max. of 10)	USI
Fall 2016	Numerical Computing 21 BSc students (evaluation grade: 8.94 out of max. of 10)	USI
Fall 2016	High-Performance Computing 5 MSc students (evaluation grade: 9.0 out of max. of 10)	USI
Spring 2016	Software Atelier: Supercomputing and Simulations 5 MSc students (evaluation grade: 9.67 out of max. of 10)	USI
Spring 2016	CSCS-USI Summer School on Effective HPC ≈ 30 MSc and PhD students (evaluation grade: 4.8 out of max. of 5).	USI/CSCS
Fall 2015	Numerical Computing 12 BSc students (evaluation grade: 9.2 out of max. of 10)	USI
Fall 2015	High-Performance Computing 7 MSc students (evaluation grade: 9.0 out of max. of 10)	USI
Spring 2015	CSCS-USI Summer School on Effective HPC ≈ 30 MSc and PhD students (evaluation grade: 4.8 out of max. of 5). Video available at http://youtu.be/3enmB6hzBGM (produced by Multimedia Services of ETH Zurich)	USI/CSCS
Spring 2015	Software Atelier: Supercomputing and Simulations 6 MSc students (evaluation grade: 8.9 out of max. of 10)	USI
Spring 2015	Introduction to Computational Science 26 BSc students (evaluation grade: 7.6 out of max. 10)	USI
Fall 2014	High-Performance Computing 7 MSc students (evaluation grade: 10.0 out of max. of 10)	USI
Fall 2014	Numerical Computing 2 BSc students (evaluation grade: 9.5 out of max. 10)	USI
Spring 2014	Special Topics in Mathematics&Computational Science 7 MSc students (evaluation grade: 9.0 out of max. of 10)	USI
Spring 2014	Parallel and Distributed Computing Lab 7 MSc students (evaluation grade: 9.0 out of max. of 10)	USI
Spring 2014	Computational Science ≈ 20 BSc students, (evaluation grade: 7.1 out of max. of 10)	USI

Spring 2014	CSCS-USI Summer School on Effective HPC 30 MSc and PhD students (evaluation grade: 4.2 out of max. of 5)	USI/CSCS
Fall 2013	Parallel and Distributed Computing cotaught with W. Binder & F. Pedone, ≈ 40 MSc students (evaluation grade: 8.1 out of max. of 10)	USI
Spring 2013	Special Topics in Mathematics & Computational Science 6 MSc students (evaluation grade: —)	USI
Spring 2013	Parallel and Distributed Computing Lab 7 MSc students (evaluation grade: —)	USI
Spring 2013	Computational Science ≈ 20 BSc students (evaluation grade: 6.7 out of max. of 10)	USI
Spring 2013	CSCS-USI Summer School on Effective HPC 30 MSc and PhD students grade: (4.1 out of max. of 5)	USI/CSCS
Fall 2012	Parallel and Distributed Computing cotaught with F. Pedone, ≈ 52 MSc students (evaluation grade: 7.2 out of max. of 10)	USI
Spring 2011	High Performance Computing cotaught with H. Burkhart, ≈ 15 MSc students	University of Basel
Spring 2010	High Performance Computing cotaught with H. Burkhart, ≈ 15 MSc students	University of Basel
Spring 2009	High Performance Computing cotaught with H. Burkhart, ≈ 15 MSc students	University of Basel
Spring 2008	High Performance Computing cotaught with H. Burkhart, ≈ 20 MSc students	University of Basel
Spring 2008	Programming Cell Processors and GPUs for High-Performance Simulations cotaught with Matthias Christen, ≈ 25 participants	PDCN 2008
Spring 2007	High Performance Computing cotaught with H. Burkhart, ≈ 15 MSc students	University of Basel
Fall 2006	Seminar Life Science Informatics cotaught with H. Burkhart, F. Baty ≈ 10 MSc students	University of Basel
Fall 2006	Seminar Parallelismus cotaught with H. Burkhart ≈ 10 MSc students	University of Basel
Spring 2005	Programmieren II ≈ 20 BSc students	University of Basel
Spring 2002	Algorithms in Computational Science and Engineering ≈ 15 MSc students	University of Basel

Advising and Mentoring

I advise(d) 4 Postdocs, 10 PhD students, >20 MSc students, >15 BSc students, and serve(d) on the committee of >4 PhD students (external member) and 11 PhD students (internal member).

Postdoctoral Research Assistants

USI

Aryan Eftekhari (April 2021 – present).

Juraj Kardos (April 2020 – present).

Aryan Eftekhari (September 2016 – present)

Drosos Kourounis (January 2012 – September 2018); first job: NEPLAN, Zurich.

Simplice Donfack (April 2014 – December 2015); first job: INRIA, Paris.

Patrick Sanan (May 2014 – September 2017); first job: ETH Zurich, Switzerland.

Matthias Christen (January 2013 – December 2015); first job: Vanamco, Zurich.

PhD students

Malik Lechekhab (September 2021 – present)
 Tim Holt (September 2020 – present)
 Lisa Gaedke-Merzhäuser (Januar 2020 – present)
 Dimosthenis Pasadakis (September 2018 – present)
 Aryan Eftekhari (PhD 2021)
 Radim Janalik (PhD 2021)
 Juraj Kardos (PhD March 2020)
 Fabio Verbosio (PhD 2019)
 Max Rietmann (PhD 2015); first job: ETH Zurich, Switzerland.

