

# Torsten Hoefler

Assistant Professor of Computer Science, ETH Zürich

## Education

- 2005–2008 **Ph.D., Computer Science (Dr. rer. nat.)** **Indiana University  
Bloomington, IN, USA**  
GPA: 4.0/4.0 (“summa cum laude”)  
Committee: [Andrew Lumsdaine](#), Randall Bramley, Jack Dongarra, Richard Graham, Minaxi Gupta  
**IU Young Alumni Award 2014**
- 2000–2004 **Diplom, Informatik (Master of CS)** **Chemnitz University of Technology  
Chemnitz, Germany**  
Grade: sehr gut (“very good”)  
**Universitätspreis 2005 (best student in class)**, Advisor: Wolfgang Rehm
- 1993–1999 **Gymnasium (Academic High School)** **Gymnasium Oelsnitz  
Oelsnitz, Germany**  
Graduated top of class (3<sup>rd</sup> best among 90 students)

## Research Interests

My research interests revolve around the central topic of "Performance-centric Software Development". In the context of High-Performance Computing (HPC), one can identify three sub-branches that I am actively working on: (1) **performance modeling, simulation, and optimization of large-scale parallel applications**, (2) **topologies, routing, and host interfaces of large-scale networks**, and (3) **advanced parallel programming techniques and runtime environments**.

## Awards and Honors

- 2016 **Outstanding Paper Award at ACM OOPSLA'16** **Amsterdam, Netherlands**  
designated as outstanding paper of the ACM Symposium on Object-oriented Programming, Systems, Languages, and Applications (four out of 52 accepted papers (203 submissions))
- 2016 **Best Student Paper Award at HOTI'16** **Santa Clara, CA, USA**  
advisor on the best student paper at IEEE Hot Interconnects 2016, \$250
- 2016 **Karsten Schwan Best Paper Award at ACM HPDC'16** **Kyoto, Japan**  
designated as best paper of the ACM Symposium on High-Performance Parallel and Distributed Computing (out of 20 accepted papers (129 submissions))
- 2015 **Latsis Prize of ETH Zürich** **Zürich, Switzerland**  
*"The purpose of the Latsis Prize is to recognize and reward scientific work of particular excellence from all fields of research undertaken at the ETH Zurich"*, CHF 25k
- 2015 **ERC Starting Grant** **Brussels, Europe**  
*"ERC Starting Grants aim to support up-and-coming research leaders who are about to establish a proper research team and to start conducting independent research in Europe"*. EUR 1.5M
- 2015 **Best Student Paper Award at HOTI'15** **Santa Clara, CA, USA**  
advisor on the best student paper at IEEE Hot Interconnects 2015, \$250
- 2015 **Best Paper Award at ACM HPDC'15** **Portland, OR, USA**  
designated as best paper of the ACM Symposium on High-Performance Parallel and Distributed Computing (out of 19 accepted papers (116 submissions))
- 2015 **Best Paper Award at IEEE Intl. Parallel & Distr. Processing Symposium** **Hyderabad, India**  
designated as best paper of the software track at IPDPS'15 (four tracks, one award each, plenary presentation, of 108 accepted papers (496 submissions))
- 2014 **Best Student Paper Award at SC14** **New Orleans, LA, USA**  
advisor on the best student paper at ACM/IEEE Supercomputing 2014; selected by a committee during the conference out of a set of seven candidates (out of 394 submissions), \$1,000
- 2014 **Young Alumni Award, Indiana University School of Informatics** **Indianapolis, IN, USA**  
*"in recognition of outstanding early career achievement that brings acclaim and recognition to the field of informatics, and honor and distinction to Indiana University."* (the school had  $\approx$ 1,800 students)

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- 2013 **Best Paper Award at SC13** **Denver, CO, USA**  
designated as best paper at ACM/IEEE Supercomputing 2013; selected by a committee during the conference out of a set of thirteen candidates (out of 457 submissions)
- 2013 **IEEE TCSC Young Achiever in Scalable Computing** **Denver, CO, USA**  
*“Awarded to individuals who have made outstanding, influential, and potentially long-lasting contributions in the field of scalable computing within 5 years of receiving their PhD.”*
- 2013 **IBM Faculty Award** **Yorktown Heights, NY, 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.”, \$30,000*
- 2013 **Best Paper Award at EuroMPI’13** **Madrid, Spain**  
designated as best paper of EuroMPI 2013 after a two-round review process, ≈\$3,400 gift
- 2012 **SIAM SIAG/SC Junior Scientist Prize** **Savannah, GA, USA**  
*“awarded to an outstanding junior researcher in the field of algorithms research and development for parallel scientific and engineering computing”, ≈\$2,000 travel funds*
- 2011 **Best Poster Award PPOPP’11** **San Antonio, TX, USA**  
designated as best poster at the 2011 ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming; selected by a committee during the poster session.
- 2010 **Best Paper Award at SC10** **New Orleans, LA, USA**  
designated as best paper at ACM/IEEE Supercomputing 2010; selected by a committee during the conference out of a set of nine candidates (out of 257 submissions) \$1,000
- 2010 **Best Paper Award LSAP’10** **Chicago, IL, USA**  
designated as best paper at the 2010 ACM Workshop on Large-Scale System and Application Performance; selected by a committee
- 2009 **Best Paper Award LCI’09** **Boulder, CO, USA**  
best student paper at the Linux Cluster Institute Conference 2009; selected by a committee; \$500
- 2008 **Cluster Challenge Champion SC’08** **Austin, TX, USA**  
co-advised the winning team at IEEE/ACM SC08’s Cluster Challenge; a competition involving seven international teams of undergraduate students running HPC applications on a self-made cluster computer
- 2008 **Travel Award CCGrid’08** **Lyon, France**  
IEEE/TCSC Doctoral Symposium for Cluster Computing and the Grid 2008, \$2,000
- 2005 **State Fellowship for Doctoral Studies** **Chemnitz, Germany**  
Saxon Ministry of Science and the Fine Arts (Sächsisches Ministerium für Wissenschaft und Kunst), one of four reputable fellowships at TU Chemnitz, €1,400/month; extension declined after one year.
- 2005 **Universitätspreis 2005 (Best Student Award)** **Chemnitz, Germany**  
Chemnitz University of Technology, €2,000
- 2005 **PARS Nachwuchspreis 2005 (PARS Junior Researcher Award)** **Lübeck, Germany**  
Group of Parallel Algorithms, Computer Architectures and System Software in the German Computer Society (Gesellschaft für Informatik, GI), €500
- 2005 **HPC Europa, Scientific Highlight** **Caseleccio di Reno, Italy**  
Selected as outstanding visitor of the HPC Europe scientific exchange program.

## Positions and Experience

### Current Significant Leadership and Service Positions

- 2013–present **ACM SIGHPC Executive Committee (2nd term)** **SIGHPC**  
Member of the first and second elected Executive Committee of ACM SIGHPC, Special Interest Group on High Performance Computing. As one of two elected members-at-large, I co-represent the body of approximately 1,000 members. I was re-elected in 2016.
- 2014–present **Associate Editor (2nd term)** **IEEE TPDS**  
IEEE Transactions on Parallel and Distributed Systems, I was re-appointed in 2016

2012–present	<b>Associate Editor</b> SAGE International Journal of High Performance Computing Applications	IJHPCA
2010–now	<b>MPI Forum WG Lead</b> I lead the MPI-3 Working Group for Collective Operations and Topology.	<b>Message Passing Interface Forum</b>
2013–now	<b>Expert in Resilience and Software Engineering</b> Invited member of two working groups in the European Exascale Software Initiative 2 to “provide recommendations on strategic European actions [...]”	<b>EESI2</b>
2014–2016	<b>Scientific Advisory Board</b> Simula Research Laboratory, Norway	<b>Simula</b>
2014–now	<b>Scientific Advisory Board</b> Member of the SAB of the European Project for Exascale ProGRAMming Models (EPIGRAM)	<b>EPIGRAM Project</b>

