

Xin Liang

CONTACT

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Corvallis, OR 97331 E-mail: xin.liang@oregonstate.edu
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EDUCATION

Ph.D. in Computer Science	<i>September 2014–December 2019</i>
University of California, Riverside, CA	
B.S. in Computer Science	<i>September 2010–July 2014</i>
Peking University, Beijing, China	
Minor in Math and Applied Math	<i>September 2011–July 2014</i>
Peking University, Beijing, China	

RESEARCH INTEREST

High Performance Computing
Parallel, Distributed & Heterogeneous Systems
Data Management & Data Reduction
Scientific Data Analysis & Visualization
Fault Tolerance & Resilience in HPC Systems
Parallel File Systems & I/O Libraries

WORK EXPERIENCE

Associate Professor , Oregon State University, Corvallis, OR, <i>January 2026–present</i>
Assistant Professor , University of Kentucky, Lexington, KY, <i>August 2022–December 2025</i>
Assistant Professor , Missouri University of Science & Technology, Rolla, MO, <i>January 2021–August 2022</i>
Computer/Data Scientist , Scientific Data Group / Workflow Systems Group, Oak Ridge National Laboratory, Oak Ridge, TN, <i>March 2020–December 2020</i>
Research Intern , Extreme Scale Resilience Group, Argonne National Laboratory, Lemont, IL, <i>January 2018–December 2019</i>
Research Intern , Scalable Machine Learning Group, Pacific Northwest National Laboratory, Richland, WA, <i>October 2017–December 2017</i>
Research Intern , Data Science at Scale Team, Los Alamos National Laboratory, Los Alamos, NM, <i>June 2017–September 2017</i>
Research Assistant , Supercomputing Laboratory, University of California, Riverside, Riverside, CA, <i>September 2014–June 2017</i>

HONOURS AND AWARDS

- Pigman College of Engineering Excellence in Research Award, University of Kentucky Stanley and Karen Pigman Colledge of Engineering. **2025**
- Best Paper Award, IEEE IPDPS. **2025**
- CAREER Award, NSF. **2025**
- 2023 Best Paper Award from IEEE Transactions on Big Data, the IEEE Computer Society Publications Board. **2024**
- IEEE CS TCHPC Early Career Researchers Award For Excellence in High Performance Computing, IEEE TCHPC. **2024**
- EPSCoR Research Fellows, NSF. **2023**
- Best Paper Finalists, ACM ICS. **2023**
- CISE Research Initiation Initiative (CRII) Award, NSF. **2022**
- R&D 100 Award (SZ compression framework), R&D World. **2021**
- Best Paper Award in the Data, Storage, and Visualization area, IEEE Cluster. **2018**
- Best Paper Award in the Application, Algorithms and Libraries area & Overall Best Paper Award, IEEE Cluster. **2018**
- Dissertation Year Program Fellowship, University of California, Riverside, Riverside. **2018**
- Dean's Distinguished Fellowship, University of California, Riverside, Riverside. **2014**

GRANTS

- *Collaborative Research: OAC Core: Mitigating Artifacts in Scientific Data Compressors with a Learning-driven Framework*, Site PI, \$600K (my share \$300K, in collaboration with UIUC), NSF, 10/2025 - 09/2028.

- CAREER: *Data Polymorphism: Enabling Fast and Adaptable Scientific Data Retrieval with Progressive Representations*, PI, \$500K, NSF, 07/2025 - 06/2030.
- RII Track-4: *NSF: Scalable MPI with Adaptive Compression for GPU-based Computing Systems*, PI, \$280K, NSF, 02/2024 - 01/2026.
- Collaborative Research: *OAC Core: Topology-Aware Data Compression for Scientific Analysis and Visualization*, Lead PI, \$600K (my share \$200K, in collaboration with OSU and U. of Utah), NSF, 09/2023 - 08/2026.
- Collaborative Research: *Elements: ProDM: Developing A Unified Progressive Data Management Library for Exascale Computational Science*, Lead PI, \$600K (my share \$240K, in collaboration with NJIT and Temple U.), NSF, 08/2023 - 07/2026.
- Collaborative Research: *CyberTraining: Pilot: Research Workforce Development for Deep Learning Systems in Advanced GPU Cyberinfrastructure*, Site PI, \$300K (my share \$98K, in collaboration with UNT, Missouri S&T, and SIUC), NSF, 12/2022 - 09/2025.
- Improving Quality of Lossy Compression by Feature Regeneration, PI, \$231K, ANL subaward, 10/2022 - 09/2025.
- OAC:CRII: Enabling Quantities-of-Interest Error Control for Trust-Driven Lossy Compression, PI, \$175K, NSF, 06/2022 - 03/2025.
- BigWave: *Big Data Wirelessly Collection System Design and Optimization for Remote Area Sensing*, co-PI, \$27K, Missouri S&T seed, 06/2022 - 12/2022.
- ESAMR: *Enabling Scalable Analytics using Multi-precision Refactoring*, PI, \$640K, ORNL LDRD, 10/2020 - 09/2022.
- SIRIUS-2: *Science-driven Data Management for Multitier Storage 2.0*, Senior Personnel, \$500K/year, DOE ASCR, 10/2020 - 09/2025.
- RAPIDS-2: *A SciDAC Institute for Computer Science, Data, and Artificial Intelligence*, Senior Personnel, \$5.75M/year, DOE ASCR, 10/2020 - 09/2025.