PhD students

University of Basel

Johannes Huber (PhD 2013), coadvised with M. Grote; first job: SAFEmine, Switzerland.
 Madan Sathe (PhD 2012); first job: Ernst & Young Consulting, Switzerland.
 Matthias Christen (PhD 2011), coadvised with H. Burkhart; first job: USI, Switzerland.

PhD students (internal committee member)

USI

Dmitri Makarov (PhD, in progress)
 Dimitri Igdalov (PhD, in progress)
 Hardik Kothari (PhD, 2021)
 Georgios Zacharopoulos (PhD, 2020)
 Diego Pizzagalli (PhD, 2020)
 Xiaochen Chou (PhD, 2020)
 Paul Erker (PhD, 2019)
 Marchenko Ganna (PhD, 2019)
 Murodzhon Akhmedov (PhD, 2018)
 Eduardo Feo Flushing (PhD, 2017)
 Igor Kaitovic (PhD, 2017)
 Kirill Lykov (PhD, 2017)
 Marijn Stollenga (PhD, 2016)
 Daniele Sciascia (PhD 2015)
 Lea Conen (PhD 2015)
 Johannes Steiner (PhD 2014)
 Marco Favino (PhD 2014)
 Sebastian Schmitz (PhD 2014)

PhD students (external committee member)

Chaulio Ferreira (PhD 2019), Technical University Munich, Germany.
 Zakariae Jorti (PhD 2019), Sorbonne University, Paris, France.
 Mauro Calderara (PhD 2016), ETH Zurich, Switzerland.
 Pierre Jolivet (PhD 2014), Université de Grenoble & Université Pierre et Marie Curie, France.
 Long Qu (PhD 2014), Université Paris Sud, Orsay, France.
 Johannes Langguth (PhD 2011), University of Bergen, Norway.

Service & Editorial Boards**Journal Editorial Board**

- 2020–present **Associate Editor** **IEEE Transactions on Parallel and Distributed Systems**
 IEEE Transactions on Parallel and Distributed Systems, special section on Innovative R&D toward the Exascale Era
- 2019–present **Associate Editor** **ACM Transaction of Mathematical Software**
 Associate Editor of the journal ACM Transaction of Mathematical Software.
- 2017 **Guest Editor** **CCPE**
 The Journal on Concurrency and Computation: Practice and Experience stresses papers in broad computer and computational science areas with a focus on concurrency and computation.

- 2012-2017 **Associate Editor** **SIAM SISC**
The SIAM Journal on Scientific Computing contains research articles on numerical methods and techniques for scientific computation.
- 2012, 2014, **Guest Editor** **PARCO**
2016, 2017 Parallel Computing is an international journal presenting the practical use of parallel computer systems, including high performance architecture, system software, programming systems and tools, and applications.
- 2004 **Guest Editor** **JFGCS**
Future Generation Computer Systems is an international journal with a focus on new theory and technological progress supporting a better understanding of wide-area, fully distributed computing systems.
- Current Leadership Service**
- SIAM PP **Conference Proceedings of the SIAM Conference on Parallel Processing for Scientific Computing, 2018–present**, Steering Committee Member
- ACM PASC **Swiss Platform for Advanced Scientific Computing Core Program, 2017–present**, Steering Committee Member
- ACM PASC **ACM Platform for Advanced Scientific Computing Conference Series, 2014–present** Steering Committee & Organizing Committee Co-Chairs
- Former Significant Leadership and Service Positions**
- SIAM **Chair** **SIAM Activity Group on Supercomputing**
Nominated by a committee, elected by all SIAG members. The SIAM Activity Group on Supercomputing provides a forum for computational mathematicians, computer scientists, computer architects, and computational scientists to exchange ideas on mathematical algorithms and computer architecture needed for simulations on high-performance computer systems, period 2020–2021
- SCCER **Project Board Member** **SCCER-FURIES**
The Swiss SCCER Future Swiss Electrical Infrastructure (FURIES) joins the competencies of the top Swiss academic and industrial actors in the area of power and energy systems to shape the next generation of the electrical Swiss infrastructure, period 2013–2021
- SIAM **Gene Golub SIAM Summer School 2019 on High Performance Data Analytics, 2019**, Co-Organizer with L. Grigori, M. Knepley, R. Vuduc, Aussois, France, June 17-30, 2019.
- SIAM **Vice Chair** **SIAM Activity Group on Supercomputing**
Nominated by a committee, elected by all SIAG members. The SIAM Activity Group on Supercomputing provides a forum for computational mathematicians, computer scientists, computer architects, and computational scientists to exchange ideas on mathematical algorithms and computer architecture needed for simulations on high-performance computer systems, period 2018–2019
- IEEE/CiSE **Editor-in-Chief Reappointment Committee for Computing in Science and Engineering (IEEE CiSE), 2019**, Committee member.
- SIAM PP18 **Conference Co-Chair** **SIAM PP18**
The SIAM Conference on Parallel Processing provides a forum for computational mathematicians, computer scientists, computer architects, and computational scientists to exchange ideas on mathematical algorithms and computer architecture needed for simulations on high-performance computer systems (>700 participants).
- SIAM SISC **Associate Editor** **SIAM SISC**
SIAM Journal on Scientific Computing, period 2012-2017
- SIAG/SC **SIAM Activity Group on Supercomputing, 2016-2017**, Program Director SIAM SIAG on Supercomputing
- PASC **ACM Platform for Advanced Scientific Computing Conference**, Conference Co-Chair (2014, 2015, 2016, 2017)
- PMAA **International Workshop Series on Parallel Matrix Algorithms and Applications**, Steering Committee, period 2012-2020.
- PASC **Swiss Platform for Advanced Scientific Computing (PASC) Project Leadership Position**, period 2012-2016.

