

Dingwen Tao, Ph.D.

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Professional Preparation

- Ph.D. *University of California, Riverside*, Riverside, CA
Computer Science & Engineering, **2018**
- B.S. *University of Science and Technology of China*, Hefei, China
Information & Computing Science, **2013**

Professional Appointments

August **2020** – present: **Assistant Professor**, *Washington State University*
School of Electrical Engineering & Computer Science

August **2018** – July **2020**: **Assistant Professor**, *University of Alabama*
Computational Science Initiative

January **2018** – June **2018**: **Research Assistant**, *Brookhaven National Laboratory*
Computational Science Initiative

June **2016** – December **2017**: **Research Assistant**, *Argonne National Laboratory*
Mathematics and Computer Science Division

June **2015** – September **2015**: **Graduate Research Intern**, *Pacific Northwest National Laboratory*
High-Performance Computing Group

September **2013** – June **2016**: **Graduate Research Assistant**, *University of California, Riverside*
Department of Computer Science & Engineering

Grants and Contracts

- **(Lead PI)** *CDS&E: Collaborative Research: HyLoC: Objective-driven Adaptive Hybrid Lossy Compression Framework for Extreme-Scale Scientific Applications*, \$527,563 (share: \$270,802), 08/01/2020 – 07/31/2023, NSF (OAC-2003624, OAC-2042084).
- **(Single PI)** *CRII: OAC: An Efficient Lossy Compression Framework for Reducing Memory Footprint for Extreme-Scale Deep Learning on GPU-Based HPC Systems*, \$174,593, 05/01/2020 – 04/30/2022, NSF (OAC-1948447, OAC-2034169).
- **(Single PI)** *Improving GPU Version of SZ for Scientific Applications at Extreme Scale*, \$63,791, 08/01/2020 – 07/31/2021, DOE Argonne National Laboratory (No. 0F-60172).
- **(Co-PI)** *CC* Compute: Accelerating Advances in Science and Engineering at The University of Alabama Through HPC Infrastructure*, \$399,995 (share: \$100,000), 07/01/2020 – 06/30/2022, NSF (OAC-2018846).
- **(Co-PI)** *CISESS: Cooperative Institute for Satellite Earth System Studies*, \$5,552,781 (share: \$250,000), 06/01/2020 – 05/31/2021, NOAA.
- **(Single PI)** *Improving Lossy Compression for Scientific Applications at Extreme Scale*, \$21,588, 08/15/2019 – 12/31/2019, DOE Argonne National Laboratory (No. 9F-60232).
- **(Co-PI)** *Center for Remote Sensing of Snow and Soil Moisture*, \$5,000,000 (share: \$250,000), 06/01/2019 – 05/31/2020, NOAA (SUBAWD000837).

Graduate Advisees

Ph.D. Dissertation Chair:

Sian Jin (since Fall 2018), University of Alabama, Washington State University

Jiannan Tian (since Spring 2019), University of Alabama, Washington State University

Chengming Zhang (since Fall 2019), University of Alabama, Washington State University

Daoce Wang (since Fall 2020), School of EECS, Washington State University

Honors and Awards

- *CISE Research Initiation Initiative (CRII) Award*. National Science Foundation, 2020.
- *Best Paper Award*. IEEE International Conference on Cluster Computing, 2018.
- *Dissertation Year Program Fellowship*. University of California, Riverside, 2017.
- *Dean's Distinguished Fellowship*. University of California, Riverside, 2013.

Synergistic Activities

- Association for Computing Machinery (ACM) membership (2016 – present)
- Institute of Electrical and Electronics Engineers (IEEE) membership (2017 – present)

Selected Publications (*with my students underlined*)