REFEREED
CONFERENCE
PUBLICATIONS
(WITH MY
STUDENTS
UNDERLINED)

- [IPDPS'26] Pu Jiao, Sheng Di, Jiannan Tian, Mingze Xia, Xuan Wu, Yang Zhang, **Xin Liang***, Franck Cappello, “Mitigating Artifacts in Pre-quantization Based Scientific Data Compressors with Quantization-aware Interpolation.” *Proceedings of the 40th IEEE International Parallel Distributed Processing Symposium*, New Orleans, LA, May 25 - May 29, 2026. (*: Corresponding authors)
- [IPDPS'26] Yuxiao Li, Mingze Xia, **Xin Liang**, Bei Wang, Robert Underwood, Sheng Di, Hemant Sharma, Dishant Beniwal, Franck Cappello, Hanqi Guo, “pMSz: A Distributed Parallel Algorithm for Correcting Morse-Smale Segmentations for Lossy Compression.” *Proceedings of the 40th IEEE International Parallel Distributed Processing Symposium*, New Orleans, LA, May 25 - May 29, 2026.
- [VIS'25] Nathaniel Gorski, **Xin Liang**, Hanqi Guo, Bei Wang, “TFZ: Topology-Preserving Compression of 2D Symmetric and Asymmetric Second-Order Tensor Fields.” *Proceedings of the 2025 IEEE VIS Conference*, Vienna, Austria, Nov 2 - 7, 2025.
- [SC'25] Yanliang Li⁺, Wenbo Li⁺, Qian Gong, Qing Liu, Norbert Podhorszki, Scott Klasky, **Xin Liang**, and Jieyang Chen, “HP-MDR: High-performance and Portable Data Refactoring and Progressive Retrieval with Advanced GPUs.” *Proceedings of the 37th ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis*, St. Louis, MO, USA, Nov 16 - 21, 2025. (+: Co-first authors)
- [SC'25] Shixun Wu, Jinwen Pan, Jinyang Liu, Jiannan Tian, Ziwei Qiu, Jiajun Huang, Kai Zhao, **Xin Liang**, Sheng Di, Zizhong Chen, and Franck Cappello, “Boosting Scientific Error-Bounded Lossy Compression through Optimized Synergistic Lossy-Lossless Orchestration.” *Proceedings of the 37th ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis*, St. Louis, MO, USA, Nov 16 - 21, 2025.
- [SC'25] Qian Gong, Mark Ainsworth, Jieyang Chen, **Xin Liang**, Liangji Zhu, Ethan Klasky, Tushar Athawale, Qing Liu, Anand Rangarajan, Sanjay Ranka, and Scott Klasky, “Stability-preserving Lossy Compression for Large-scale Partial Differential Equations.” *Proceedings of the 37th ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis*, St. Louis, MO, USA, Nov 16 - 21, 2025.
- [SC'25] Franck Cappello et al., “What to Support When You’re Compressing: The State of Practice, Gaps, and Opportunities for Scientific Data Compression.” *Proceedings of the 37th ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis*, St. Louis, MO, USA, Nov 16 - 21, 2025.
- [VLDB'25] Jinyang Liu⁺, Pu Jiao⁺, Kai Zhao, **Xin Liang***, Sheng Di, Franck Cappello, “QPET: A Versatile and Portable Quantity-of-Interest-Preservation Framework for Error-Bounded

Lossy Compression.” *Proceedings of the 51st International Conference on Very Large Data Bases, London, United Kingdom, Sep 1 - Sep 5, 2025.* (+: Co-first authors, *: Corresponding authors)

