# *Rick Archibald*

Computer Science and Mathematics Division
Oak Ridge National Laboratory
PO BOX 2008 MS 6211
Oak Ridge, TN
**Telephone**: (865) 576- 5761 **Fax**: (865) 241-0381
**Electronic Mail**: archibaldrk@ornl.gov

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## Education

**Arizona State University** *Ph.D. in Mathematics*
Tempe, AZ. **August 1998– May 2002**
Thesis Advisor: Anne Gelb. Thesis title: *Boundary Detection and Reconstruction in Magnetic Resonance Imaging*. Focus of study: spectral methods, partial differential equations, statistics, computational biology, and medical image analysis.

**University Of Alberta** *M.Sc. in Applied Mathematics*
Edmonton, AB. **September 1996– April 1998**
Thesis Advisor: Abel Cadenillas. Focus of study: mathematical finance, stochastic partial differential equations, and numerical computation.

**University Of Alberta** *B.Sc. in Honors Physics*
Edmonton, AB. **September 1992– April 1996**
Focus of study: partial differential equations, computer programming, and biological physics.

## Professional Experience

**Computer Science and Mathematics Division** *Group Leader*
Oak Ridge National Laboratory **October 2019–Present**
Supervisor: Juan Restrepo. Responsible for a group of research mathematicians. Focus of study: Data analysis and machine learning

**Computer Science and Mathematics Division** *Deputy Group Leader*
Oak Ridge National Laboratory **October 2016–September 2019**
Supervisor: Clayton Webster. Responsible for a small group of research mathematicians. Focus of study: Data analysis and machine learning

**Computer Science and Mathematics Division** *Senior Staff Scientist*
Oak Ridge National Laboratory **October 2015–Present**
Supervisor: Clayton Webster. Focus of study: Experimental facilities data analysis, high performance computing, and machine learning.

**Computer Science and Mathematics Division** *Staff Scientist*
Oak Ridge National Laboratory **August 2007–Sept 2015**
Supervisor: Clayton Webster. Focus of study: Climate science, experimental facilities data analysis, high performance computing, and uncertainty quantification.

**Computer Science and Mathematics Division** *Householder Fellow*
Oak Ridge National Laboratory **August 2005–August 2007**
Supervisor: Ed D'Azevedo. Focus of study: hyperspectral imaging, nano-technology, parallel computing, and partial differential equations.

**Department of Neuroscience** *Post Doctorate*
Brown University **August 2004–July 2005**
Supervisor: Jerome Sanes. Focus of study: Data fusion and beamforming in Electroencephalography (EEG), Magnetoencephalography (MEG) and functional Magnetic Resonance Imaging (fMRI).

**Center for System Science and Engineering Research** — *Post Doctorate*
Arizona State University — **May 2002–August 2004**
Supervisor: Frank Hoppensteadt. Focus of study: Dynamical nano-systems and image analysis.

**Alzheimer Disease Research Center** — *Research Assistant*
Good Samaritan Hospital, AZ. — **January 1999– May 2002**
Studied under the guidance of Kewei Chen in the areas of medical imaging methods and analysis.

## Publications

I have over 100 reviewed publication (see Google Scholar) and over 70 invited presentation.

Archibald, Bao & Yong, "A Stochastic Maximum Principle Approach for Reinforcement Learning With Parameterized Environment", *Journal of Computational Physics*, **488**, 2023.

Malviya, Hitefield, McDonnell, Wolf, Archibald, Drane, Roccapriore, Ziatdinov, McGaha, Smith, Hetrick, Abraham, Yakubov, Watson, Chance, Nguyen, Baker, Michael & Mintz, "Towards a Software Development Framework for Interconnected Science Ecosystems", *Oak Ridge National Lab Technical Report*, 2023.

Cianciosa, Archibald, Elwasif, Gainaru, Park & Whitfield, "Adaptive Generation of Training Data for ML Reduced Model Creation", *2022 IEEE International Conference on Big Data (Big Data)*, 2022.

Archibald, Cianciosa & Lau, "Improving Predictions Under Uncertainty of Material Plasma Device Operations", *2022 IEEE International Conference on Big Data (Big Data)*, 2022.