## Research

2012–present	<b>Assistant Professor (Tenure Track) of Computer Science</b> <i>Computer Science Department</i> I lead research on scalable parallel computing, advising PhD and Master students in the Scalable Parallel Computing Laboratory.	<b>ETH Zürich</b>
2010–2013	<b>Adjunct Assistant Professor of Computer Science</b> <i>Computer Science Department</i> I led research in high-performance computing involving CS faculty members focused on topology mapping [ICS'11] and performance modeling [SC'11]. I taught two classes on High-Performance Computing.	<b>University of Illinois Urbana-Champaign</b>
2012	<b>Interim Technical Program Manager Applications</b> <i>Blue Waters Directorate, NCSA</i> I led the Advanced Application and User Support Group, consisting of 11 domain specialists at Masters or Ph.D. level who provide advanced scientific computing support to a small number of expert users (≈40) of Blue Waters in their respective domains. Also certification of application and system performance milestones during installation and bringup of Blue Waters.	<b>University of Illinois Urbana-Champaign</b>
2010–2012	<b>Application and System Performance Modeling and Simulation Lead</b> <i>Blue Waters Directorate, NCSA</i> I performed Modeling and Simulation of Sustained Petaflop Applications for Blue Waters, MPI Forum Activities. Scientific advisors: Marc Snir, Bill Gropp.	<b>University of Illinois Urbana-Champaign</b>
2008–2010	<b>Postdoctoral Fellow</b> <i>Open Systems Lab</i> Parallel Programming, Modelling and Network Research, MPI Forum Activities Scientific advisor: Andrew Lumsdaine.	<b>Indiana University Bloomington, IN</b>
2006–2008	<b>Research Assistant</b> <i>Open Systems Lab</i> Parallel Computing and Networking Research	<b>Indiana University Bloomington, IN</b>
Jan 2007	<b>Visiting Researcher</b> <i>Direction des Applications Militaires (CEA-DAM)</i> Parallel Quantum-Mechanical Computations with ABINIT	<b>Commissariat à l'Énergie Atomique Bruyères-le-Châtel, France</b>
Dec 2005	<b>Visiting Researcher</b> <i>CINECA Consorzio Interuniversitario</i> Parallel Ab-Initio Quantum Mechanical Computations	<b>CINECA Casalecchio di Reno, Italy</b>
2004–2006	<b>Research Assistant</b> Parallel Ab-Initio Quantum Mechanical Computations, Networking Research	<b>Chemnitz University of Technology Chemnitz, Germany</b>

## Industry Experience

2000–2005	<b>Software Engineer</b> Design and Implementation of Database (Informix) and Web Applications (PHP/Perl)	<b>DELTA proveris AG</b>
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## Publications

**total:** 44 top conference papers, 12 journal papers, 57 workshop and conference papers, 2800+ citations (Google Scholar)  
**since 2013:** 34 top conference papers, 7 journal papers, 2 workshop and conference papers, 12 best paper noms., 9 awards  
full publication list available at <http://hlor.inf.ethz.ch/publications/>

### Selected Peer-reviewed Conference Publications

- OOPSLA'16** Andrei Marian Dan, Patrick Lam, T. Hoefler, and Martin Vechev: Modeling and Analysis of Remote Memory Access Programming *ACM Symposium on Object-oriented Programming, Systems, Languages, and Applications OOPSLA'16* (acceptance rate: 25%, 52/203) **Outstanding Paper Award (4/52)**
- SC16** T. Gysi, J. Baer, and T. Hoefler: dCUDA: Hardware Supported Overlap of Computation and Communication *In Proceedings of the IEEE/ACM International Conference on High Performance Computing, Networking, Storage and Analysis (SC16)* (acceptance rate: 18%, 82/446)
- SC16** J. Domke and T. Hoefler: Scheduling-Aware Routing for Supercomputers *In Proceedings of the IEEE/ACM International Conference on High Performance Computing, Networking, Storage and Analysis (SC16)* (acceptance rate: 18%, 82/446)
- SC16** W. Tang, B. Wang, S. Ethier, G. Kwasniewski, T. Hoefler, K. Ibrahim, K. Madduri, S. Williams, L. Oliker, C. Rosales-Fernandez, and T. Williams: Extreme Scale Plasma Turbulence Simulations on Top Supercomputers Worldwide *In Proceedings of the IEEE/ACM International Conference on High Performance Computing, Networking, Storage and Analysis (SC16)* (acceptance rate: 18%, 82/446)
- SC16** M. Martinasso, G. Kwasniewski, S. Alam, T. Schulthess, and T. Hoefler: A PCIe Congestion-Aware Performance Model for Densely Populated Accelerator Servers *In Proceedings of the IEEE/ACM International Conference on High Performance Computing, Networking, Storage and Analysis (SC16)* (acceptance rate: 18%, 82/446)
- HOTI'16** T. Schneider, O. Bibartiu and T. Hoefler: Ensuring Deadlock-Freedom in Low-Diameter InfiniBand Networks *In Proceedings of the 24th IEEE Symposium on High-Performance Interconnects, HOTI'16* **Best Student Paper**
- HPDC'16** J. Domke, T. Hoefler, and S. Matsuoka: Routing on the Dependency Graph: A New Approach to Deadlock-Free High-Performance Routing *In Proceedings of the 25th Symposium on High-Performance Parallel and Distributed Computing (HPDC'16)* (acceptance rate: 16%, 20/129)
- HPDC'16** P. Schmid, M. Besta, and T. Hoefler: High-Performance Distributed RMA Locks *In Proceedings of the 25th Symposium on High-Performance Parallel and Distributed Computing (HPDC'16)* (acceptance rate: 16%, 20/129) **received Karsten Schwan Best Paper Award (1/20)**
- ICS'16** T. Grosser and T. Hoefler: Polly-ACC: Transparent compilation to heterogeneous hardware *In Proceedings of the 30th International Conference on Supercomputing (ICS'16)* (acceptance rate: 24%, 43/178)
- PACT'15** H. Schweizer, M. Besta, and T. Hoefler: Evaluating the Cost of Atomic Operations on Modern Architectures *In Proceedings of the 24th International Conference on Parallel Architectures and Compilation (PACT'15)* (acceptance rate: 21%, 38/179)
- PACT'15** A. Bhattacharyya and T. Hoefler: Using Compiler Techniques to Improve Automatic Performance Modeling *In Proceedings of the 24th International Conference on Parallel Architectures and Compilation (PACT'15)* (acceptance rate: 21%, 38/179)
- SC15** T. Hoefler and R. Belli: Scientific Benchmarking of Parallel Computing Systems *In Proceedings of the IEEE/ACM International Conference on High Performance Computing, Networking, Storage and Analysis (SC15)* (acceptance rate: 22%, 79/358)
- SC15** G. Kathareios, C. Minkenberg, B. Prisacari, G. Rodriguez, and T. Hoefler: Cost-Effective Diameter-Two Topologies: Analysis and Evaluation *In Proceedings of the IEEE/ACM International Conference on High Performance Computing, Networking, Storage and Analysis (SC15)* (acceptance rate: 22%, 79/358)
- HOTI'15** S. Di Girolamo, P. Jolivet, K. D. Underwood and T. Hoefler: Exploiting Offload Enabled Network Interfaces *In Proceedings of the 23rd IEEE Symposium on High-Performance Interconnects, HOTI'15* **Best Student Paper**
- HPDC'15** M. Besta and T. Hoefler: Accelerating Irregular Computations with Hardware Transactional Memory and Active Messages *In Proceedings of ACM Symposium on High-Performance Parallel and Distributed Computing, HPDC'15* (acceptance rate: 16% (19/116)) **HPDC'15 Best Paper (1/19)**