- [ICDE’25] Mingze Xia, Bei Wang, Yuxiao Li, Pu Jiao, **Xin Liang***, Hanqi Guo, “TspSZ: An Efficient Parallel Error-Bounded Lossy Compressor for Topological Skeleton Preservation.” *Proceedings of the 41st IEEE International Conference on Data Engineering, Hong Kong SAR, China, May 19 - 23, 2025.* (*: Corresponding authors)
- [IPDPS’25] Xuan Wu, Sheng Di, Congrong Ren, Pu Jiao, Mingze Xia, Cheng Wang, Hanqi Guo, **Xin Liang***, Franck Cappello, “Enabling Efficient Error-controlled Lossy Compression for Unstructured Scientific Data.” *Proceedings of the 39th IEEE International Parallel & Distributed Processing Symposium, Milan, Italy, June 3 - 7, 2025. Selected for the Best Paper Award.* (*: Corresponding authors) **Best Paper Award.**
- [IPDPS’25] Pu Jiao, Sheng Di, Mingze Xia, Xuan Wu, Jinyang Liu, **Xin Liang***, Franck Cappello, “Improving the Efficiency of Interpolation-Based Scientific Data Compressors with Adaptive Quantization Index Prediction.” *Proceedings of the 39th IEEE International Parallel & Distributed Processing Symposium, Milan, Italy, June 3 - 7, 2025.* (*: Corresponding authors)
- [IPDPS’25] Jieyang Chen, Qian Gong, **Xin Liang**, Qing Liu, Lipeng Wan, Yanliang Li, Norbert Podhorszki, Scott Klasky, “HPDR: High-Performance Portable Scientific Data Reduction Framework.” *Proceedings of the 39th IEEE International Parallel & Distributed Processing Symposium, Milan, Italy, June 3 - 7, 2025.*
- [PacificVis’25/TCVG] Nathan Gorski, **Xin Liang**, Hanqi Guo, Lin Yan, Bei Wang, “A General Framework for Augmenting Lossy Compressors with Topological Guarantees.” *Proceedings of the 18th IEEE Pacific Visualization Conference (fast track to IEEE Transactions on Visualization and Computer Graphics), 2025.*
- [SIGMOD’25] Longtao Zhang, Ruoyu Li, Congrong Ren, Sheng Di, Jinyang Liu, Jiajun Huang, Robert Underwood, Pascal Grosset, Dingwen Tao, **Xin Liang**, Hanqi Guo, Franck Cappello, Kai Zhao, “LCP: Enhancing Scientific Data Management with Lossy Compression for Particles.” *Proceedings of the 2025 ACM SIGMOD International Conference on Management of Data, Berlin, Germany, Jun 22 - 27, 2025.*
- [SC’24] Xuan Wu, Qian Gong, Jieyang Chen, Qing Liu, Norbert Podhorszki, **Xin Liang***, Scott Klasky, “Error-controlled Progressive Retrieval of Scientific Data under Derivable Quantities of Interest.” *Proceedings of the 36th ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis, Atlanta, GA, USA, Nov 17 - 22, 2024.* (*: Corresponding authors)
- [SC’24] Jiajun Huang, Sheng Di, Xiaodong Yu, Yujia Zhai, Jinyang Liu, Zizhe Jian, **Xin Liang**, Kai Zhao, Xiaoyi Lu, Zizhong Chen, Franck Cappello, “hZCCL: Accelerating Collective Communication with Co-Designed Homomorphic Compression.” *Proceedings of the 36th ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis, Atlanta, GA, USA, Nov 17 - 22, 2024.*
- [VIS’24] Yuxiao Li, **Xin Liang**, Bei Wang, Yongfeng Qiu, Lin Yan, Hanqi Guo, “MSz: An Efficient Parallel Algorithm for Correcting Morse-Smale Segmentations in Error-Bounded Lossy Compressors.” *Proceedings of the 2024 IEEE VIS Conference, St. Pete Beach, FL, USA, Oct 13 - 18, 2024.*
- [EuroVis’24] Congrong Ren, **Xin Liang**, Hanqi Guo, “A Prediction-Traversal Approach for Compressing Scientific Data on Unstructured Meshes with Bounded Error.” *Proceedings of 26th EG Conference on Visualization, Odense, Denmark, May 27 - May 31, 2024.*
- [IPDPS’24] Zizhe Jian, Sheng Di, Jinyang Liu, Kai Zhao, **Xin Liang**, Haiying Xu, Robert Underwood, Shixun Wu, Jiajun Huang, Zizhong Chen, Franck Cappello, “CliZ: Optimizing Lossy Compression for Climate Datasets with Adaptive Fine-tuned Data Prediction.” *Proceedings of 38th IEEE International Parallel & Distributed Processing Symposium, San Francisco, California, May 27 - May 31, 2024.*
- [SIGMOD’24] Jinyang Liu, Sheng Di, Kai Zhao, **Xin Liang**, Sian Jin, Zizhe Jian, Jiajun Huang, Shixun Wu, Zizhong Chen, Franck Cappello, “High-performance Effective Scientific Error-bounded Lossy Compression with Auto-tuned Multi-component Interpolation.” *Proceedings of the 2024 ACM SIGMOD International Conference on Management of Data, Santiago, Chile, June 9 - Jun 15, 2024.*
- [ICDE’24] Mingze Xia, Sheng Di, Franck Cappello, Pu Jiao, Kai Zhao, Jinyang Liu, Xuan Wu, **Xin Liang***, and Hanqi Guo, “Preserving Topological Feature with Sign-of-Determinant Predicates in Lossy Compression: A Case Study of Vector Field Critical Points.” *Proceedings of the 40th IEEE International Conference on Data Engineering, Utrecht, Netherlands, May 13 - May 17, 2024.*

16, 2024. (*: Corresponding authors)