Dyck, Bao, Ziatdinov, Nobakht, Law, Maksov, Sumpter, Archibald, Jesse, Kalinin & Lingerfelt, "Strain-Induced Asymmetry and On-Site Dynamics of Silicon Defects In Graphene", *Carbon Trends*, **9**, 2022.

Thakur, Hitefield, McDonnell, Wolf, Archibald, Drane, Roccapriore, Ziatdinov, McGaha, Smith, Hetrick, Abraham, Yakubov, Watson, Chance, Nguyen, Baker, Michael, Arenholz & Mintz, "Towards a Software Development Framework for Interconnected Science Ecosystems", *Smoky Mountains Computational Sciences and Engineering Conference*, 2022.

Popov, Archibald, Hiscox & Sobes, "Artificial Intelligence-Driven Thermal Design for Additively Manufactured Reactor Cores", *Nuclear Engineering and Design*, **395**, 2022.

Doucet, Archibald, & Heller, "SAS-Temper", *Oak Ridge National Lab Technical Report*, 2021.

Doucet, Archibald, & Heller, "Machine Learning for Neutron Reflectometry Data Analysis of Two-Layer Thin Films", *Machine Learning: Science and Technology*, 2021.

Dyck, Ziatdinov, Jesse, Bao, Nobakht, Maksov, Sumpter, Archibald, Law, & Kalinin, "Probing potential energy landscapes via electron-beam-induced single atom dynamics", *Acta Materialia*, **203**, 2021.

Sobes, Hiscox, Popov, Delchini, Archibald, Hauck, Laiu, Betzler & Kurt Terrani, "Artificial Intelligence Design of Nuclear Systems Empowered by Advanced Manufacturing", *EPJ Web Conf.*, **247**, 2021.

Doucet, Samarakoon, Do, Heller, Archibald, Tennant, Proffen, & Granroth, "Machine Learning For Neutron Scattering at ORNL", *Machine Learning: Science and Technology*, **2**(2), 2020.

Madireddy, Park, Lee, Balaprakash, Yoo, Liao, Hauck, Laiu, & Archibald, "In Situ Compression Artifact Removal In Scientific Data Using Deep Transfer Learning and Experience Replay", *Machine Learning: Science and Technology*, **2**(2), 2020.

Archibald, Bao, & Yong, "Stochastic Gradient Descent Approach For Stochastic Optimal Control", *East Asian J. Appl. Math*, **10**(4), 2020.

Archibald, Bao, Yong, & Zhou, "An Efficient Numerical Algorithm For Solving Data Driven Feedback Control Problems", *Journal of Scientific Computing*, **85**(2), 2020.

Archibald, Doucet, Johnston, Young, Yang, & Heller, "Classifying and Analyzing Small-angle Scattering Data Using Weighted k Nearest Neighbors Machine Learning Techniques", *J. Appl. Cryst.* **53**, 2020.

Parkinson, Gursoy, Pelt, Venkatakrishnan, Archibald, Mohan, Bicer, Vogelgesang, Sethian, Wadeson, Basham, & Faragó, "Tomographic Reconstruction for Synchrotron Tomography", *Handbook on Big Data and Machine Learning in the Physical Sciences*, Chapter 4, 65-82, 2020.

Archibald, Chow, DAzevedo, Dongarra, Eisenbach, Febbo, Lopez, Nichols, Tomov, Wong, & Yin, "Driving Scientific and Engineering Discoveries Through the Convergence of HPC, Big Data and AI", *SMC 2020. Communications in Computer and Information Science*, **1315**, 2020.

Nobakht, Dyck, Lingerfelt, Bao, Maksov, Sumpter, Archibald, Jesse, Kalinin, & Law, "Reconstruction of Effective Potential from Statistical Analysis of Dynamic Trajectories", *AIP Advances*, **10**(6), 2020.

Feng, Archibald, and Maksymovych, "Lévy Backward SDE Filter for Jump Diffusion Processes and Its Applications in Material Sciences", *Communications in Computational Physics*, **27**(2), 589–618, 2019.

Brendan, Archibald, Azadmanesh, Vandavasi, Langan, Coates, Lynch, and Langan, "BraggNet: integrating Bragg peaks using neural networks", *Journal of Applied Crystallography*, **52**(4), 854–863, 2019.