- SIAM PP16 **SIAM Conference on Parallel Processing for Scientific Computing, 2016**, Organizing Committee
- IEEE CSE 2015 **IEEE International Conference on Computational Science and Engineering, 2015**, Chair for the conference track on "Scientific and Engineering Computing"
- SPEEDUP **The Speedup Society: The Swiss Forum for High-Performance Computing**, Vice-president (2008-2015)
- Award Committee Service**
- SIAG/GS 2023 **Chair SIAM SIAG Geosciences Career Award Committee**. The SIAM Activity Group on Geosciences Career Prize is awarded every two years to an outstanding senior researcher who has made broad and distinguished contributions to the field of geosciences.
- SIAG/SC 2020 **Chair SIAM SIAG/Supercomputing Award Committee**. The SIAG/SC Best Paper Prize is awarded biennially to authors of the most outstanding paper, as determined by the prize committee, making significant contributions in the field of parallel scientific and engineering computing.
- SIAG/CSE 2019 **Chair SIAM SIAG on Computational Science & Engineering Supercomputing Award Committee**. The SIAG/CSE Best Paper Prize is awarded biennially to authors of the most outstanding paper, as determined by the prize committee, making significant contributions in the field of Computational Science & Engineering.
- SIAG/SC **Chair SIAM SIAG/Supercomputing Best Paper Prize Committee, 2016**, Committee Chair for the SIAM Activity Group on Supercomputing (SIAG/SC) Best Paper Prize
- PASC17 **PASC17 PhD Award Committee Member**. PhD Award sponsored by the Swiss Graduate Program FoMICS "Foundations in Mathematics and Informatics for Computer Simulations in Science and Engineering", led by the Institute of Computational Science at USI.
- ISC **ISC PhD Forum Award Committee Member**. The International Supercomputing Conference (ISC) is a yearly conference on supercomputing. ICS PhD Forum Program Committee is an international committee of HPC experts and it selected one contribution to receive the "ISC PhD Forum Award" (2016, 2017).
- Former Advisory Service**
- 2022 **Evaluation Panel** **BMBF, Germany**
Member of an international evaluation panel for the BMBF project "Artificial Intelligence Competence Center".
- 2022 **Evaluation Panel** **BMBF, Germany**
Member of an international evaluation panel for the SCALEXA project "Neue Methoden und Technologien für das Exascale-Höchstleistungsrechnen".
- 2021 **Evaluation Panel** **INRIA, France**
Member of an international evaluation panel of INRIA Evaluation Committee.
- 2020 **Reviewer** **University of Stuttgart, Germany**
External Reviewer for a Junior Professor position in Stuttgart on "Sustainability and Usability of Simulation Software" at Stuttgart Center for Simulation Science
- 2020 **Evaluation Panel** **IT4Innovations National Supercomputing Center, Czech Republic**
Member of international evaluation panel for Technical University of Ostrava, IT4Innovations and Department of Computer Science.
- 2019 **Proposal Reviewer** **SNF Ambizione Grant, Switzerland**
Swiss National Science Foundation, Research proposal on computing and computational science, requesting a grant of CHF 750.000.
- 2019 **Reviewer** **Friedrich-Schiller-University Jena, Germany**
External Reviewer for a W2/W3-Professur on "Skalierbare daten- und rechenintensive Analysen" at Friedrich-Schiller-University Jena
- 2018 **Proposal Reviewer** **PRACE Fifth Implementation Phase (PRACE-6IP), Europe**
PRACE (Partnership for Advanced Computing in Europe), proposal reviewer for package 8 on "forward-looking software solutions".