- ICS'15** S. Shudler, A. Calotoiu, T. Hoefler, and F. Wolf: Exascaling Your Library: Will Your Implementation Meet Your Expectations? *In Proceedings of the ACM Conference on Supercomputing, ICS'15 (acceptance rate: 25% (40/160))*
- HPDC'15** M. Poke and T. Hoefler: DARE: High-Performance State Machine Replication on RDMA Networks *Accepted at ACM HPDC'15 (acceptance rate: 16% (19/116))*
- ICS'15** M. Besta and T. Hoefler: Active Access: A Mechanism for High-Performance Distributed Data-Centric Computations *In Proceedings of the ACM Conference on Supercomputing, ICS'15 (acceptance rate: 25% (40/160))*
- ICS'15** T. Gysi, T. Grosser, and T. Hoefler: MODESTO: Data-centric Analytic Optimization of Complex Stencil Programs on Heterogeneous Architectures *In Proceedings of the ACM Conference on Supercomputing, ICS'15 (acceptance rate: 25% (40/160))*
- HPDC'15** S. Ramos and T. Hoefler: Cache Line Aware Optimizations for ccNUMA Systems *In Proceedings of ACM Symposium on High-Performance Parallel and Distributed Computing, HPDC'15 (short paper)*
- IPDPS'15** R. Belli and T. Hoefler: Notified Access: Extending Remote Memory Access Programming Models for Producer-Consumer Synchronization *In Proceedings of the IEEE International Parallel and Distributed Processing Symposium (IPDPS), (acceptance rate: 21.8% (108/496)) IPDPS'15 Best Paper (4/108)*
- SC14** M. Besta and T. Hoefler: Slim Fly: A Cost Effective Low-Diameter Network Topology *In Proceedings of IEEE/ACM International Conference on High Performance Computing, Networking, Storage and Analysis (SC14), (acceptance rate: 21%, 82/394), SC14 Best Student Paper (1/82)*
- SC14** J. Domke, T. Hoefler, and S. Matsuoka: Fail-in-Place Network Design: Interaction between Topology, Routing Algorithm and Failures *In Proceedings of IEEE/ACM International Conference on High Performance Computing, Networking, Storage and Analysis (SC14), (acceptance rate: 21%, 82/394)*
- SC14** K. B. Ferreira, P. Widener, S. Levy, D. Arnold, and T. Hoefler: Understanding the Effects of Communication and Coordination on Checkpointing at Scale *In Proceedings of IEEE/ACM International Conference on High Performance Computing, Networking, Storage and Analysis (SC14), (acceptance rate: 21%, 82/394)*
- PACT'14** A. Bhattacharyya and T. Hoefler: PEMOGEN: Automatic Adaptive Performance Modeling during Program Runtime *In Proceedings of 23rd Intl. Conference on Parallel Architectures and Compilation Techniques (PACT'14)*
- HPDC'14** B. Prisacari, G. Rodriguez, P. Heidelberger, D. Chen, C. Minkenberg and T. Hoefler: Efficient Task Placement and Routing in Dragonfly Networks *In Proceedings of the 23rd ACM International Symposium on High-Performance Parallel and Distributed Computing (HPDC'14), (acceptance rate: 16%, 21/130)*
- HPDC'14** M. Besta and T. Hoefler: Fault Tolerance for Remote Memory Access Programming Models *In Proceedings of the 23rd ACM International Symposium on High-Performance Parallel and Distributed Computing (HPDC'14), (acceptance rate: 16%, 21/130), Best Paper Nominee (3/21)*
- SPAA'14** T. Hoefler and G. Kwasniewski: Automatic Complexity Analysis of Explicitly Parallel Programs *In Proceedings of the 26th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA'14), (acceptance rate: 25%, 30/122)*
- IPDPS'14** A. Arteaga, T. Hoefler and O. Fuhrer: Designing Bit-Reproducible Portable High-Performance Applications *In Proceedings of IEEE International Parallel & Distributed Processing Symposium (IPDPS), (acceptance rate: 21.1%, 114/541)*
- ACM TACO (HIPEAC)** B. Prisacari, G. Rodriguez, C. Minkenberg, and T. Hoefler: Fast Pattern-Specific Routing for Fat Tree Networks *In ACM Transactions on Architecture and Code Optimization, and presented at the HIPEAC 2014 conference, (acceptance rate: 24%, 2011)*
- SC13** A. Calotoiu, T. Hoefler, M. Poke, and F. Wolf: Using Automated Performance Modeling to Find Scalability Bugs in Complex Codes *In Proceedings of the IEEE/ACM International Conference on High Performance Computing, Networking, Storage and Analysis (SC13), (acceptance rate: 20%, 92/457)*
- SC13** R. Gerstenberger, M. Besta, and T. Hoefler: Enabling Highly-Scalable Remote Memory Access Programming with MPI-3 One Sided *In Proceedings of the IEEE/ACM International Conference on High Performance Computing, Networking, Storage and Analysis (SC13), (acceptance rate: 20%, 92/457), SC13 Best Paper Award (1/92) and Best Student Paper Finalist (8/92)*
- SC13** A. Friedley, G. Bronevetsky, A. Lumsdaine, and T. Hoefler: Hybrid MPI: Efficient Message Passing for Multi-core Systems *In Proceedings of the IEEE/ACM International Conference on High Performance Computing, Networking, Storage and Analysis (SC13), (acceptance rate: 20%, 92/457)*

- ICPP'13** T. Schneider, R. Grant, B. Barrett, R. Brightwell, and T. Hoefler: Protocols for Fully Offloaded Collective Operations on Accelerated Network Adapters *In Proceedings of the Intl. Conference on Parallel Processing, ICPP'13*
- EuroMPI'13** T. Schneider, F. Kjolstad, and T. Hoefler: MPI Datatype Processing using Runtime Compilation *In Proceedings of ACM/SIGHPC Recent Advances in Message Passing Interface, EuroMPI'13 **Best Paper Award (1/25)***
- ICS'13** B. Prisacari, G. Rodriguez, C. Minkenberg, and T. Hoefler: Bandwidth-optimal Alltoall Exchanges in Fat Tree Networks *In Proceedings of the 27th ACM International Conference on Supercomputing, ICS'13 (acceptance rate: 21%, 41/198)*
- LCPC'13** T. Schneider, R. Gerstenberger, and T. Hoefler: Compiler Optimizations for Non-Contiguous Remote Data Movement *In Proceedings of 26th International Workshop on Languages and Compilers for Parallel Computing, LCPC'13*
- HPDC'13** S. Ramos Garea and T. Hoefler: Modeling Communication in Cache-Coherent SMP Systems - A Case-Study with Xeon Phi *In Proceedings of the 22nd ACM Symposium on High-Performance Parallel and Distributed Computing, HPDC'13 (acceptance rate: 15%, 20/131)*
- HPDC'13** S. Li, T. Hoefler, and M. Snir: NUMA-Aware Shared Memory Collective Communication for MPI *In Proceedings of the 22nd ACM Symposium on High-Performance Parallel and Distributed Computing, HPDC'13 (acceptance rate: 15%, 20/131), **Best Paper Nominee (3/20)***
- PPoPP'13** A. Friedley, T. Hoefler, G. Bronevetsky, and A. Lumsdaine: Ownership Passing: Efficient Distributed Memory Programming on Multi-core Systems *In Proceedings of the 18th ACM SIGPLAN symposium on Principles and Practice of Parallel Programming, PPoPP'13, pages 177–186. ACM, Feb. 2013 (acceptance rate: 21%, 100/472)*
- SC12** T. Hoefler and T. Schneider: Optimization Principles for Collective Neighborhood Communications *In Proceedings of the International Conference on High Performance Computing, Networking, Storage and Analysis, SC'12, pages 98:1–98:10. IEEE Computer Society Press, Nov. 2012, (acceptance rate: 21%, 100/472)*
- EuroMPI'12** T. Schneider, R. Gerstenberger, and T. Hoefler: Micro-Applications for Communication Data Access Patterns and MPI Datatypes *In Recent Advances in the Message Passing Interface - 19th European MPI Users' Group Meeting, EuroMPI 2012, volume 7490, pages 121-131. Springer, Sept. 2012*
- EuroMPI'12** S. Pellegrini, T. Hoefler, and T. Fahringer: Exact Dependence Analysis for Increased Communication Overlap *In Recent Advances in the Message Passing Interface - 19th European MPI Users' Group Meeting, EuroMPI 2012, volume 7490, pages 89–99. Springer, Sept. 2012*
- EuroMPI'12** T. Hoefler J. Dinan, D. Buntinas, P. Balaji, B. Barrett, R. Brightwell, W. Gropp, V. Kale, and R. Thakur: Leveraging MPI's One-Sided Communication Interface for Shared-Memory Programming *In Recent Advances in the Message Passing Interface - 19th European MPI Users' Group Meeting, EuroMPI 2012, volume 7490, pages 132–141. Springer, Sept. 2012*
- PACT'12** T. Hoefler and T. Schneider: Runtime Detection and Optimization of Collective Communication Patterns *In Proceedings of the 21st international conference on Parallel Architectures and Compilation Techniques, PACT'12, pages 263–272. ACM, Sept. 2012, (acceptance rate: 19%, 39/207)*
- PPoPP'12** T. Hoefler and T. Schneider: Communication-Centric Optimizations by Dynamically Detecting Collective Operations *In Proceedings of the 17th ACM SIGPLAN symposium on Principles and Practice of Parallel Programming, PPoPP'12, pages 305–306. ACM, Feb. 2012, (poster paper) (acceptance rate (posters): 17%, 32/185)*
- PPoPP'12** F. Kjolstad, T. Hoefler, and M. Snir: Automatic Datatype Generation and Optimization *In Proceedings of the 17th ACM SIGPLAN symposium on Principles and Practice of Parallel Programming, PPoPP'12, pages 327–328. ACM, Feb. 2012, (poster paper) (acceptance rate (posters): 17%, 32/185)*
- SC11** T. Hoefler, W. Gropp, M. Snir, and W. Kramer: Performance Modeling for Systematic Performance Tuning *In State of the Practice Reports, SC'11, pages 6:1–6:12. ACM, Nov. 2011*
- EuroMPI'11** W. Gropp, T. Hoefler, R. Thakur, and J. L. Traeff: Performance Expectations and Guidelines for MPI Derived Datatypes *In Recent Advances in the Message Passing Interface, EuroMPI'11, volume 6960, pages 150–159. Springer, Sept. 2011*
- EuroMPI'11** V. Venkatesan, M. Chaarawi, E. Gabriel, and T. Hoefler: Design and Evaluation of Nonblocking Collective I/O Operations *In Recent Advances in the Message Passing Interface, EuroMPI'11, volume 6960, pages 90–98. Springer, Sept. 2011*