- [Big Data'23] Jinyang Liu, Sheng Di, Sian Jin, Kai Zhao, **Xin Liang**, Zizhong Chen, Franck Cappello, “Scientific Error-bounded Lossy Compression with Super-resolution Neural Networks.” *Proceedings of the 2023 IEEE International Conference on Big Data*, Sorrento, Italy, Dec 15 - Dec 18, 2023.
- [HiPC'23] Pu Jiao, Sheng Di, Jinyang Liu, **Xin Liang***, and Franck Cappello, “Characterization and Detection of Artifacts for Error-controlled Lossy Compressors.” *Proceedings of the 30th IEEE International Conference on High Performance Computing, Data, and Analytics*, Goa, India, Dec 18 - Dec 21, 2023. (*: Corresponding authors)
- [VIS'23] Lin Yan, **Xin Liang**, Hanqi Guo, Bei Wang, “TopoSZ: Preserving Topology in Error-Bounded Lossy Compression.” *Proceedings of the 2023 IEEE VIS Conference*, Melbourne, Australia, Oct 22 - 27, 2023.
- [HPDC'23] Lipeng Wan, Jieyang Chen, **Xin Liang**, Ana Gainaru, Qian Gong, Qing Liu, Ben Whitney, Joy Arulraj, Zhengchun Liu, Ian Foster, Scott Klasky, “RAPIDS: Reconciling Availability, Accuracy, and Performance in Managing Geo-Distributed Scientific Data.” *Proceedings of the 32nd International Symposium on High-Performance Parallel and Distributed Computing*, Orlando, FL, Jun 20 - 23, 2023.
- [HPDC'23] Boyuan Zhang, Jiannan Tian, Sheng Di, Xiaodong Yu, Yunhe Feng, **Xin Liang**, Dingwen Tao, Franck Cappello, “FZ-GPU: A Fast and High-Ratio Lossy Compressor for Scientific Computing Applications on GPUs.” *Proceedings of the 32nd International Symposium on High-Performance Parallel and Distributed Computing*, Orlando, FL, Jun 20 - 23, 2023.
- [ICS'23] Jinyang Liu, Sheng Di, Kai Zhao, **Xin Liang**, Zizhong Chen, Franck Cappello, “FAZ: A flexible auto-tuned modular error-bounded compression framework for scientific data.” *Proceedings of the 37th International Conference on Supercomputing*, Orlando, FL, Jun 21 - 23, 2023. **Nominated in the Best Paper Finalist**.
- [ICDE'23] Jinzhen Wang, **Xin Liang**, Ben Whitney, Jieyang Chen, Qian Gong, Xubin He, Lipeng Wan, Scott Klasky, Norbert Podhorszki, Qing Liu, “Improving Progressive Retrieval for HPC Scientific Data using Deep Neural Network.” *Proceedings of the 39th International Conference on Data Engineering*, Anaheim, CA, Apr 4 - 6, 2023.
- [VLDB'23] Pu Jiao, Sheng Di, Hanqi Guo, Kai Zhao, Jiannan Tian, Dingwen Tao, **Xin Liang***, and Franck Cappello, “Toward Quantity-of-Interest Preserving Lossy Compression for Scientific Data.” *Proceedings of the 49th International Conference on Very Large Data Bases*, Vancouver, Canada, Aug 28 - Sep 1, 2023. (*: Corresponding authors).
- [PPoPP'23] Jieyang Chen, **Xin Liang**, Kai Zhao, Hadi Zamani Sabzi, Laxmi Bhuyan, and Zizhong Chen, “Improving Energy Saving of One-sided Matrix Decompositions on CPU-GPU Heterogeneous Systems.” *Proceedings of the 28th ACM SIGPLAN Annual Symposium on Principles and Practice of Parallel Programming*, Montreal, Canada. Feb 25 - Mar 1, 2023.
- [HiPC'22] Arindam Khanda, Sanjukta Bhowmick, **Xin Liang**, Sajal K Das., “Parallel Vertex Color Update on Large Dynamic Networks.” *Proceedings of the 29th IEEE International Conference on High Performance Computing, Data, and Analytics*, Bangalore, India, Dec 18 - 21, 2022.
- [SC'22] Jinyang Liu, Sheng Di, Kai Zhao, **Xin Liang**, Zizhong Chen, and Franck Cappello, “Dynamic Quality Metric Oriented Error Bounded Lossy Compression for Scientific Datasets.” *Proceedings of the 34th ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis*, Dallas, TX, USA, Nov 13 - 18, 2022.
- [SSDBM'22] Qian Gong, Ben Whitney, Chengzhu Zhang, **Xin Liang**, Anand Rangarajan, Jieyang Chen, Lipeng Wan, Paul Ullrich, Qing Liu, Robert Jacob, Sanjay Ranka, and Scott Klasky, “Region-adaptive, Error-controlled Scientific Data Compression using Multilevel Decomposition.” *Proceedings of the 34th International Conference on Scientific and Statistical Database Management*, Copenhagen, Denmark, July 6-8, 2022.
- [HPDC'22] Xiaodong Yu, Sheng Di, Kai Zhao, Jiannan Tian, Dingwen Tao, **Xin Liang**, and Franck Cappello, “Ultra-fast Error-bounded Lossy Compression for Scientific Dataset.” *Proceedings of the 31st ACM International Symposium on High-Performance Parallel and Distributed Computing*, Minneapolis, MN, June 27-July 1, 2022. Acceptance Rate: 19% (21/108)
- [ICDE'22] Kai Zhao, Sheng Di, Danny Perez, **Xin Liang**, Zizhong Chen, and Franck Cappello, “MDZ: An Efficient Error-bounded Lossy Compressor for Molecular Dynamics.” *Proceedings of the 38th IEEE International Conference on Data Engineering*, Virtual, May 9 - 12, 2022.
- [Cluster'21] Jinyang Liu, Sheng Di, Kai Zhao, Sian Jin, Dingwen Tao, **Xin Liang**, Zizhong Chen, and Franck Cappello, “Exploring Autoencoder-Based Error-Bounded Compression for Scientific Data.” *Proceedings of the 2021 IEEE International Conference on Cluster Computing*,

Portland, OR, USA, September 7-10, 2021. Acceptance Rate: 29% (48/163)