- 2018 **Proposal Reviewer** **John von Neumann Institute for Computing (NIC), Jülich, Germany**
Research proposal on accelerated optimization of energy system models asking for 2.584M core hours.
- 2018 **Scientific Reviewer** **PRACE Projects, Bruxelles, Belgium**
Scientific reviewer of PRACE research proposals asking for up to 88M core hours on Piz Daint at CSCS.
- 2017 **Proposal Reviewer** **John von Neumann Institute for Computing (NIC), Jülich, Germany**
Research proposal on accelerated optimization of energy system models asking for 1.846M core hours.
- 2017 **Reviewer** **Friedrich-Schiller-University Jena, Germany**
External Reviewer for a W2-Professur on "Skalierbare daten- und rechenintensive Analysen" at Friedrich-Schiller-University Jena
- 2017 **Proposal Reviewer** **Deutsche Forschungsgemeinschaft (DFG), Bonn, Germany**
Research proposal on graph algorithms asking for €250.000
- 2016 **Proposal Reviewer** **ETH Grant, ETH Zurich, Switzerland**
Research proposal on Partial differential Solvers for Fluid Simulations asking for CHF 240.000.
- 2016 **Proposal Reviewer** **Industrial Research Fund KU Leuven, Belgium**
Research proposal on Large-Scale Numerical Computing to the Research Foundation of KU Leuven asking for \$ 1400.000.
- 2014 **Proposal Reviewer** **Research Foundation Flanders, Belgium**
Postdoctoral Fellow application to the Research Foundation Flanders asking for \$ 400.000 per proposal.
- 2013 **Proposal Reviewer** **French National Research Agency, France**
Evaluation Committee of the MN program of the French National Research Agency asking for \$ 600.000 per proposal.
- 2013 **Proposal Reviewer** **Czech Science Foundation, Czech Republic**
Evaluation Committee for individual projects of the Czech Science Foundation.
- 2012 **Proposal Reviewer** **French National Research Agency, France**
Evaluation Committee of the MN program of the French National Research Agency asking for \$ 600.000 per proposal.
- Faculty Service**
- 2014–present **Master Director** **USI**
Director of the Computational Science Master program at USI.
- 2012–present **USI–CSCS** **USI**
I am serving as a faculty contact person to the Swiss Center of Supercomputing (CSCS).
- 2012–present **PhD Prospectus Committee Member** **USI**
I am serving on a regular basis on evaluation committees of PhD, MSc, and BSc students.
- 2017–2019 **PhD Director** **USI**
Director of the two PhD Programs in Computational Science and Informatics
- 2013–2021 **Swiss Competence Center on Energy Research** **USI**
I served as a faculty representative on the project board of the SCCER Future Swiss Electrical Infrastructure (FURIES) project which joins the competencies of the several Swiss academic and industrial actors in the area of power and energy systems.
- 2017 **Committee member** **USI**
Member of a faculty committee for a faculty position on Computational Energy(level: full professor).
- 2017 **Committee member** **USI**
Member of a faculty committee for a faculty position on Data Science (level: full professor).
- 2017 **Promotion Committee Member** **USI**
Member of a faculty committee for a promotion process from associate professor to full professor.
- 2015-2016 **Promotion Committee Member** **USI**
Member of a faculty committee for a promotion process from assistant professor to senior assistant professor.

- 2014 **Exhibition Organizing Committee Member** **USI**
Member of a faculty committee of the 10 year informatic anniversary exhibition, responsible for the computational science booth.
- 2008 **Promotion committee member** **University of Basel**
Member of a faculty committee for a faculty position on Biomedical Data Analysis (level: associate professor).
- 2004-2011 **Committee member** **University of Basel**
Member of a faculty committee for a new BSc program on Computational Science.

Selected Invited Keynote or Seminar Talks

Only listing keynote or invited seminar talks since 2012, not counting normal conference or workshop presentations (only subset):

- Plenary **Conference on Fast Direct Solvers, Department of Mathematics** **Purdue University, USA**
Title: Towards Scalable Selected Inversion Factorization Algorithms, Oct. 2020
- Plenary **Invited Seminar** **Los Alamos National Laboratory, USA**
Title: Advancing HPC direct solvers with applications in large-scale power grid optimization, Feb. 2020
- Plenary **Invited Workshop** **Huawei European Research Symposium, Paris**
Title: Advancing HPC direct solvers with applications in large-scale power grid optimization, Oct. 2019
- Plenary **Invited Workshop** **ParNum 2019, Dubrovnik**
Title: Advancing HPC direct solvers with applications in large-scale power grid optimization, Oct. 2019
- Plenary **Conference on Fast Direct Solvers, Department of Mathematics** **Purdue University, USA**
Title: Towards Scalable Selected Inversion Factorization Algorithms, Nov. 2018
- Semi-Plenary **ISC 2017 High Performance Conference, Session on Algorithms for Extreme Scale in Practice** **Frankfurt, Germany**
Title: Towards Extreme Scalable Selected Inversion Algorithm for Green's Function Calculation in Nanoelectronic Device Simulation, June 2017
- Keynote **HPCSE17 University of Ostrava & IT4Innovations National Supercomputing Center, Czech Republic**
Title: Algorithms for Extreme Scale in Practice, May 2017
- Distinguished Lecturer **Supercomputing Division, Information Technology Center, The University of Tokyo** **Tokyo, Japan**
Title: Direct solvers for sparse matrices: Introduction, applications and supercomputing, Dec. 2016
- Keynote **1st International Symposium on Research and Education of Computational Science (RECS), University of Tokyo** **Tokyo, Japan**
Title: PASC, CSCS, ICS - Three initiatives to advance research and education in computational science in Switzerland, Dec. 2016
- Invited Seminar **Zurich Initiative on Computational Economics** **Zurich, Switzerland**
Applications of Large-Scale Nonlinear Optimization at the Petascale: Achievements and Perspectives in Switzerland, February 2016
- Keynote **First Annual Meeting of Applied Mathematics: Frontier Aspects of Applied Mathematics** **National Taiwan University, Taipei, Taiwan**
Extreme-Scale Stochastic Optimizations: HPC, Numerics and Applications, December 2015
- Invited Seminar **Zurich Initiative on Computational Economics** **Zurich, Switzerland**
Applications of Large-Scale Nonlinear Optimization at the Petascale: Achievements and Perspectives in Switzerland, February 2015
- Invited Seminar **Pacific Institute for the Mathematical Sciences** **Vancouver, Canada**
Performance Engineering of Seismic Simulations for Future Exascale Architectures, January 2015
- SCAIM UBC **Scientific Computing, Applied & Industrial Mathematics Seminar** **Vancouver, Canada**
Performance Engineering & Sparse Matrices: Introduction, Applications and Supercomputing, January 2015