- Tian J., Di S., Zhao K., Rivera C., Hickman M., Underwood R., Jin S., Liang X., Calhoun J., **Tao D.**, Cappello F. “cuSZ: An Efficient GPU Based Error-Bounded Lossy Compression Framework for Scientific Data.” Accepted by *the 29th International Conference on Parallel Architectures and Compilation Techniques (PACT)*, 2020. (**Acceptance Rate: 25%**)
- Dong P., Wang S., Niu W., Zhang C., Lin S., Li Z., Gong Y., Ren B., Lin X., **Tao D.** “RTMobile: Beyond Real-Time Mobile Acceleration of RNNs for Speech Recognition.” In *Proceedings of the 57th Annual Design Automation Conference (IEEE/ACM DAC)*, 2020. (**Acceptance Rate: 23%**)
- Jin S., Grosset P., Biver C. M., Pulido J., Tian J., **Tao D.**, Ahrens J. “Understanding GPU-Based Lossy Compression for Extreme-Scale Cosmological Simulations.” In *Proceedings of the 34th IEEE International Parallel and Distributed Symposium (IEEE IPDPS)*, pp. 105 – 115, 2020. (**Acceptance Rate: 24%**)
- Tian J., Di S., Zhang C., Liang X., Jin S., Cheng D., **Tao D.**, Cappello F. “wavesZ: A Hardware-Algorithm Co-Design of Efficient Lossy Compression for Scientific Data.” In *Proceedings of the 25th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (ACM PPoPP)*, pp. 74 – 88, 2020. (**Acceptance Rate: 23%**)
- Jin S., Di S., Liang X., Tian J., **Tao D.**, Cappello F. “DeepSZ: A Novel Framework to Compress Deep Neural Networks by Using Error-Bounded Lossy Compression.” In *Proceedings of the 28th ACM International Symposium on High-Performance Parallel and Distributed Computing (ACM HPDC)*, pp. 159 – 170, 2019. (**Acceptance Rate: 20%**)
- **Tao D.**, Di S., Liang X., Chen Z., Cappello F. “Optimizing Lossy Compression Rate-Distortion from Automatic Online Selection Between SZ and ZFP”. *IEEE Transactions on Parallel and Distributed Systems (IEEE TPDS)*, vol. 30, no. 8, pp. 1857-1871, 2019.
- **Tao D.**, Di S., Guo H., Chen Z., Cappello F. “Z-checker: A Framework for Assessing Lossy Compression of Scientific Data.” *The International Journal of High Performance Computing Applications (IJHPCA)*, vol. 33, no. 8, pp. 285 – 303, 2019.
- Di S., **Tao D.**, Liang X., Cappello F. “Efficient Lossy Compression for Scientific Data based on Pointwise Relative Error Bound.” *IEEE Transactions on Parallel and Distributed Systems (IEEE TPDS)*, vol 30, no. 2, pp. 331 – 345, 2019.
- Liang X., Di S., Li S., **Tao D.**, Nicolae B., Chen Z., Cappello F. “Significantly Improving Lossy Compression Quality based on An Optimized Hybrid Prediction Model.” In *Proceedings of ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis (IEEE/ACM SC)*, p. 33, 2019. (**Acceptance Rate: 22%**)
- Gok A. M., Di S., Alexeev Y., **Tao D.**, Mironov V., Cappello F. “PaSTRI: Error-Bounded Lossy Compression for Two-Electron Integrals in Quantum Chemistry.” In *IEEE International Conference on Cluster Computing (IEEE Cluster)*, pp. 1 – 11, 2018. (**Acceptance Rate: 0.6%**) **Best Overall Paper Award**
- Liang X., Di S., **Tao D.**, Chen Z., Cappello F. “An Efficient Transformation Scheme for Lossy Data Compression with Pointwise Relative Error Bound.” In *IEEE International Conference on Cluster Computing (IEEE Cluster)*, pp. 179 – 189, 2018. (**Acceptance Rate: 2.6%**) **Best Area Paper Award**
- **Tao D.**, Di S., Liang X., Chen Z., Cappello F. “Improving Performance of Iterative Methods by Lossy Checkpointing.” In *Proceedings of the 27th ACM International Symposium on High-Performance Parallel and Distributed Computing (ACM HPDC)*, pp. 52 – 65, 2018. (**Acceptance Rate: 19%**)
- **Tao D.**, Di S., Chen Z., Cappello F. “Significantly Improving Lossy Compression for Scientific Data Sets Based on Multidimensional Prediction and Error-Controlled Quantization”. In *Proceedings of the 31st IEEE International Parallel and Distributed Processing Symposium (IEEE IPDPS)*, pp. 1129 – 1139, 2017. (**Acceptance Rate: 22%**)
- **Tao D.**, Di S., Chen Z., Cappello F. “In-Depth Exploration of Single-Snapshot Lossy Compression Techniques for N-Body Simulations.” In *IEEE International Conference on Big Data (BigData)*, pp. 486 – 493, 2017. (**Acceptance Rate: 19%**)
- **Tao D.**, Song S., Krishnamoorthy S., Wu P., Liang X., Zhang Z., Kerbyson D., Chen Z. “New-Sum: A Novel Online ABFT Scheme for General Iterative Methods.” In *Proceedings of the 25th ACM International Symposium on High-Performance Parallel and Distributed Computing (ACM HPDC)*, pp. 43 – 55, 2016. (**Acceptance Rate: 15%**)

Selected Presentations

- **Tao D.** “Scientific Data Reduction Challenges in the Era of Exascale Computing”, CSM Seminar, Oak Ridge National Laboratory, Oak Ridge, Tennessee, USA, December 2019 (*Invited*).
- **Tao D.** “Keeping-up with Scientific Data Explosion in the Era of Exascale Computing”, ECE Seminar, Boston University, Boston, Massachusetts, USA, November 2019 (*Invited*).
- **Tao D.** “High-Performance Computing at Extreme Scale: Keeping-up with Scientific Data Explosion”, ISTI Seminar, Los Alamos National Laboratory, Los Alamos, New Mexico, USA, July 2019 (*Invited*).
- **Tao D.** “High-Performance Computing at Extreme Scale: Keeping-up with Scientific Data Explosion”, CST Seminar, University of Petroleum, Beijing, China, June 2019 (*Invited*).
- **Tao D.** “GreenLA: Energy Efficient Linear Algebra Software for GPU-Accelerated Heterogeneous Computing”, Energy-Efficient Computing Workshop, HPC China, Qingdao, China, September 2018 (*Invited*).
- **Tao D.** “High-Performance Computing at Extreme Scale: Data Reduction, Resilience, Scalability”, School of Software Seminar, Tsinghua University, Beijing, China, October 2018 (*Invited*).