- [Cluster'21] Jiannan Tian, Sheng Di, Xiaodong Yu, Cody Rivera, Kai Zhao, Sian Jin, Yunhe Feng, **Xin Liang**, Dingwen Tao, and Franck Cappello, “Optimizing Error-Bounded Lossy Compression for Scientific Data on GPUs.” *Proceedings of the 2021 IEEE International Conference on Cluster Computing*, Portland, OR, USA, September 7-10, 2021. Acceptance Rate: 29% (48/163)
- [SC'21] **Xin Liang**, Qian Gong, Jieyang Chen, Ben Whitney, Lipeng Wan, Qing Liu, David Pugmire, Rick Archibald, Norbert Podhorszki, and Scott Klasky, “Error-controlled, Progressive, and Adaptable Retrieval of Scientific Data with Multilevel Decomposition.” *Proceedings of the 33rd ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis*, St. Louis, Missouri, USA, Nov 14 - 19, 2021. Acceptance Rate: 23.6% (86/365)
- [SC'21] Sihuan Li, Sheng Di, Kai Zhao, **Xin Liang**, Zizhong Chen, and Franck Cappello, “Resilient Error-bounded Lossy compressor for Data Transfer.” *Proceedings of the 33rd ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis*, St. Louis, Missouri, USA, Nov 14 - 19, 2021. Acceptance Rate: 23.6% (86/365)
- [IPDPS'21] Jieyang Chen, Lipeng Wan, **Xin Liang**, Ben Whitney, Qing Liu, Dave Pugmire, Nicholas Thompson, Matthew Wolf, Todd Munson, Ian Foster, and Scott Klasky, “Accelerating Multigrid-based Hierarchical Scientific Data Refactoring on GPUs.” *Proceedings of the 35th IEEE International Parallel and Distributed Symposium*, Portland, Oregon, May 17-21, 2021. Acceptance Rate: 23% (105/462)
- [IPDPS'21] Jiannan Tian, Cody Rivera, Sheng Di, Jieyang Chen, **Xin Liang**, Dingwen Tao, and Franck Cappello, “Revisiting Huffman Coding: Toward Extreme Performance on Modern GPU Architectures.” *Proceedings of the 35th IEEE International Parallel and Distributed Symposium*, Portland, Oregon, May 17-21, 2021. Acceptance Rate: 23% (105/462)
- [Cluster'20] Sihuan Li, Sheng Di, Kai Zhao, **Xin Liang**, Zizhong Chen, and Franck Cappello, “Towards End-to-end SDC Detection for HPC Applications Equipped with Lossy Compression.” *Proceedings of the 22nd IEEE International Conference on Cluster Computing*, Kobe, Japan, September 14 - 17 2020. Acceptance Rate: 20% (27/132)
- [PACT'20] Jiannan Tian, Sheng Di, Kai Zhao, Cody Rivera, Megan Hickman, Robert Underwood, Sian Jin, **Xin Liang**, Jon Calhoun, Dingwen Tao, and Franck Cappello, “cuSZ: An Efficient GPU Based Error-Bounded Lossy Compression Framework for Scientific Data.” *Proceedings of the 29th International Conference on Parallel Architectures and Compilation Techniques*, Atlanta, GA, USA, October 3 - 7, 2020. Acceptance Rate: 25% (35/137)
- [HPDC'20] Kai Zhao, Sheng Di, **Xin Liang**, Sihuan Li, Dingwen Tao, Zizhong Chen, and Franck Cappello, “Significantly Improving Lossy Compression for HPC Datasets with Second-Order Prediction and Parameter Optimization.” *Proceedings of the 28th ACM International Symposium on High-Performance Parallel and Distributed Computing*, Stockholm, Sweden, June 23 - 26, 2020. Acceptance Rate: 22% (16/71)
- [PPOPP'20] Jiannan Tian, Sheng Di, Chengming Zhang, **Xin Liang**, Sian Jin, Dazhao Cheng, Dingwen Tao, and Franck Cappello, “waveSZ: A Hardware-Algorithm Co-Design of Efficient Lossy Compression for Scientific Data.” *Proceedings of the 25th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming*, San Diego, California, USA, February 22 - 26, 2020. Acceptance Rate: 23% (28/121)
- [PacificVis'20] **Xin Liang**, Hanqi Guo, Sheng Di, Franck Cappello, Mukund Raj, Chunhui Liu, Kenji Ono, Zizhong Chen, and Tom Peterka, “Towards Feature Preserving 2D and 3D Vector Field Compression.” *Proceedings of the 13rd IEEE Pacific Visualization Symposium*, Tianjin, China, Apr 14 - 17, 2020. Acceptance Rate: 24% (23/96)
- [SC'19] **Xin Liang**, Sheng Di, Sihuan Li, Dingwen Tao, Bogdan Nicolae, Zizhong Chen, and Franck Cappello, “Significantly Improving Lossy Compression Quality based on An Optimized Hybrid Prediction Model.” *Proceedings of the 31st ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis*, Denver, Colorado, USA, Nov 17 - 22, 2019. Acceptance Rate: 25.3% (87/344)
- [SC'19] Sihuan Li, Hongbo Li, **Xin Liang**, Jieyang Chen, Elisabeth Giem, Kaiming Ouyang, Kai Zhao, Sheng Di, Franck Cappello, and Zizhong Chen, “FT-iSort: Efficient Fault Tolerance for Introsort.” *Proceedings of the 31st ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis*, Denver, Colorado, USA, Nov 17 - 22, 2019. Acceptance Rate: 25.3% (87/344)
- [Cluster'19] **Xin Liang**, Sheng Di, Dingwen Tao, Sihuan Li, Bogdan Nicolae, Zizhong Chen, and Franck Cappello, “Improving Performance of Data Dumping with Lossy Compression for

Scientific Simulation.” *Proceedings of the 2019 IEEE International Conference on Cluster Computing*, Albuquerque, New Mexico USA, September 23 - 26, 2019.