- Uni Basel **Numerical Analysis Seminar** **University of Basel, Switzerland**
Performance Engineering & Sparse Matrices: Introduction, Applications and Supercomputing, Dec. 2014
- Keynote **JST/CREST International Symposium on Post Petascale System Software** **Kobe, Japan**
ISP2S2 Performance Engineering for Large-Scale Stochastic Optimizations on Petascale Architectures, Dec. 2014
- Keynote Ex- **SPPEXA Workshop ExaStencils 2014** **Technical University of Dresden, Germany**
aStencils'14 High-Level Software Approaches for HPC: Overview and Case Study (declined), March 2014
- Keynote **ASCETE Workshop on advanced numerical methods for earthquake and tsunami simulation**
ASCETE'14 **on modern HPC systems** **Sudelfeld, Germany**
Seismic Structured Grid Simulations on Many-Core Architectures, May 2014
- ZICE'14 **Zurich Initiative on Computational Economics** **Zurich, Switzerland**
Applications of Large-Scale Nonlinear Optimization at the Petascale: Achievements and Perspectives in Switzerland, February 2014
- Semi- **HPCSE13 University of Ostrava & IT4Innovations National Supercomputing Center, Czech**
Keynote **Republic**
HPCSE13 Interior Point Methods for Large-Scale Stochastic Optimization on High-Performance Computers, May 2013
- Keynote **HPC Advisory Council Switzerland Conference** **Lugano, Switzerland**
HPCAdvisory Large-Scale PDE-Constrained Optimization on HPC Architectures: Applications, Algorithms and Software,
Council'12 March 2012
- Keynote **Teratec International meeting for Simulation and HPC** **Ecole Polytechnique, France**
Teratec Exascale Computing Research Challenges, June 2012
Forum'12
- Semi- **Accelerating Computational Science Symposium 2012** **Washington, DC, USA**
Keynote Large-Scale Seismic Imaging on HPC Architectures: Applications, Algorithms and Software, May 2012
ACSS'12

Technical Program Committee Member (alphabetically)

I served on over >70 program committees of computer science conferences over the last ten years including all major conferences on computing such as IEEE International Parallel & Distributed Processing Symposium (2010, 2014, 2016-2020), ACM/IEEE Conference on High Performance Computing, Networking, Storage and Analysis SC (2008, 2010, 2013-2017, 2019).

- CoSaS **Symposium "Computational Science at Scale (CoSaS)", DFG priority program Software for ExaScale Computing (SPPEXA), 2018**
- CSC **SIAM Workshop on Combinatorial Scientific Computing, 2012, 2014, 2018**
- CENG **International Symposium on Computer and Information Sciences, 2010**
- DAGSTUHL **Dagstuhl Seminars, 2009, 2015**
- DD **International Conference on Domain Decomposition Methods, 2013**
- ECT **International Conference on Engineering Computational Technology, 2006, 2008, 2010, 2012**
- FMC **Facing the Multicore-Challenge Conference, 2010, 2011, 2012**
- HipHaC **New Frontiers in High-performance and Hardware-aware Computing, 2011**
- HiStencils **International Workshop on High-Performance Stencil Computations, 2014**
- HPDC **International Symposium on High-Performance Parallel and Distributed Computing, 2023**
- HiPEAC **International HiPEAC conference, 2020**
- HiPC **IEEE International Conference on High Performance Computing, 2007, 2008, 2013, 2015**
- HPCS **International Conference on High Performance Computing & Simulation, 2014**
- ICPP **IEEE International Conference on Parallel Processing, 2013, 2021, 2022**
- IHPCES **International Workshop on Advances in High-Performance Computational Earth Sciences: Applications and Frameworks, 2013, 2014, 2016, 2017, 2018, 2019, 2020, 2021, 2022**
- IPDPS **IEEE International Parallel & Distributed Processing Symposium, 2010, 2014, 2016, 2017, 2018, 2019, 2020, 2021**

- ISC **International Supercomputing Conference**, 2016, 2017
- ICCS **International Conference on Computational Science** 2022
- PASC **Platform for Advanced Scientific Computing Conference Series**, 2014, 2015, 2016, 2017
- PDCN **International Conference on Parallel and Distributed Computing and Networks**, 2011
- PMAA **International Workshop on Parallel Matrix Algorithms and Applications**, 2008, 2010, 2012, 2014, 2016, 2018
- PPAM **International Conference on Parallel Processing and Applied Mathematics**, 2013, 2015, 2019
- POWER **14th IEEE PowerTech**, 2021
- PASC **Platform for Advanced Scientific Computing Conference Series**, 2014, 2015, 2016, 2017
- SBAC-PAD **International Symposium on Computer Architecture and High Performance Computing**, 2009, 2016, 2017, 2018
- SC **ACM/IEEE Conference on High Performance Computing, Networking, Storage and Analysis**, 2008, 2010, 2013, 2014, 2015, 2016, 2019
- SPEEDUP **Speedup Workshops on High-Performance Computing**, 2003, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015