- EuroMPI'11** T. Hoefler, and M. Snir.: Writing Parallel Libraries with MPI - Common Practice, Issues, and Extensions *In Recent Advances in the Message Passing Interface, EuroMPI'11, volume 6960, pages 345–355. Springer, Sept. 2011, Keynote Paper at the IMUDI session at EuroMPI 2011 Conference*
- EuroPar'11** T. Schneider, S. Eckelmann, T. Hoefler, and W. Rehm.: Kernel-Based Offload of Collective Operations - Implementation, Evaluation and Lessons Learned. *In Proceedings of the 17th international conference on Parallel processing - Volume Part II, EuroPar'11, pages 264-275. Springer, Aug. 2011 (acceptance rate 29.9%, 81/271)*
- ICS'11** T. Hoefler and M. Snir.: Generic Topology Mapping Strategies for Large-scale Parallel Architectures. *In Proceedings of the 2011 ACM International Conference on Supercomputing, ICS'11, pages 75–85. ACM, Jun. 2011 (acceptance rate 21.7%, 35/161)*
- ICS'11** J. Willcock, T. Hoefler, N. Edmonds, and A. Lumsdaine.: Active Pebbles: Parallel Programming for Data-Driven Applications. *In Proceedings of the 2011 ACM International Conference on Supercomputing, ICS'11, pages 235–245. ACM, Jun. 2011 (acceptance rate 21.7%, 35/161)*
- IPDPS'11** J. Domke, T. Hoefler, and W. Nagel.: Deadlock-Free Oblivious Routing for Arbitrary Topologies. *In Proceedings of the 25th IEEE International Parallel & Distributed Processing Symposium, IPDPS'11, pages 613–624. IEEE Computer Society, May 2011 (acceptance rate: 19.6%, 112/571)*
- PPoPP'11** J. Willcock, T. Hoefler, N. Edmonds, and A. Lumsdaine.: Active Pebbles: A Programming Model For Highly Parallel Fine-Grained Data-Driven Computations. *In Proceedings of the 16th ACM symposium on Principles and Practice of Parallel Programming, PPoPP'11, pages 305–306. ACM, Feb. 2011 **Best Poster at PPoPP'11** (acceptance rate: 25%, 26/165 papers + 16/165 poster).*
- PADL'11** E. Holk, W. E. Byrd, J. Willcock, and T. Hoefler, A. Chauhan, and A. Lumsdaine.: Kanor – A Declarative Language for Explicit Communication. *In Proceedings of the 13th international conference on Practical aspects of declarative languages, PADL'11, pages 190–204. Springer, Jan. 2011*
- HiPC'10** N. Edmonds, T. Hoefler, and A. Lumsdaine.: A Space-Efficient Parallel Algorithm for Computing Betweenness Centrality in Distributed Memory. *In Proceedings of International Conference on High Performance Computing, HiPC'10, pages 1–10. Dec. 2010 (acceptance rate: 19.2%)*
- SC'10** T. Hoefler, T. Schneider, and A. Lumsdaine.: Characterizing the Influence of System Noise on Large-Scale Applications by Simulation. *In Proceedings of the 2010 ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis, SC'10, pages 1–11. IEEE Computer Society, Nov. 2010 **Best Paper at SC10**, (acceptance rate: 19.8%, 50/253)*
- PACT'10** J. Willcock, T. Hoefler, N. Edmonds, and A. Lumsdaine.: AM++: A Generalized Active Message Framework. *In Proceedings of the 19th international conference on Parallel Architectures and Compilation Techniques, PACT'10, pages 401-410. ACM, Sept. 2010 (acceptance rate: 17%, 46/266)*
- EuroMPI'10** T. Hoefler, G. Bronevetsky, B. Barrett, B. R. de Supinski, and A. Lumsdaine.: Efficient MPI Support for Advanced Hybrid Programming Models. *In Recent Advances in the Message Passing Interface, EuroMPI'10, pages 50–61, volume LNCS 6305. Springer, Sept. 2010*
- EuroMPI'10** T. Hoefler, W. Gropp, R. Thakur, and J. L. Traeff.: Toward Performance Models of MPI Implementations for Understanding Application Scaling Issues. *In Recent Advances in the Message Passing Interface, EuroMPI'10, pages 21–30, volume LNCS 6305. Springer, Sept. 2010*
- EuroMPI'10** T. Hoefler and S. Gottlieb.: Parallel Zero-Copy Algorithms for Fast Fourier Transform and Conjugate Gradient using MPI Datatypes. *In Recent Advances in the Message Passing Interface, EuroMPI'10, pages 132–141, volume LNCS 6305. Springer, Sept. 2010*
- HotI'10** B. Arimilli, R. Arimilli, V. Chung, S. Clark, W. Denzel, B. Drerup, T. Hoefler, J. Joyner, J. Lewis, J. Li, N. Ni, and R. Rajamony.: The PERCS High-Performance Interconnect. *Proceedings of 18th Symposium on High-Performance Interconnects (Hot Interconnects 2010). IEEE, Aug. 2010. (invited paper)*
- PPoPP'10** T. Hoefler, C. Siebert, and A. Lumsdaine.: Scalable Communication Protocols for Dynamic Sparse Data Exchange. *Proceedings of the 2010 ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming, pages 159–168. ACM, Jan. 2010. (acceptance rate: 16.8%, 29/173)*
- HiPC'09** P. Kambadur, A. Gupta, T. Hoefler, and A. Lumsdaine.: Demand-driven Execution of Static Directed Acyclic Graphs Using Task Parallelism. *In Proceedings of International Conference on High Performance Computing, HiPC'09, pages 284–293. Dec. 2009 (acceptance rate: 11%, 35/320)*
- HotI'09** T. Hoefler, T. Schneider, and A. Lumsdaine.: Optimized Routing for Large-Scale InfiniBand Networks. *17th Annual IEEE Symposium on High Performance Interconnects, HOTI'09, IEEE Computer Society, Aug. 2009. (acceptance rate: 30%, 14/47)*

- ICPP'09** T. Hoefler, C. Siebert, and A. Lumsdaine.: Group Operation Assembly Language - A Flexible Way to Express Collective Communication *ICPP-2009 - The 38th International Conference on Parallel Processing*. IEEE, Sep. 2009. (acceptance rate: 32%, 71/220)
- EuroMPI'09** T. Hoefler, A. Lumsdaine, and J. Dongarra.: Towards Efficient MapReduce Using MPI. *Recent Advances in Parallel Virtual Machine and Message Passing Interface, 16th European PVM/MPI Users' Group Meeting, EuroPVM/MPI'09*. Springer, Sep. 2009.
- LCI'09** J. Mueller, T. Schneider, J. Domke, R. Geyer, M. Haesing, T. Hoefler, S. Hoehlig, G. Juckeland A. Lumsdaine, M. Mueller, and W. Nagel.: Cluster Challenge 2008: Optimizing Cluster Configuration and Applications to Maximize Power Efficiency. *Proceedings of the 10th LCI International Conference on High-Performance Clustered Computing, LCI'09, Mar. 2009*. **Best Student Paper at LCI'09**
- Cluster'08** T. Hoefler, T. Schneider, and A. Lumsdaine.: Multistage Switches are not Crossbars: Effects of Static Routing in High-Performance Networks. *Proceedings of the 2008 IEEE International Conference on Cluster Computing, CLUSTER'08*. IEEE Computer Society, Oct. 2008. (acceptance rate: 30%, 28/92)
- Cluster'08** T. Hoefler and A. Lumsdaine.: Message Progression in Parallel Computing - To Thread or not to Thread? *Proceedings of the 2008 IEEE International Conference on Cluster Computing, CLUSTER'08*. IEEE Computer Society, Oct. 2008. (acceptance rate: 30%, 28/92)
- HotI'08** P. Geoffray and T. Hoefler.: Adaptive Routing Strategies for Modern High Performance Networks. *16th Annual IEEE Symposium on High Performance Interconnects, HOTI'08, pages 165–172*. IEEE Computer Society, Aug. 2008. (acceptance rate: 30%, 14/47)
- SPAA'08** T. Hoefler, P. Gottschling, and A. Lumsdaine.: Leveraging Non-blocking Collective Communication in High-performance Applications. *Proceedings of the Twentieth Annual Symposium on Parallelism in Algorithms and Architectures, SPAA'08, pages 113–115*. Association for Computing Machinery (ACM), Jun. 2008. (acceptance rate: 28%, 36/128)
- SC07** T. Hoefler, A. Lumsdaine, and W. Rehm.: Implementation and Performance Analysis of Non-Blocking Collective Operations for MPI. *In proceedings of the 2007 International Conference on High Performance Computing, Networking, Storage and Analysis, SC07*. IEEE Computer Society/ACM, Nov. 2007. (acceptance rate: 20%, 54/268)
- EuroMPI'06** T. Hoefler, P. Gottschling, W. Rehm, and A. Lumsdaine.: Optimizing a Conjugate Gradient Solver with Non-Blocking Collective Operations. *Proceedings of Recent Advantages in Parallel Virtual Machine and Message Passing Interface, EuroPVM/MPI'06, pages 374–382*. Springer, Sep. 2006.
- EuroPar'06** F. Mietke, R. Baumgartl, R. Rex, T. Mehlan, T. Hoefler, and W. Rehm.: Analysis of the Memory Registration Process in the Mellanox InfiniBand Software Stack. *Proceedings of Euro-Par 2006 Parallel Processing, pages 124–133*. Springer-Verlag Berlin, Aug. 2006. (acceptance rate: 37.9%, 110/290)

### Edited Journals

- IJHPCA'13** T. Hoefler and Kamil Iskra (Editors):. Operating systems and runtime environments on supercomputers *IJHPCA, May 2013 (vol 27 no. 2)*.
- IJHPCA'12** T. Hoefler and Kamil Iskra (Editors):. Issues in Large Scale Computing Environments: Heterogeneous Computing and Operating Systems *IJHPCA, May 2012 (vol 26 no. 2)*.
- IEEE Micro'12** T. Hoefler, P. Geoffray, F. Petrini, J. L. Traeff (Editors):. Top Picks from Hot Interconnects 2011: Petascale Network Architectures *IEEE Micro, Jan/Feb. 2012 (vol 32 no. 1)*.
- PARCO'12** T. Hoefler (Editor):. Extensions for Next-Generation Parallel Programming Models. *Elsevier Parallel Computing, Jan/Feb. 2012*.