- [ICS’19] Jieyang Chen, Nan Xiong, **Xin Liang**, Dingwen Tao, Sihuan Li, Kaiming Ouyang, Kai Zhao, Nathan DeBardeleben, Qiang Guan, and Zizhong Chen, “TSM2: Optimizing Tall-and-Skinny Matrix-Matrix Multiplication on GPUs.” *Proceedings of the 33rd ACM International Conference on Supercomputing*, Phoenix, AZ, USA, June 26 - 28, 2019. Acceptance Rate: 23.3% (45/193)
- [HPDC’19] Sian Jin, Sheng Di, **Xin Liang**, Jiannan Tian, Dingwen Tao, and Franck Cappello, “DeepSZ: A Novel Framework to Compress Deep Neural Networks by Using Error-Bounded Lossy Compression.” *Proceedings of the 28th ACM International Symposium on High-Performance Parallel and Distributed Computing*, Phoenix, AZ, USA, June 24 - 28, 2019. Acceptance Rate: 20.7% (22/106)
- [BigData’18] **Xin Liang**, Sheng Di, Dingwen Tao, Sihuan Li, Shaomeng Li, Hanqi Guo, Zizhong Chen, and Franck Cappello, “Error-Controlled Lossy Compression Optimized for High Compression Ratios of Scientific Datasets.” *Proceedings of the 2018 IEEE International Conference on Big Data*, Seattle, WA, USA, December 10 - 13, 2018. Acceptance Rate: 18.9% (98/518)
- [BigData’18] Sihuan Li, Sheng Di, **Xin Liang**, Zizhong Chen, and Franck Cappello, “Optimizing Lossy Compression with Adjacent Snapshots for N-body Simulation Data.” *Proceedings of the 2018 IEEE International Conference on Big Data*, Seattle, WA, USA, December 10 - 13, 2018. Acceptance Rate: 18.9% (98/518)
- [BigData’18] Jieyang Chen, Qiang Guan, **Xin Liang**, Paul Bryant, Patricia Grubel, Allen McPherson, Li-Ta Lo, Timothy Randles, Zizhong Chen and James Ahrens, “Build and Execution Environment (BEE): an Encapsulated Environment Enabling HPC Applications Running Everywhere.” *Proceedings of the 2018 IEEE International Conference on Big Data*, Seattle, WA, USA, December 10 - 13, 2018. Acceptance Rate: 18.9% (98/518)
- [Cluster’18] **Xin Liang**, Sheng Di, Dingwen Tao, Zizhong Chen, and Franck Cappello, “An Efficient Transformation Scheme for Lossy Data Compression with Point-wise Relative Error Bound.” (**Best Paper Award in the Data, Storage, and Visualization area**) *Proceedings of the 2018 IEEE International Conference on Cluster Computing*, Belfast, UK, September 10 - 13, 2018.
- [Cluster’18] Ali Murat Gok, Sheng Di, Yuri Alexeev, Dingwen Tao, Vladimir Mironov, **Xin Liang**, and Franck Cappello, “PaSTRI: Error-Bounded Lossy Compression for Two-Electron Integrals in Quantum Chemistry.” (**Best Paper Award in the Application, Algorithms and Libraries area, Overall Best Paper Award**) *Proceedings of the 2018 IEEE International Conference on Cluster Computing*, Belfast, UK, September 10 - 13, 2018.
- [Cluster’18] Dingwen Tao, Sheng Di, **Xin Liang**, Zizhong Chen, and Franck Cappello, “Fixed-PSNR Lossy Compression for Scientific Data.” (short paper) *Proceedings of the 2018 IEEE International Conference on Cluster Computing*, Belfast, UK, September 10 - 13, 2018.
- [SC’18] Jieyang Chen, Hongbo Li, Sihuan Li, **Xin Liang**, Panruo Wu, Dingwen Tao, Kaiming Ouyang, Yuanlai Liu, Qiang Guan, and Zizhong Chen, “FT-MAGMA: Fault Tolerance Dense Matrix Decomposition on Heterogeneous Systems with GPUs.” *Proceedings of the 30th ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis*, Dallas, Texas, USA, Nov 11 - 16, 2018. Acceptance Rate: 19.1% (55/288)
- [ICDCS’18] Jieyang Chen, Qiang Guan, Zhao Zhang, **Xin Liang**, Louis Vernon, Allen Mcpherson, Li-Ta Lo, Zizhong Chen, Patricia Grubel, and James Ahrens, “BeeFlow : a Workflow Management System for In situ Processing Across HPC and Cloud Systems.” *Proceedings of the 38th IEEE International Conference on Distributed Computing Systems*, Vienna, Austria, July 2-5, 2018. Acceptance Rate: 20.6% (78/378).
- [HPDC’18] Dingwen Tao, Sheng Di, **Xin Liang**, Zizhong Chen, and Franck Cappello, “Improving Performance of Iterative Methods by Lossy Checkpointing.” *Proceedings of the 27th ACM International Symposium on High-Performance Parallel and Distributed Computing*, Tempe, AZ, USA, June 11 - 15, 2018. Acceptance Rate: 19.6% (22/112)
- [SC’17] **Xin Liang**, Jieyang Chen, Dingwen Tao, Sihuan Li, Panruo Wu, Hongbo Li, Kaiming Ouyang, Yuanlai Liu, Fengguang Song, and Zizhong Chen, “Correcting Soft Errors Online in Fast Fourier Transform.” *Proceedings of the 29th ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis*, Denver, Colorado, USA, Nov 12 - 17, 2017. Acceptance Rate: 18.6% (61/327)
- [PPoPP’17] Panruo Wu, Qiang Guan, Nathan DeBardeleben, Sean Blanchard, Jieyang Chen, Dingwen Tao, **Xin Liang**, Sihuan Li, Kaiming Ouyang, and Zizhong Chen, “Silent Data Cor-

ruption Resilient Two-sided Matrix Factorizations.” *Proceedings of the 22nd ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming*, Austin, Texas, USA, February 4 - 8 2017. Acceptance Rate: 21.9%. 29/132)

- [SC’16] Jieyang Chen, Li Tan, Panruo Wu, Dingwen Tao, Hongbo Li, **Xin Liang**, Sihuan Li, Rong Ge, Laxmi Bhuyan, and Zizhong Chen, “GreenLA: Green Linear Algebra Software for GPU-Accelerated Heterogeneous Computing.” *Proceedings of the 28th ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis*, Salt Lake City, Utah, USA, Nov 13 - 18, 2016. Acceptance Rate: 18.4% (82/446).
- [HPDC’16] Dingwen Tao, Shuaiwen Leon Song, Sriram Krishnamoorthy, Panruo Wu, **Xin Liang**, Zheng Eddy Zhang, Darren Kerbyson, and Zizhong Chen, “New-Sum: A Novel Online ABFT Scheme for General Iterative Methods.” *Proceedings of the 25th ACM International Symposium on High-Performance Parallel and Distributed Computing*, Kyoto, JAPAN, May 31- June 4, 2016 Acceptance Rate: 15.5% (20/129).
- [HPDC’16] Panruo Wu, Qiang Guan, Nathan DeBardeleben, Sean Blanchard, Dingwen Tao, **Xin Liang**, Jieyang Chen, and Zizhong Chen, “Towards Practical Algorithm Based Fault Tolerance in Dense Linear Algebra.” *Proceedings of the 25th ACM International Symposium on High-Performance Parallel and Distributed Computing*, Kyoto, JAPAN, May 31 - June 4, 2016. Acceptance Rate: 15.5% (20/129).
- [IPDPS’16] Jieyang Chen, **Xin Liang**, and Zizhong Chen, “Online Algorithm-Based Fault Tolerance for Cholesky Decomposition on Heterogeneous Systems with GPUs.” *Proceedings of the 30th IEEE International Parallel & Distributed Processing Symposium*, Chicago, Illinois, USA, May 23-27, 2016. Acceptance Rate: 22.98% (114/496).
- [HPCC’15] Teresa Davies, **Xin Liang**, Jieyang Chen, Zizhong Chen, “Simulated Annealing to Generate Numerically Stable Real Number Error Correction Codes.” *Proceedings of the 2015 IEEE 17th International Conference on High Performance Computing and Communications*, New York, USA, August 24 - 26, 2015