Scientific Journal Reviewer

- ACM TOMS **ACM Transactions on Mathematical Software**, 2006, 2008, 2009, 2010, 2014, 2015, 2016, 2017
- SIMAX **SIAM Journal on Matrix Analysis and Applications**, 2006, 2008, 2009, 2010, 2014
- SISC **SIAM Journal on Scientific Computing**, 2007, 2008, 2009, 2010, 2014, 2015, 2016
- SIOPT **SIAM Journal on Optimization**, 2010, 2016
- IJHPC **International Journal of High Performance Computing**, 2010
- JCOA **Journal of Computational Optimization and Applications**, 2010
- JCP **Journal of Computational Physics**, 2006
- ETNA **Electronic Transactions of Numerical Analysis**, 2005
- JFGCS **Journal of Future Generation Computer Systems**, 2005, 2008, 2009
- PARCO **Journal of Parallel Computing**, 2003, 2004, 2005, 2006
- IEEE TPDS **IEEE Transactions on Parallel and Distributed Computing**, 2008, 2009, 2010, 2017
- IEEE TCAD **IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems**, 2005
- IEEE PCDS **IEEE Proceedings - Circuits, Devices and Systems**, 2003
- COMP. STRUC **Journal Computer & Structures**, 2005, 2006
- JCCPE **Journal Concurrency and Computation: Practice and Experience**, 2011, 2012

Professional Organizations

- IEEE and IEEE Computer Society**, Senior Member
- Association for Computing Machinery (ACM)**, Member
- ACM Special Interest Group on High Performance Computing (ACM SIGHPC)**, Member
- Society for Industrial and Applied Mathematics (SIAM)**, Member

Selected Research Visits (> two week)

(not counting normal conference or workshop attendance)

- Los Alamos National Laboratory, USA**, 2020
- Center of Computational Science, University of Tokyo, Tokyo, Japan**, 2016, 2018
- Center of Advanced Study in Theoretical Sciences (CASTS), Taipei, Taiwan**, 2015
- IBM Thomas Watson Research Center, USA**, 2002, 2003, 2007, 2009, 2010, 2011
- IBM Research Lab Austin, USA**, 2008
- Center of Scientific Computing, University of Warwick, UK**, 2008, 2009

Department of Computer Science, University of British Columbia, Vancouver, CA, 2006, 2007, 2008, 2015

Weierstrass-Institute of Applied Analysis and Stochastic, Berlin, Germany, 2004, 2007, 2010

Argonne National Lab, USA, 2008, 2012

Purdue University, USA, 2009, 2010, 2011

Academy of Sciences, Department of Computer Science, Prague, CZ, 2004

Stanford University, USA, 2010

NVIDIA Research, USA, 2010

Banff International Research Station of Mathematical Innovation, Canada, 2009

Intel Research Lab Oregon, USA, 2008

ZIB Berlin, Germany, 2007

KTH Stockholm, Sweden, 2006

TU Berlin, Germany, 2006

Publications

Total: Total (only last 10 years): >40 journal papers, 1 book, 6 book chapters, >29 top computer science conference papers, **6900 citations**, h-index: 35 (Google Scholar); full publication list available at: <http://usi.to/ovv>.

Olaf Schenk and his PhD students and postdocs are underlined.

Peer-reviewed Journal Publications

- IEEE** D. Pasadakis, M. Bollhoefer, O. Schenk, *Sparse Quadratic Approximation for Graph Learning*, Transactions on Pattern Analysis and Machine Intelligence, 2023, accepted, in press, DOI 10.36227/techrxiv.19635990.v1
- SAC** L. Gaedke-Merzhäuser, J. Van Niekerk, O. Schenk, H. Rue, *Parallelized integrated nested Laplace approximations for fast Bayesian inference*, Statistics and Computing, December 2022, pages 1-20, <https://www.springer.com/journal/11222>
- PNAS** 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), November 2022, pages 1-13, <https://www.pnas.org/>
- IEEE** 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, November 2022, pages 1-18, DOI 10.1109/TPDS.2022.3223512
- IEEE** 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, June 2022, pages 1-17, DOI 10.1016/j.segan.2022.100789
- SAC** 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, 2022, Pages 1-15, DOI 10.2139/ssrn.3904001
- APNUM** M. Bollhöfer, O. Schenk, F. Verbosio, *High Performance Block Incomplete LU Factorization*, Applied Numerical Mathematics, Volume 162, April 2021, Pages 265-282, DOI 10.1016/j.apnum.2020.12.023.
- JCS** A. Eftekhari, D. Pasadakis, S. Scheidegger, M. Bollhöfer, O. Schenk, *Block-Enhanced Precision Matrix Estimation for Large-Scale Datasets*, Journal of Computational Science, Volume 53, July 2021, Pages 1-39, <doi.org/10.1016/j.jocs.2021.101389>.
- JML** D. Pasadakis, C. L. Alappat, O. Schenk, G. Wellein, *Multiway p-spectral graph cuts on Grassmann manifolds*, Machine Learning, November 2021, Pages 1-39, <doi.org/10.1007/s10994-021-06108-1>.
- JCS** J. van Niekerk, H. Bakka, H. Rue, and O. Schenk, *New frontiers in Bayesian modeling using the INLA package*, Journal of Statistical Software, November 2021, Pages 1-39, DOI 10.18637/jss.v100.i02.
- Solid Earth Discussions** 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, 1-23, 2020, DOI 10.5194/se-2020-79.