Xian, Archibald, Mayer, Liu and Li, "An effective online data monitoring and saving strategy for large-scale climate simulations", *Quality Technology & Quantitative Management*, **16**(3), 330–346, 2019.

Evans, Archibald, Gardner, Norman, Taylor, Woodward, and Worley, "Performance analysis of fully explicit and fully implicit solvers within a spectral element shallow-water atmosphere model", *The International Journal of High Performance Computing Applications*, **33**(2), 268–284, 2019.

Sullivan, Archibald, Vandavasi, Langan, Coates and Lynch, "Volumetric Segmentation via Neural Networks Improves Neutron Crystallography Data Analysis", *2019 19th IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing (CCGRID)*, **10.1109/CCGRID.2019.00070**, 2019.

Shang, Archibald, Gelb and Luke, "Sparsity-based photoacoustic image reconstruction with a linear array transducer and direct measurement of the forward model", *Journal of Biomedical Optics*, **24**(3), 1 – 9, 2018.

Sullivan, Archibald, Langan, Dobbek, Bommer, McFeeters, Coates, Wang, Gallmeier, Carpenter, Lynch, and Langan, Paul, "Improving the accuracy and resolution of neutron crystallographic data by three-dimensional profile fitting of Bragg peaks in reciprocal space", *Acta Crystallographica Section D*, **74**(11), 1085–1095, 2018.

Archibald, Krogel, and Kent, "Gaussian process based optimization of molecular geometries using statistically sampled energy surfaces from quantum Monte Carlo", *The Journal of Chemical Physics*, **149**(16), 164116, 2018.

Barnard, Bilheux,Toops, Nafziger, Finney, Splitter, and Archibald, "Total variation-based neutron computed tomography", *Review of Scientific Instruments*, **89**(5), 053704, 2018.

Dyck, Bao, Ziatdinov, Nobakht, Shin, Law, Maksov, Sumpter, Archibald, Jesse, and Kalinin, "Leveraging Single Atom Dynamics to Measure the Electron-Beam-Induced Force and Atomic Potentials", *Microscopy and Microanalysis*, **24**(S1), 96-97 2018.

Shang, Archibald, Gelb and Luke, "Computational Photoacoustic Imaging with Sparsity-Based Optimization of the Initial Pressure Distribution", *Proc. SPIE*, **10494**, 7, 2018.

Somnath, Law, Morozovska, Maksymovych, Kim, Lu, Alexe, Archibald, Kalinin, Jesse, Vasudevan, "Ultrafast Current Imaging by Bayesian Inversion", *Nature Communications*, **9**(1), 513, 2018.

Brugiapaglia, Adcock, and Archibald, "Recovery Guarantees for Compressed Sensing with Unknown Errors", *2017 International Conference on Sampling Theory and Applications (SampTA)*, 533–537, 7, 2017.

Lingerfelt, Belianinov, Endeve, Ovchinnikov, Somnath, Borreguero, Grodowitz, Park, Archibald, Symons, Kalinin, Messer, Shankar, and Jesse, "BEAM: A Computational Workflow System for Managing and Modeling Material Characterization Data in HPC Environments", *Procedia Computer Science*, **80**, 2276–2280, 2016.

Bao, Archibald, Niedziela, Bansal, and Delaire, "Complex Optimization for Big Computational and Experimental Neutron Datasets", *Nanotechnology*, **27**(48), 484002, 2016.

Kalinin, Strelcov, Belianinov, Somnath, Vasudevan, Lingerfelt, Archibald, Chen, Proksch, Laanait, and Jesse, "Big, Deep, and Smart Data in Scanning Probe Microscopy", *ACS Nano*, **10**(10), 9068–9086, 2016.

Belianinov, Gobeljic, Shvartsman, Endeve, Lingerfelt, Archibald, Kalinin, and Jesse, "High Performance Computing Tools for Cross Correlation of Multi-Dimensional Data Sets Across Instrument Platforms", *Microscopy and Microanalysis*, **22**(S3), 288, 2016.

Sang, Lupini, Unocic, Meyer, Ward, Lee, Endeve, Archibald, Borisevich, and Kalinin, "Distortion Correction in Scanning Transmission Electron Microcopy with Controllable Scanning Pathways", *Microscopy and Microanalysis*, **22**(S3), 900, 2016.