### Selected Journal Publications and Book Chapters

- IEEE TPDS'16** S. Ramos and T. Hoefler.: Cache Line Aware Algorithm Design for Cache-Coherent Architectures *IEEE Transactions on Parallel and Distributed Systems (TPDS)*. Vol PP, Nr. 99, IEEE, Jan. 2016
- IEEE MICRO'16** S. Di Girolamo, P. Jolivet, K. D. Underwood, and T. Hoefler.: Exploiting Offload Enabled Network Interfaces *IEEE MICRO*. Vol 36, Nr. 4, IEEE, Jul. 2016
- ACM TOPC'15** T. Hoefler, J. Dinan, R. Thakur, B. Barrett, P. Balaji, W. Gropp, K. Underwood.: Remote Memory Access Programming in MPI-3 *ACM Transactions on Parallel Computing (TOPC)*. ACM, Jan. 2015



- JSFI'14** T. Hoefler and D. Moor.: Energy, Memory, and Runtime Tradeoffs for Implementing Collective Communication Operations *Journal of Supercomputing Frontiers and Innovations*. Vol 1, Nr. 2, pages 58–75, Oct. 2014
- Computing'13** T. Schneider, R. Gerstenberger, T. Hoefler.: Application-oriented ping-pong benchmarking: how to assess the real communication overheads. *Journal of Computing*. Springer, May. 2013.
- Computing'13** T. Hoefler, J. Dinan, D. Buntinas, P. Balaji, B. Barrett, R. Brightwell, W. Gropp, V. Kale and R. Thakur.: MPI + MPI: a new hybrid approach to parallel programming with MPI plus shared memory. *Journal of Computing*. Springer, May. 2013.
- MPI-3.0 Standard** The MPI Forum.: MPI: A Message-Passing Interface Standard, Version 2.2. *Technical report, MPI Forum, 2012. (Chapters 5 (Collective Operations), 7 (Process Topologies), and 11 (One Sided))*.
- PPL'11** P. Balaji, D. Buntinas, D. Goodell, W. Gropp, T. Hoefler, S. Kumar, E. Lusk, R. Thakur, and J. L. Traeff.: MPI on Millions of Cores. *Parallel Processing Letters (PPL)*, Mar. 2011.
- CiSE'10** T. Hoefler.: Software and Hardware Techniques for Power-Efficient HPC Networking. *Computing in Science and Engineering (CiSE)*, Dec. 2010.
- CCPE'10** T. Hoefler, R. Rabenseifner, H. Ritzdorf, B. R. de Supinski, R. Thakur, , and J. L. Traeff.: The Scalable Process Topology Interface of MPI 2.2. *Concurrency and Computation: Practice and Experience*, Dec. 2010.
- MPI-2.2 Standard** The MPI Forum.: MPI: A Message-Passing Interface Standard, Version 2.2. *Technical report, MPI Forum, 2009. (Chapters 5 (Collective Operations) and 7 (Process Topologies))*.
- PPL'09** T. Hoefler, T. Schneider, and A. Lumsdaine.: The Effect of Network Noise on Large-Scale Collective Communications. *Parallel Processing Letters (PPL)*, 19(4):573–593, Aug. 2009.
- PARCO'07** T. Hoefler, P. Gottschling, A. Lumsdaine, and W. Rehm.: Optimizing a Conjugate Gradient Solver with Non-Blocking Collective Operations. *Elsevier Journal of Parallel Computing (PARCO)*, 33(9):624–633, Sep. 2007.

### Peer-reviewed Workshop Publications

- LSAP'11** T. Hoefler and M. Snir.: Performance Engineering: A Must for Petaflops and Beyond. *Proceedings of Workshop on Large-Scale System and Application Performance (LSAP 2011)*. **Keynote Paper**
- PROPER'10** T. Hoefler.: Bridging Performance Analysis Tools and Analytic Performance Modeling for HPC. *Proceedings of Workshop on Productivity and Performance (PROPER 2010)*. Springer, Dec. 2010. **Keynote Paper**
- LSAP'10** T. Hoefler, T. Schneider, and A. Lumsdaine.: LogGOPSim - Simulating Large-Scale Applications in the LogGOPS Model. *In Proceedings of the 19th ACM International Symposium on High Performance Distributed Computing, LSAP'10*, pages 597–604. ACM, Jun. 2010 **Best Paper at LSAP'10**
- HIPS'09** T. Hoefler and J. L. Traeff.: Sparse Collective Operations for MPI. *Proceedings of the 23rd IEEE International Parallel & Distributed Processing Symposium, HIPS'09 Workshop*, May 2009.
- LSPP'09** T. Hoefler, T. Schneider, and A. Lumsdaine.: The Impact of Network Noise at Large-Scale Communication Performance. *Proceedings of the 23rd IEEE International Parallel & Distributed Processing Symposium, LSPP'09 Workshop*, May 2009.
- CAC'09** C. Kaiser, T. Hoefler, B. Bierbaum, and T. Bemmerl.: Implementation and Analysis of Nonblocking Collective Operations on SCI Networks. *Proceedings of the 23rd IEEE International Parallel & Distributed Processing Symposium, CAC'09 Workshop*, May 2009.
- CAC'09** T. Hoefler, T. Schneider, and A. Lumsdaine.: A Power-Aware, Application-Based, Performance Study Of Modern Commodity Cluster Interconnection Networks. *Proceedings of the 23rd IEEE International Parallel & Distributed Processing Symposium, CAC'09 Workshop*, May 2009.
- CAC'08** T. Hoefler and A. Lumsdaine.: Optimizing non-blocking Collective Operations for InfiniBand. *Proceedings of the 22nd IEEE International Parallel & Distributed Processing Symposium, CAC'08 Workshop*, Apr. 2008.
- CAC'07** T. Hoefler, C. Siebert, and W. Rehm.: A practically constant-time MPI Broadcast Algorithm for large-scale InfiniBand Clusters with Multicast. *Proceedings of the 21st IEEE International Parallel & Distributed Processing Symposium, CAC'07 Workshop*, page 232. IEEE Computer Society, Mar. 2007.
- CAC'06** T. Hoefler, T. Mehlman, F. Mietke, and W. Rehm.: Fast Barrier Synchronization for InfiniBand. *Proceedings of the 20th IEEE International Parallel & Distributed Processing Symposium, CAC'06 Workshop*, Apr. 2006.