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- Precon'99** A. Pomp, O. Schenk, W. Fichtner, *An ILU Preconditioners Adapted to Diffusion Processes in Semiconductors*, Proc. of Preconditioning 1999, Conference on Preconditioning Techniques for Large Sparse Matrix Problems in Industrial Applications, June, 1999, Minneapolis, USA.
- PDPTA'98** O. Schenk, W. Fichtner, K. Gärtner, *Parallel Sparse LU Factorization in a Shared Memory Computing Environment*, Proc. of the PDPTA98, CSREA Press, pp. 907–914, ISBN 1-892512-05-x, Las Vegas, Nevada, USA, July 13-16, 1998.

Edited Books

Book Chapters

- Birkhauser** Juraj Kardos, 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, 2020, Cham. DOI 10.1007/978-3-030-43736-7_1
- Birkhauser** M. Bollhöfer, O. Schenk, R. Janalik, S. Hamm, 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, 2020, Cham. DOI 10.1007/978-3-030-43736-7_1
- CRC Press** J. Huber, U. Naumann, O. Schenk, A. Wächter, *Algorithmic Differentiation and Nonlinear Optimization for an Inverse Medium Problem*, Chapter in Combinatorial Scientific Computing by U. Nauman and O. Schenk (Editors), pp. 203–232, book in the Computational Science series from Chapman and Hall/CRC, 2012, DOI: 10.1201/b11644-18
- CRC Press** O. Schenk, M. Sathe, B. Ucar, A. Sameh, *Towards A Scalable Hybrid Linear Solver Based On Combinatorial Algorithms*, chapter in Combinatorial Scientific Computing by U. Nauman and O. Schenk (Editors), pp. 96–127, book in the Computational Science series from Chapman and Hall/CRC, 2012, DOI: 10.1201/b11644-18
- CRC Press** O. Schenk, M. Christen, H. Burkhart, *Parallel Stencil Computations on Manycore Architectures in Hyperthermia Applications*, Scientific Computing with Multicore and Accelerators by D. Bader and J. Dongarra (Editors), Computational Science series from Chapman and Hall/CRC Press, Taylor and Francis Group. pp. 255–277, 2011. DOI: 10.1201/b10376-10, 2010.
- Springer** O. Schenk, K. Gärtner, *Parallel Numerical Linear Algebra*, invited book chapter in Encyclopedia of Parallel Computing, D. Padua (Editor), pp. 1458–1464, Springer, 2012, ISBN 978-0-387-09765-7.

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Edited Journals

PARCO E. Agullo, P. Arbenz, L. Giraud, [O. Schenk](#), *Guest editorial: Special Issue on Parallel Matrix Algorithms and Applications (PMAA'16)*, Parallel Computing, May 2018, vol 74, pp. 1-2. DOI: 10.1016/j.parco.2018.01.003

CCPE C. Lengauer, M. Bolten, R. Falgout, [O. Schenk](#), X. Zhou, L. Zhao, *Guest editorial: Special Issue on Advanced Stencil-Code Engineering*, Journal of Concurrency and Computation: Practice and Experience, 2017, Volume 29, Issue 18, DOI: 10.1002/cpe.4142

PARCO P. Arbenz, L. Grigori, R. Krause, [O. Schenk](#), *Guest editorial: Special Issue on Parallel Matrix Algorithms and Applications (PMAA'14, Part 2)*, Parallel Computing, pp. 135-136, August 2016, DOI: 10.1016/j.parco.2016.08.003

DAGSTUHL C. Lengauer, M. Bolten, R. D. Falgout, [O. Schenk](#), 15161 Abstracts Collection, *Advanced Stencil-Code Engineering*, 15161, Dagstuhl Seminar Proceedings, pp. 56–75, Schloss Dagstuhl - Leibniz-Zentrum für Informatik, Germany, 2015. DOI: 10.4230/DagRep.5.4.56

PARCO P. Arbenz, L. Grigori, R. Krause, [O. Schenk](#), *Guest editorial: Special Issue on Parallel Matrix Algorithms and Applications (PMAA'14, Part 1)*, Parallel Computing, pp. 99-100 (2015) , DOI: 10.1016/j.parco.2015.10.004

PARCO C. Bekas, A. Grama, [O. Schenk](#), Y. Saad, *Guest editorial: Special Issue on Parallel Matrix Algorithms and Applications (PMAA'12)*, Parallel Computing, Volume 40, Issue 7, pp. 159–160, July 2014. DOI: 10.1016/j.parco.2014.06.001

PARCO P. Arbenz, Y. Saad, A. Sameh, [O. Schenk](#): *Guest editorial: Special Issue on Parallel Matrix Algorithms and Applications (PMAA'10)*, Parallel Computing, 37(12):731–732, 2011. DOI: 10.1016/j.parco.2011.10.011