REFEREED
JOURNAL
PUBLICATIONS

- [CSUR] Sheng Di, Jinyang Liu, Kai Zhao, **Xin Liang**, et al., “A Survey on Error-Bounded Lossy Compression for Scientific Datasets.” *ACM Computing Surveys*, 2025.
- [TVCG] **Xin Liang**, Sheng Di, Franck Cappello, Mukund Raj, Chunhui Liu, Kenji Ono, Zizhong Chen, Tom Peterka, and Hanqi Guo, “Toward Feature-Preserving Vector Field Compression.” *IEEE Transactions on Visualization and Computer Graphics*, 2022.
- [TBD] **Xin Liang***, Kai Zhao*, Sheng Di, Sihuan Li, Robert Underwood, Ali M. Gok, Jiannan Tian, Junjing Deng, Jon C. Calhoun, Dingwen Tao, Zizhong Chen, and Franck Cappello, “SZ3: A Modular Framework for Composing Prediction-based Error-bounded Lossy Compressors.” *IEEE Transactions on Big Data*, 2022. **2023 Best Paper Award from IEEE Transactions on Big Data by the IEEE Computer Society Publications Board.** (*: Co-first authors)
- [TC] **Xin Liang***, Ben Whitney*, Jieyang Chen, Lipeng Wan, Qing Liu, Dingwen Tao, James Kress, David Pugmire, Matthew Wolf, Norbert Podhorszki, and Scott Klasky, “MGARD+: Optimizing Multilevel Methods for Error-bounded Scientific Data Reduction.” *IEEE Transaction on Computers*, 2021. (*: Co-first authors)
- [TPDS-SS] Lipeng Wan, Axel Huebl, Junmin Gu, Franz Poesschel, Ana Gainaru, Ruonan Wang, Jieyang Chen, **Xin Liang**, Dmitry Ganyushin, Todd Munson, Ian Foster, Jean-Luc Vay, Norbert Podhorszki, Kesheng Wu, and Scott Klasky, “Improving I/O Performance for Exascale Applications through Online Data Layout Reorganization.” *IEEE Transactions on Parallel and Distributed Systems Special Section on Innovative R&D toward the Exascale Era*, 2021.
- [TVCG] Hanqi Guo, David Lenz, Jiayi Xu, **Xin Liang**, Wenbin He, Iulian R. Grindeanu, Han-Wei Shen, Tom Peterka, Todd Munson, and Ian Foster, “FTK: A Simplicial Spacetime Meshing Framework for Robust and Scalable Feature Tracking.” *IEEE Transactions on Visualization and Computer Graphics*, 2021.
- [TPDS-SS-AI] Kai Zhao, Sheng Di, Sihuan Li, **Xin Liang**, Yujia Zhai, Jieyang Chen, Kaiming Ouyang, Franck Cappello, and Zizhong Chen, “Algorithm-Based Fault Tolerance for Convolutional Neural Networks.” *IEEE Transactions on Parallel and Distributed Systems Special Section on Parallel and Distributed Computing Techniques for AI, ML and DL*, 2020.
- [IJHPCA] Franck Cappello, Sheng Di, Sihuan Li, **Xin Liang**, Ali Murat Gok, Dingwen Tao, Chun Hong Yoon, Xin-Chuan Wu, Yuri Alexeev, and Frederic T Chong, “Use Cases of Lossy Compression for Floating-Point Data in Scientific Data Sets.” *The International Journal of High Performance Computing Applications*, 2019.
- [TPDS] Dingwen Tao, Sheng Di, **Xin Liang**, Zizhong Chen, and Franck Cappello, “Optimizing Lossy Compression Rate-Distortion from Automatic Online Selection between SZ and ZFP.”

IEEE Transactions on Parallel and Distributed Systems, 2019.

- [TPDS] Sheng Di, Dingwen Tao, **Xin Liang**, and Franck Cappello, “Efficient Lossy Compression for Scientific Data based on Pointwise Relative Error Bound.” *IEEE Transactions on Parallel and Distributed Systems*, 2018.

SERVICES

- **Guest Editor:** Electronics (Special Issue “New Trends for High-Performance Computing”)
- **Program Chairs/Co-chairs:** DRBSD’24, IWBDI’23, IWBDI’22
- **Organizing Committee:** DRBSD’25, IWBDI’25, DRBSD’24, DRBSD’23, IWBDI’23, DRBSD’22, IWBDI’22
- **Programs Committee:** ICDM’25, BigData’25, CCGGrid’25, Cloud Summit’25, BigData’24, CCGGrid’24, SSDBM’24, BigData’23, DRBSD’23, ICPP’23, SSDBM’23, BigData’22, SC’22, CIKM’22, SSDBM’22
- **Reviewers:** EuroVis’25, pacificVis’25, VIS’22, VIS’21, VIS’20, PacificVis’20, ChinaVis’20, TPDS, TC, TCAD, JSA, JV, KAIS, KnoSys