**PARS'05** [T. Hoefler](#) and [W. Rehm.](#): A Communication Model for Small Messages with InfiniBand. *PARS Mitteilungen (German)*, pages 32–41. *PARS*, Jun. 2005. **Received PARS Junior Researcher Award.**

## Selected Invited Talks

9 invited keynotes, more than 24 invited talks, not counting normal conference or workshop presentations

Keynote HPC China'16	<b>Theory and Practice in HPC: Modeling, Programming, and Networking</b> Keynote at the HPC China 2016 conference	<b>Xi'an, China</b>
Keynote Cluster'16	<b>Theory and Practice in HPC: Modeling, Programming, and Networking</b> Opening Keynote at the IEEE Cluster 2016 conference	<b>Taipei, Taiwan</b>
Keynote HIPS'15	<b>How fast will your application go? Static and dynamic techniques for application performance modeling.</b> Keynote at the HIPS'15/LSPP'15 combined workshop in conjunction with IPDPS'15	<b>Hyderabad, India</b>
Keynote LLVMHPC'14	<b>A case for runtime recompilation in HPC</b> Keynote at the LLVM Compiler Infrastructure in HPC workshop at SC14, Nov. 2014	<b>New Orleans, LA, USA</b>
Keynote ExaMPI'13	<b>MPI Beyond 3.0 and Towards Larger-Scale Computing</b> Keynote at the Workshop on Exascale MPI at SC13, Nov. 2013, ≈120 attendees	<b>Denver, CO, USA</b>
SC13	<b>The Second Green Graph500 List</b> Birds of a Feather, Nov. 2013	<b>Denver, CO, USA</b>
Dagstuhl	<b>Fault Tolerance for Remote Memory Access Programming Models</b> Invited to seminar "Resilience in Exascale Computing"	<b>Dagstuhl, Germany</b>
ISC'13	<b>The First Green Graph500 List</b> Birds of a Feather, Jun. 2013	<b>Leipzig, Germany</b>
EASC'13	<b>Application-Centric Benchmarking and Modeling for Co-Design</b> Exascale Applications and Software Conference	<b>Edinburgh, UK</b>
Keynote MCC'12	<b>MPI-3.0: A Response to New Challenges in Hardware and Software</b> Keynote talk at Multicore Challenge Conference 2012	<b>Stuttgart, Germany</b>
TiTech'12	<b>Optimized routing and process mapping for arbitrary network topologies</b> Invited talk at Tokio Institute of Technology	<b>Tokio, Japan</b>
Keynote EuroMPI'11	<b>Writing Parallel Libraries with MPI - The Good, the Bad, and the Ugly</b> Keynote talk at 18th European PVM/MPI User's Group Meeting	<b>Santorini, Greece</b>
Keynote EnA-HPC'11	<b>Energy-aware Software Development for Massive-Scale Systems</b> Keynote at the International Conference on Energy-Aware High Performance Computing	<b>Hamburg, Germany</b>
Jülich 2011	<b>Model-Driven HPC Software and System Design and Optimization</b> Jülich Supercomputing Center, Apr. 2011	<b>Jülich, Germany</b>
Keynote PROPER'10	<b>Analytical Performance Modeling and Simulation for Blue Waters</b> Keynote at the Workshop on Productivity and Performance in conjunction with EuroPar, Aug. 2010	<b>Ischia, Italy</b>
Argonne Natl. Laboratory	<b>Nonblocking and Sparse Collective Operations on Petascale Computers</b> Argonne National Laboratory, Jun. 2010	<b>Chicago, IL, USA</b>
SC'09 BoF	<b>Selected MPI-2.2 and MPI-3 Features</b> MPICH Birds of a Feather, Nov. 2009	<b>Portland, OR, USA</b>
Cisco Systems	<b>The Effects of Common Communication Patterns in Large-Scale Networks with Switch-Based Static Routing</b> Nerd Lunch at Cisco Systems, Aug. 2008	<b>San Jose, CA, USA</b>
Berkeley Natl. Laboratory	<b>Multistage Interconnection Networks are not Crossbars</b> Lawrence Berkeley National Laboratory, Aug. 2008	<b>Berkeley, CA, USA</b>
Livermore Natl. Laboratory	<b>Non-blocking Collective Operations for MPI</b> Lawrence Livermore National Laboratory, Aug. 2008	<b>Livermore, CA, USA</b>

HLRS	<b>Non-blocking Collectives for MPI-2</b> High Performance Computing Center Stuttgart (HLRS), Dec. 2007	Stuttgart, Germany
ABINIT Workshop	<b>Optimization of a parallel 3d-FFT with non-blocking Collective Operations</b> Invited to the 3rd International ABINIT Developer Workshop, Jan. 2007	Liege, Belgium
TU Munich	<b>Fast Barrier Synchronization for InfiniBand</b> Technical University of Munich, Sep. 2005	Munich, Germany

## Impact

DFSSSP Routing	<b>Deadlock-free Single Source Shortest Path routing</b> The fastest routing algorithm for arbitrary topologies. Available in OpenSM (the InfiniBand subnet manager) and used at various sites. (with J. Domke)
Nonblocking Collectives	<b>Nonblocking Collective Operations for MPI</b> Proposed algorithms and reference implementation that are now used in virtually every MPI implementation. Drove the standardization in MPI-3.0.
Neighborhood Collectives	<b>Neighborhood Collective Operations for MPI</b> Proposed algorithms and reference implementation that are now used in virtually every MPI implementation. Drove the standardization in MPI-3.0.
RMA Programming	<b>Remote Memory Access Programming</b> Co-editor and driver of the MPI-3.0 One Sided chapter. This functionality is implemented in virtually all MPI libraries. (with W. Gropp and R. Thakur)

## External Funding

raised ≈\$3.22M in funding from government and industry.

2016–2021	<b>Data-Centric Parallel Programming (DAPP)</b> EUR 1.5M; ERC Starting Grant	ETH Zürich
2013–2017	<b>A Heterogeneous Compiler Platform for Scientific Codes</b> \$649,713; Platform for Advanced Scientific Computing	ETH Zürich
2013–2016	<b>Data-Centric Compilation Techniques for Parallel Programs</b> \$188,171; Swiss National Science Fund	ETH Zürich
2013–2016	<b>Google Ph.D. Fellowship for Maciej Besta</b> \$255,000 unrestricted gift; First European Fellowship for Parallel Computing	ETH Zürich
2013	<b>Programming Hierarchical Memory Systems for Big Data Analytics</b> \$30,000 unrestricted gift by IBM (faculty award)	ETH Zürich
2013–2016	<b>A Quick Development Path for Performance Models</b> ETH's share: \$177,338; DFG Special Priority Programme SPPEXA (funded by SNF)	ETH Zürich
2011–2012	<b>Nonblocking Collective Operations for Portals IV</b> \$50,000 subcontract of Sandia National Laboratories, NNSA, DOE, to UIUC	University of Illinois
2010–2013	<b>Compiled MPI: Cost-Effective Exascale Application Development</b> UI's share: \$165,000; funded under DOE X-Stack; in Collaboration with Daniel Quinlan, Greg Bronevetsky (LLNL) and Andrew Lumsdaine (IU)	University of Illinois
2005	<b>Quantum Mechanical Computations</b> € 55,000; individual funding for Ph.D. studies received from AMD Saxony	Chemnitz University of Technology

## Teaching Experience

(co)taught 3 undergraduate courses, 4 graduate courses, 6 seminars, 15 tutorials, 8 PhD committees

Nov. 2015	<b>Full-day Tutorial: Advanced Parallel Programming with MPI</b> <i>co-presented with P. Balaji, B. Gropp, R. Thakur, ≈ 70 attendees</i>	SC15 Austin, TX
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Nov. 2015	<b>Half-day Tutorial: Insightful Automatic Performance Modeling</b> <i>co-presented with A. Calotoiu, M. Schulz, F. Wolf, ≈ 30 attendees</i>	SC15 Austin, TX
Sep. 2015	<b>Half-day Tutorial: Insightful Automatic Performance Modeling</b> <i>co-presented with A. Calotoiu, M. Schulz, F. Wolf, ≈ 20 attendees</i>	EuroMPI'15 Bordeaux, France
Sep. 2015	<b>Full-day Tutorial: Advanced Parallel Programming with MPI</b> <i>≈ 20 attendees</i>	Speedup'15 Lugano, Switzerland
Jun. 2015	<b>Half-day Tutorial: Advanced Parallel Programming with MPI</b> <i>co-presented with P. Balaji, ≈ 40 attendees</i>	ISC'15 Frankfurt, Germany
Spring 2015	<b>Operating Systems and Networks</b> <i>co-taught with Adrian Perrig, undergrad, ≈ 140 students</i>	ETH Zürich
Spring 2015	<b>Computational Science, Seminar</b> <i>co-taught with Peter Arbenz &amp; Petros Koumoutsakos, ≈ 15 students</i>	ETH Zürich
Spring 2015	<b>Research Topics in Software Engineering, Seminar</b> <i>≈ 25 students</i>	ETH Zürich
Nov. 2014	<b>Full-day Tutorial: Advanced Parallel Programming with MPI</b> <i>co-presented with P. Balaji, B. Gropp, R. Thakur, ≈ 120 attendees</i>	SC14 Denver, CO, USA
Sep. 2014	<b>Full-day Tutorial: Advanced Parallel Programming with MPI</b> <i>invited lecturer ≈ 50 attendees</i>	EuroMPI/Asia 2014 Kobe, Japan
Fall 2013	<b>Design of Parallel and High-Performance Computing</b> <i>co-taught with Markus Pueschel ≈ 35 students</i>	ETH Zürich
Jun. 2014	<b>Full-day Tutorial: Advanced Parallel Programming with MPI</b> <i>co-presented with Pavan Balaji, ≈ 15 attendees</i>	ISC'13 Leipzig, Germany
Spring 2014	<b>Operating Systems and Networks</b> <i>co-taught with Adrian Perrig, undergrad, ≈ 130 students</i>	ETH Zürich
Spring 2014	<b>Computational Science, Seminar</b> <i>co-taught with Peter Arbenz &amp; Petros Koumoutsakos, ≈ 10 students</i>	ETH Zürich
Nov. 2013	<b>Tutorial: Advanced Parallel Programming with MPI</b> <i>co-presented with Pavan Balaji, Rajeev Thakur, James Dinan ≈ 50 attendees</i>	SC13 Denver, CO, USA
Fall 2013	<b>Design of Parallel and High-Performance Computing</b> <i>co-taught with Markus Pueschel ≈ 25 students</i>	ETH Zürich
Fall 2013	<b>Research Topics in Software Engineering, Seminar</b> <i>co-taught with Martin Vechev ≈ 20 students</i>	ETH Zürich
Jul. 2013	<b>MPI Programming</b> <i>Invited lecturer at CHPC Winter School, ≈ 65 students</i>	University of Johannesburg Johannesburg, South Africa
Jun. 2013	<b>Tutorial: Advanced Parallel Programming with MPI</b> <i>co-presented with Pavan Balaji &amp; Martin Schulz, ≈ 15 attendees</i>	ISC'13 Leipzig, Germany
Jun. 2013	<b>Tutorial: Advanced Parallel Programming with MPI</b> <i>co-presented with Pavan Balaji, ≈ 25 attendees</i>	ICS'13 Eugene, OR, USA
Spring 2013	<b>Operating Systems and Networks</b> <i>co-taught with Donald Kossmann, undergrad, ≈ 130 students</i>	ETH Zürich
Spring 2013	<b>Computational Science, Seminar</b> <i>co-taught with Peter Arbenz &amp; Petros Koumoutsakos, ≈ 5 students</i>	ETH Zürich
Feb 24	<b>Tutorial: MPI &amp; Advanced Parallel Programming</b> <i>co-presented with Pavan Balaji</i>	PPoPP'13 Shenzen, China
Fall 2012	<b>Design of Parallel and High-Performance Computing</b> <i>co-taught with Thomas Gross &amp; Markus Pueschel, ≈ 25 students</i>	ETH Zürich
Fall 2012	<b>Computational Science, Seminar</b> <i>co-taught with Peter Arbenz &amp; Petros Koumoutsakos, ≈ 5 students</i>	ETH Zürich