DAGSTUHL U. Naumann, [O. Schenk](#), H. Simon, S. Toledo, 09061 Abstracts Collection, *Combinatorial Scientific Computing*, 09061, Dagstuhl Seminar Proceedings, 1862-4405, Schloss Dagstuhl - Leibniz-Zentrum für Informatik, Germany, 2009

JFGCS P. Arbenz, H. Burkhart, [O. Schenk](#), E. Mähle, *SPEEDUP/PARS Workshop on Modern Algorithms in Computational Sciences and Information Technology*, J. of Future Generation Computer Systems, 21 (8), pp. 1249–1250, 2005, DOI: 10.1016/j.future.2004.09.002

Patent

European Patent [D. Kourounis](#), [O. Schenk](#), *Processing of Multiperiod Optimal Power Flow Problems using Structure-Exploiting Interior Point Methods*, European Patent Office., PCT - International patent No. PCT/EP2017/057632, March 2017, European Patent Nr. 17719497.4, USA Patent Nr: US Patent number 11,080,362

Monographic Thesis

PhD Thesis

Title *Parallel Sparse LU Factorization Methods on Shared Memory Multiprocessors*

Supervisors Professor Wolfgang Fichtner (ETH Zurich) & Professor Martin Gutknecht (ETH Zurich)

Description This dissertation presents new techniques for solving large sparse symmetric and structurally symmetric linear systems on shared memory high performance parallel computers, using Gaussian elimination with complete supernode pivoting. Shared memory multiprocessors have recently attracted considerable interest in scientific and engineering computing and the objective is to increase the parallel performance on these architectures. The efficiencies of the algorithms are demonstrated for matrices from various application fields and for a variety of high performance computers

Place ETH Zurich, 2000, Series in Microelectronics, Volume 89, Hartung-Gorre, ISBN 3-89649-532-1.

doi [dx.doi.org/10.3929/ethz-a-003876213](https://doi.org/10.3929/ethz-a-003876213)

Habilitation Thesis

Title *Scientific Computing - Algorithms, Combinatorics, High-Performance Computing, and Applications*

Place Department of Computer Science and Mathematics, Faculty of Science, University of Basel, Switzerland, March 2010.

Description This research introduced some of the many ways in which combinatorial abstractions and numerical algorithms in computer science play a role in computational science. It is explained how these algorithms might be useful in scientific applications. It deals in particular with scientific algorithmic research and high-performance computing architectures to enable large-scale simulations and optimizations. This is a discipline where computing power is a critical issue in almost every application. Complex simulation models containing more degrees of freedom not only require more available space in memory, but also demand faster computing architectures, sophisticated algorithms, and modern HPC technology to compute solutions to these models within an acceptable time frame. In general, the research spans the entire stack, from advanced information technology to scientific algorithmic research.

Publication Impact

Citations

Number of citations for my ten most cited papers (Source: Google Scholar as of February 06, 2023, scholar.google.com)

citations	paper
1693	Solving unsymmetric sparse systems of linear equations with PARDISO (DOI Link)
667	On fast factorization pivoting methods for sparse symmetric indefinite systems (DOI Link)
414	Patus: A code generation and autotuning framework for parallel iterative stencil computations on modern microarchitectures (DOI Link)
267	On large-scale diagonalization techniques for the Anderson model of localization (DOI Link)
237	Matching-based preprocessing algorithms to the solution of saddle-point problems in large-scale nonconvex interior-point optimization (DOI Link)
235	PARDISO: a high-performance serial and parallel sparse linear solver in semiconductor device simulation (DOI Link)
226	Efficient sparse LU factorization with left-right looking strategy on shared memory multiprocessors (DOI Link)
188	An augmented incomplete factorization approach for computing the Schur complement in stochastic optimization (DOI Link)
185	Fast methods for computing selected elements of the Green's function in massively parallel nanoelectronic device simulation (DOI Link)
164	Toward the next generation of multiperiod optimal power flow solvers in (DOI Link)

Impact factors

Impact factors of the journals I have published in (Source: Journal Citation Reports 2016, Thomson Scientific.):

Journal	Impact Factor 2016	5-Year Impact Factor
IEEE Transactions on Pattern Analysis and Machine Intelligence	24.31	24.31
PNAS	12.78	12.78
IEEE Transactions on Power Systems	5.68	7.26
SIAM Review	4.89	7.26
Genetics	4.55	5.09
J. of Future Generation Computer Systems	3.99	4.78
Geochem. Geophys. Geosyst.	3.20	3.41
Computer&Structures	2.84	3.18
Journal of Computational Physics	2.74	3.12
IEEE Computing in Science & Engineering	2.07	3.09
Mathematical Programming Series B	2.44	2.98
IEEE Transactions on Electron Devices	2.60	2.84
SIAM J. Sci. Comput	2.19	2.80
Journal of Advanced Manufacturing Technology	2.20	2.29
Journal of Computational Geosciences	1.60	2.25
IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems	1.94	2.12
Parallel Computing	1.36	2.01
Journal of Computational Science	1.74	2.00
Journal of Parallel and Distributed Computing	1.93	1.97
BIT Numerical Mathematics	1.67	1.96