TEACHING

- **Instructor**, CS/MA321: Introduction to Numerical Methods, University of Kentucky, Lexington, KY, August–December 2025.
- **Instructor**, CS 621: Parallel and Distributed Computing, University of Kentucky, Lexington, KY, January–May 2025.
- **Instructor**, CS/MA321: Introduction to Numerical Methods, University of Kentucky, Lexington, KY, August–December 2024.
- **Instructor**, CS 621: Parallel and Distributed Computing, University of Kentucky, Lexington, KY, January–May 2024.
- **Instructor**, CS/MA321: Introduction to Numerical Methods, University of Kentucky, Lexington, KY, August–December, 2023.
- **Instructor**, CS 621: Parallel and Distributed Computing, University of Kentucky, Lexington, KY, January–May 2023.
- **Instructor**, CS/MA321: Introduction to Numerical Methods, University of Kentucky, Lexington, KY, August–December 2022.
- **Instructor**, CS6001: High Performance Computing, Missouri S&T, Rolla, MO, January–May 2022.
- **Instructor**, CS5200: Analysis of Algorithms, Missouri S&T, Rolla, MO, August–December 2021.
- **Instructor**, CS2500: Algorithms, Missouri S&T, Rolla, MO, January–May, 2021.
- **Teaching Assistant**, CS150: Automata and Formal Languages, University of California, Riverside, Riverside, CA, April–June 2016.
- **Teaching Assistant**, CS008: Introduction to Computing, University of California, Riverside, Riverside, CA, April–June 2016.
- **Teaching Assistant**, CS161: Design & Architecture of Computer Systems, University of California, Riverside, Riverside, CA, January–March 2016.
- **Teaching Assistant**, CS203: Advanced Computer Architecture, University of California, Riverside, Riverside, CA, January–March 2016.
- **Teaching Assistant**, CS010: Intro: CS for Sci, Math & Engr I, University of California, Riverside, Riverside, CA, October–December 2015.
- **Teaching Assistant**, CS008: Introduction to Computing, University of California, Riverside, Riverside, CA, October–December 2015.

TALKS AND PRESENTATIONS

- 09/2024, seminar talk, Accelerating Scientific Data Compression with Advanced GPUs, University of Kentucky, KY, USA.
- 10/2023, invited talk, Advancing Exascale Data Management with Trust-Driven Lossy Compression, University of Alabama at Birmingham, Birmingham, AL, USA.
- 04/2022, invited talk, Keeping-up with Exascale Data Flood via Trust-Aware Data Reduction, University of Kentucky, KY, USA.
- 11/2021, presentation, Error-controlled, Progressive, and Adaptable Retrieval of Scientific Data with Multilevel Decomposition, the 33rd ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis, St. Louis, Missouri, USA.
- 02/2020, invited talk, Fidelity-Oriented Data Reduction for Exascale Data Management, Oak Ridge National Laboratory, Oak Ridge, TN, USA.

- 02/2020, invited talk, Keeping-up with Exascale Data Flood with Adaptive Error-bounded Lossy Compression, Missouri University of Science and Technology, Rolla, MO, USA.
- 12/2019, seminar talk, Keeping-up with Exascale Data Flood with Adaptive Error-bounded Lossy Compression, Argonne National Laboratory, Lemont, IL, USA.
- 11/2019, invited talk, Keeping-up with Exascale Data Flood with Adaptive Error-bounded Lossy Compression, Oak Ridge National Laboratory, Oak Ridge, TN, USA.
- 11/2019, presentation, Significantly Improving Lossy Compression Quality based on An Optimized Hybrid Prediction Model, the 31st ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis, Denver, CO, USA.
- 09/2019, presentation, Improving Performance of Data Dumping with Lossy Compression for Scientific Simulation, the 2019 IEEE International Conference on Cluster Computing, Albuquerque, New Mexico, USA.
- 04/2019, presentation, DeepSZ: A Novel Framework to Compress Deep Neural Networks by Using Error-Bounded Lossy Compression, the Joint Laboratory for Extreme Scale Computing Workshop, Knoxville, TN, USA.
- 04/2019, poster presentation, Significantly Improving Lossy Compression Quality based on An Optimized Hybrid Prediction Model, the Joint Laboratory for Extreme Scale Computing Workshop, Knoxville, TN, USA.
- 01/2019, poster presentation, EZ: Exascale Lossy Compression for Scientific Data, 2019 ECP Annual Meeting, Houston, TX, USA.
- 12/2018, presentation, Error-Controlled Lossy Compression Optimized for High Compression Ratios of Scientific Datasets, the 2018 IEEE International Conference on Big Data, Seattle, WA, USA.
- 09/2018, presentation, An Efficient Transformation Scheme for Lossy Data Compression with Point-wise Relative Error Bound, the 2018 IEEE International Conference on Cluster Computing, Belfast, UK.
- 11/2017, presentation, Correcting Soft Errors Online in Fast Fourier Transform, the 29th ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis, Denver, Colorado, USA.
- 08/2015, presentation, Simulated Annealing to Generate Numerically Stable Real Number Error Correction Codes. 17th IEEE International Conference on High Performance Computing and Communications, New York, USA.

TRAVEL GRANTS

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| • Student Travel Grant, IEEE Big Data 2018 | 2018 |
| • Student Travel Grant, IEEE Cluster 2018 | 2018 |
| • Student Travel Grant, IEEE/ACM SC'16 | 2016 |
| • Student Travel Grant, IEEE/ACM SC'15 | 2015 |

ACTIVITIES

- | | |
|--------------------------------------|-------------|
| • Student Volunteer, IEEE BigData'18 | 2018 |
| • Student Volunteer, NAS'16 | 2016 |
| • Student Volunteer, IEEE/ACM SC'16 | 2016 |
| • Student Volunteer, IEEE/ACM SC'15 | 2015 |