- Jun 17 **Tutorial: Next Generation MPI Programming** **ISC'12**  
*co-presented with Martin Schulz, ≈ 25 attendees* **Hamburg, Germany**
- May 23-15 **Tutorial: Advanced Distributed Memory Parallel Programming** **CSCS**  
 Advanced Distributed Memory Parallel Programming: MPI-2.2, MPI 3.0 and PGAS, ≈ 35 attendees
- Spring 2011 **Hot Topics in HPC: Networks and Fault tolerance, CS498** **University of Illinois**  
 (4cr grad./3cr undergrad.), *co-taught with Franck Cappello, ≈ 25 students*

### Advising and Mentoring

I advise(d) 6 Ph.D. students and 9 M.Sc. students.

#### PhD Students

**ETH Zürich**

Maciej Besta  
 Timo Schneider  
 Salvatore di Girolamo  
 Tobias Gysi  
 Grzegorz Kwasniewski  
 Bogdan Prisacari (co-advised with Cyriel Minckenberg)

#### Master Students

**ETH Zürich**

Andrea Arteaga (MS 2014), first job: MeteoSwiss  
 Roberto Belli (visiting MS 2014), first job: Credit Suisse  
 Jeremiah Bär (MS 2015)  
 Erik Henriksson (visiting MS 2015)

#### Master Students

**University of Technology Chemnitz**

Timo Schneider (MS 2011), first job: PhD student at ETH Zurich  
 Sven Eckelmann (MS 2011), first job: independent consultant  
 Christian Siebert (MS 2006), first job: PhD student at RWTH Aachen, Germany  
 Andre Lichei (MS 2006), first job: Capgemini, Munich, Germany  
 Mirko Reinhardt (MS 2006)

#### Master Students

**Technical University of Dresden**

Jens Domke (MS 2010), co-advised with W. Nagel, first job: Tokio Institute of Technology, Japan

- 2008 **Co-Advisor** **Indiana University**  
 Cluster Challenge Preparation  
 Preparing (the winning) IU/TUD team of undergraduate students for the challenge at SC'08
- 2007 **Co-Advisor** **Indiana University**  
 Cluster Challenge Preparation  
 Preparing the IU team of undergraduate students for the challenge at SC'07.
- 2013 **PhD Thesis Committee Member** **ETH Zurich**  
 Served on the PhD committee for Omar Awile (Peter Widmayer) at D-INFK ETH Zurich
- 2014 **PhD Thesis Committee Member** **ETH Zurich**  
 Served on the PhD committee for Daniel Crisan (Lothar Thiele) at D-ITET ETH Zurich
- 2014 **PhD Thesis Committee Member** **University of Oslo**  
 Served on the PhD committee for Ernst Gunnar Gran (Olaf Lysne) at University of Oslo
- 2014 **PhD Thesis Committee Member** **University of Versailles**  
 Served on the PhD committee for Silvain Didelot (William Jalby) at University of Versailles
- 2014 **PhD Thesis Committee Member** **Polytechnic University of Catalonia**  
 Served on the PhD committee for Ana Jakanovic (Jesus Labarta) at Polytechnic University of Catalonia
- 2015 **PhD Thesis Committee Member** **University of Bordeaux**  
 Served on the PhD committee for Emmanuelle Saillard (Denis Barthou) at University of Bordeaux
- 2015 **PhD Thesis Committee Member** **Polytechnic University of Catalonia**  
 Served on the PhD committee for German Llort (Jesus Labarta) at Polytechnic University of Catalonia

## Service

### Leadership Service

- 2010–now **MPI Forum Meetings**, *MPI-3 Working Group for Collective Operations and Topology*
- 2012–now **Green Graph 500**, *chair the Green Graph 500 list of the greenest data analytics machines.*
- 2014–now **Workshop on High-Performance Interconnects in the Exascale and Big-Data**, *Steering Committee*
- 2014–now **Platform for Advanced Scientific Computing Conference**, *Steering Committee*
- ACM PASC'17 **ACM Platform for Advanced Scientific Computing Conference**, *Program Co-Chair*
- ICPP'17 **International Conference on Parallel Processing**, *Area Co-Chair*
- IPDPS'17 **International Parallel & Distributed Processing Symposium**, *Area Co-Chair*
- ACM PASC'16 **ACM Platform for Advanced Scientific Computing Conference**, *Program Co-Chair*
- HOTI'14 **Hot Interconnects**, *Tutorials Co-Chair*
- SIAM PP'14 **SIAM Parallel Processing**, *Member of the Organizing Committee*
- HOTI'13 **Hot Interconnects**, *General Co-Chair*
- EuroPar'13 **European Conference on Parallel Processing**, *Local Topic Chair for High-Performance Networks and Communication*
- ROSS'13 **International Workshop on Runtime & Operating Systems for Supercomputers**, *General Co-Chair*
- HOTI'12 **Hot Interconnects**, *Program Chair*
- SC'12 **IEEE/ACM Supercomputing**, *Technical Posters Chair*
- ROSS'12 **International Workshop on Runtime & Operating Systems for Supercomputers**, *General Co-Chair*
- HIPS'11 **16th International Workshop on High-Level Parallel Programming Models and Supportive Environments**, *General Chair*
- ROSS'11 **International Workshop on Runtime & Operating Systems for Supercomputers**, *General Co-Chair*
- HOTI'11 **Hot Interconnects**, *Program Co-Chair*
- HOTI'10 **Hot Interconnects**, *Tutorials Chair*

### Standardization Committees

- 2012–present **MPI Forum**, *Representing ETH Zurich, Chair of the Collective Operations and Topology Working Group for MPI-3.1*
- 2010–2012 **MPI Forum**, *Representing University of Illinois at Urbana-Champaign, Chair of the Collective Operations and Topology Working Group for MPI-3*
- 2007–2010 **MPI Forum**, *Representing Indiana University, Chair of the Collective Operations Working Group, Co-Author of the Chapter 5 (Collective Communication) and Chapter 7 (Process Topologies) in MPI-2.2*

### Advisory Service

- 2014 **NSF Reviewer (Big Data call)** **NSF, Washington, DC**  
(reviewing grant proposals asking for ≈\$1M per proposal)
- 2013 **Proposal Reviewer** **SNF, Switzerland**  
(reviewing grant proposals asking for ≈\$400.000 per proposal)
- 2012 **DOE Exploratory Panel** **DOE, Washington, DC**  
Performance Modeling Early Explorations (basis for future funding decisions, resulted in DOE workshop and program)
- 2011 **NSF Review Panel** **NSF, Washington, DC**  
(reviewing grant proposals asking for ≈\$500.000 per proposal)
- 2010 **Scientific Software Innovation Institute for Quantum Chemistry** **NSF, Washington, DC**  
Exploratory Workshop

2010 **Scientific Software Innovation Institute for Parallel Tools**  
Exploratory Workshop

NSF, Washington, DC

### Journal Editorial Boards

2014–present	<b>Subject Area Editor</b> Supercomputing Frontiers and Innovations	<b>SuperFri</b>
2014–present	<b>Associate Editor</b> IEEE Transactions on Parallel and Distributed Systems	<b>IEEE TPDS</b>
2013–present	<b>Associate Editor</b> Elsevier Parallel Computing Journal	<b>PARCO</b>
2012–present	<b>Associate Editor</b> SAGE International Journal of High Performance Computing Applications	<b>IJHPCA</b>

### Technical Program Committee Member (alphabetically)

AMP/PLDI	<b>Advances in Message Passing, 2010</b>
Big Data	<b>IEEE Conference on Big Data, 2013</b>
CACHES/ICS	<b>Characterizing Applications for Heterogeneous Exascale Systems, 2011</b>
AsHES/IPDPS	<b>Accelerators and Heterogeneous Exascale Systems, 2012</b>
CASS/IPDPS	<b>Comm. Architecture for Scalable Systems (formerly CAC), 2010, 2011, 2012, 2013</b>
CCGrid	<b>IEEE Symposium on Cluster Computing and the Grid, 2009, 2010, 2011, 2012, 2013, 2014</b>
Cluster	<b>IEEE Conference on Cluster Computing, 2010, 2012</b>
E2SC/SC	<b>International Workshop on Energy Efficient Supercomputing, 2015</b>
ESPAS/HiPEAC	<b>Extreme Scale Parallel Architectures and Systems, 2012</b>
EuroMPI	<b>former EuroPVM/MPI, 2009, 2010, 2011, 2012, 2013</b>
HiPC	<b>High Performance Computing Conference, 2011, 2012, 2013</b>
HIPS/IPDPS	<b>High-Level Par. Programming Models and Supportive Environments, 2011, 2012, 2013</b>
HotI	<b>IEEE Hot Interconnects, 2009, 2010, 2011, 2012, 2013</b>
HPCC	<b>High Performance Computing and Communications, 2011, 2012</b>
ICPP	<b>Intl. Conference on Parallel Processing, 2012, 2013</b>
ICS	<b>ACM International Conference on Supercomputing, 2011, 2014</b>
IPDPS	<b>IEEE Intl. Parallel &amp; Distributed Processing Symposium, 2010, 2013, 2015</b>
ISC	<b>International Supercomputing Conference, 2012, 2014 (tutorials)</b>
IWAPT	<b>International Workshop on Automatic Performance Tuning, 2014, 2017</b>
PACT	<b>Parallel Architectures and Compilation Techniques, 2015</b>
LLVM/SC	<b>Workshop on the LLVM Compiler Infrastructure in HPC, 2015, 2016</b>
NRE/SC	<b>Workshop on Numerical reproducibility in high-performance computing, 2015, 2016</b>
PARCO	<b>Parallel Computing, 2014</b>
P2S2/ICPP	<b>Par. Progr. Models and Systems Software for High-End Comp., 2010, 2011, 2012</b>
PGAS	<b>Partitioned Global Address Space Programming Models, 2014</b>
PPoPP	<b>Symposium on Principles and Practice of Parallel Programming, 2012, 2013 (ERC), 2014, 2016 (ERC)</b>
SC	<b>ACM/IEEE Conference on High Performance Computing, 2010, 2011, 2012, 2013 (stepped down), 2014 (stepped down)</b>
SC	<b>ACM/IEEE SC Doctoral Showcase Committee, 2012</b>
SC	<b>ACM/IEEE SC Technical Posters Committee, 2012, 2013</b>
SPAA	<b>Symposium on Parallelism in Algorithms and Architectures, 2013</b>
HUCAA/HPDC	<b>Heterogeneous Unconventional Cluster Architectures and Applications, 2011, 2012, 2013</b>

## Technical Program Committee Reviewer/Scientific Journal Reviewer

AJSE	<b>Arabian Journal for Science and Engineering</b> , 2011, 2012
CACM	<b>Communications of the ACM</b> , 2013
CAC/IPDPS	<b>Communication Architecture for Clusters</b> , 2008
CCPE	<b>Elsevier Concurrency and Computation: Practice and Experience</b> , 2011, 2012
CISE	<b>IEEE Computing in Science and Engineering</b> , 2010
Cluster	<b>IEEE Conference on Cluster Computing</b> , 2007, 2008, 2010
Cluster	<b>Springer Journal on Cluster Computing</b> , 2014
Computer	<b>IEEE Computer</b> , 2009
Euro-Par	<b>Euro-Par</b> , 2010, 2011, 2012
GPCE	<b>Intl. Conference on Generative Programming</b> , 2013
ICPP	<b>Intl. Conference on Parallel Processing</b> , 2010
IJHPCA	<b>Intl. Journal of High Performance Computing Applications</b> , 2009
IJPEDS	<b>Intl. Journal of Parallel, Emergent and Distributed Systems</b> , 2008
IPDPS	<b>IEEE Intl. Parallel &amp; Distributed Processing Symposium</b> , 2008, 2009, 2010, 2011, 2012
JPDC	<b>Intl. Journal of Parallel and Distributed Computing</b> , 2011
PGAS	<b>Partitioned Global Address Space Conference</b> , 2011
SC	<b>ACM/IEEE Conference on High Performance Computing</b> , 2007, 2008, 2009, 2010, 2011, 2012
SISC	<b>SIAM Journal on Scientific Computing</b> , 2014
SPAA	<b>Symposium on Parallelism in Algorithms and Architectures</b> , 2009
TPDS	<b>IEEE Transactions on Parallel and Distributed Systems</b> , 2008, 2009, 2012
TCOM	<b>IEEE Transactions on Communications</b> , 2012
PARCO	<b>Elsevier Parallel Computing</b> , 2011

## Organized Workshops

**Co-Chair of Intl. Workshop on Runtime and Operating Systems for Supercomputers (ROSS'14)**, Organized in conjunction with ACM ICS'14, Munich, Germany, 2014

**Co-Chair of Intl. Workshop on Runtime and Operating Systems for Supercomputers (ROSS'13)**, Organized in conjunction with ACM ICS'13, Eugene, OR, 2013

**Co-Chair of Intl. Workshop on Runtime and Operating Systems for Supercomputers (ROSS'12)**, Organized in conjunction with ACM ICS'12, Venice, Italy, 2012

**Co-Chair of Intl. Workshop on Runtime and Operating Systems for Supercomputers (ROSS'11)**, Organized in conjunction with ACM ICS'11, Tucson, AZ, 2011

**16th International Workshop on High-Level Parallel Programming Models and Supportive Environments (HIPS'11)**, Organized in conjunction with IEEE IPDPS'11, Anchorage, AL, USA, 2011

**1st Blue Waters Performance Modeling Workshop**, Organized a performance modeling workshop with speakers from the Los Alamos National Laboratory for early users of the Blue Waters Petascale system, Urbana, IL, 2010

**3rd KiCC Workshop**, Co-Organized 3rd workshop on Kommunikation in Clusterrechnern und Clusterverbundsystemen, Aachen 2007

**2nd KiCC Workshop**, Co-Organized 2nd workshop on Kommunikation in Clusterrechnern und Clusterverbundsystemen, Chemnitz 2007

**1st KiCC Workshop**, Co-Organized 1st workshop on Kommunikation in Clusterrechnern und Clusterverbundsystemen, Chemnitz 2005

## Professional Organizations

**IEEE Computer Society**, Member

**Association for Computing Machinery (ACM)**, Member

**ACM SIGHPC**, Member and Member at Large (elected)

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## Significant Project Involvement

### Research Projects

- 2010–2013 **NSF Blue Waters**, *Sustained Petaflop Computing with the Blue Waters machine. Responsible for Modelling and Simulation of Parallel Petaflop Applications*
- 2008–2010 **DOE CIFTS**, *Coordinated and Improved Fault Tolerance for High Performance Computing Systems*
- 2007–2010 **DOE FAST-OS II**, *Forum to Address Scalable Technology for Runtime and Operating Systems*
- 2005–2006 **CHiC**, *Co-Design and Procurement of the Chemnitzer Hochleistungs-Linux-Cluster, project volume 2.6 + 1.7 Million Euro, 528 diskless InfiniBand nodes, 8.2 TFlop/s (73.4% HPL efficiency) #117 in Top 500 June 2007*

### Software Projects

- 2008–present **LogGOPSim**, *Network performance simulator using the LogGOPS model*
- 2006–present **Netgauge**, *Network performance measurement tool (open source)*
- 2008 **ORCS**, *Oblivious Routing Congestion Simulator (completed successfully)*
- 2006–2008 **LibNBC**, *Implementation of Nonblocking Collective Operations (completed successfully)*
- 2006–2008 **Open MPI**, *Open source MPI implementation (contributed to collectives framework)*