Jesse, Chi, Borisevich, Belianinov, Kalinin, Sergei Endeve, Archibald, Symons, and Lupini, "Using Multivariate Analysis of Scanning-Rochigram Data to Reveal Material Functionality", *Microscopy and Microanalysis*, **22**(S3), 292, 2016.

Bao, Archibald, Niedziela, Bansal, and Delaire, "Hierarchical Optimization for Neutron Scattering Problems", *Journal of Computational Physics*, **315**, 39–51, 2016.

Sang, Lupini, Unocic, Chi, Borisevich, Kalinin, Endeve, Archibald, and Jesse, "Dynamic Scan Control in STEM: Spiral Scans", *Advanced Structural and Chemical Imaging*, **2**(1), 6, 2016.

Langan, Archibald, and Lamberti, "Nuclear Forensics Attribution with Missing and Uncertain Data", *Journal of Radioanalytical and Nuclear Chemistry*, **308**(2), 687–692, 2016.

Archibald, Gelb, and Platte, "Image Reconstruction from Undersampled Fourier Data Using the Polynomial Annihilation Transform", *Journal of Scientific Computing*, **67**(2), 432–452, 2016.

Bracco, Archibald, Dvovrolis, Foundalis, Luo and Neelin, "The parameter optimization problem in state-of-the-art climate models and network analysis for systematic data mining in model intercomparison projects"', The Fluid Dynamics of Climate, Courses and Lectures Vol. 564, Edited by A. Provenzale, E. Palazzi and K. Fraedrich pp 121–141, Springer, 2016.

Kalinin, Sumpter, and Archibald, "Big, Deep, and Smart Data: Guiding Materials Design through Imaging", *Nature Materials*, **14**, 973–980, 2015.

Fu, Allen, and Archibald, "Evaluating the Relationship between the Population Trends, Prices, Heat Waves, and the Demands of Energy Consumption in Cities", *Sustainability*, **7**(11), 15284–15301, 2015.

Belianinov, Vasudevan, Strelcov, Steed, Yang, Tselev, Jesse, Biegalski, Shipman, Symons, Borisevich, Archibald, and Kalinin, "Big Data and Deep Data in Scanning and Electron Microscopies: Functionality from Multidimensional Data Sets", *Advanced Structural and Chemical Imaging*, **1**(1), 1–25, 2015.

Archibald, Evans, Salanger, "Accelerating Time Integration for Climate Modeling Using GPUs", *Journal of Computational Science*, **51**, 2046–2055, 2015.

Joubert, Archibald, Berrill, Brown, Eisenbach, Grout, Larkin, Levesque, Messer, Norman, Philip, Sankaran, Tharrington, and Turner, "Accelerated Application Development: The ORNL Titan Experience", *Computers & Electrical Engineering*, **46**, 123–138, 2015.

Wasserman, Archibald, and Gelb, "Image Reconstruction from Fourier Data Using Sparsity of Edges Polynomial Annihilation Sparsifying Transform", *Journal of Scientific Computing*, **65**(2), 533–552, 2015.

Denker, Archibald, and Gelb, "An Adaptive Fourier Filter for Relaxing Time Stepping Constraints for Explicit Solvers", *Spectral and High Order Methods for Partial Differential Equations ICOSAHOM 2014*, 157–166, 2015.

Langan, Archibald, Plumlee, Mahajan, Ricciuto, Yang, Mei, Mao, and Shi, "Stochastic Parameterization to Represent Variability and Extremes in Climate Modeling", *Journal of Computational Science: Procedia*, **29**, 1146–1155, 2014.

Rao, Archibald, and Evans, "Emulation to simulate low resolution atmospheric data", *International Journal of Computer Mathematics*, **91**(4), 770–780, 2014.

Surace, Archibald, and Saxena, "On the Use of the Polynomial Annihilation Edge Detection for Locating Cracks in Beam-Like Structures", *Computers & Structures*, **114**, 72–83, 2013.

Archibald, Constantinescu, Evans, Finkel, Haut, Norris, Norman, Sandu, Stonyanov, Tokman, Wingate, and Xing, "Resilient, Communication-Reducing, and Adaptive Time Stepping to Accelerate Exascale Scientific Applications", *DOE Workshop on Applied Mathematics Research for Exascale Computing*, 2013.

Archibald, "Error Estimation in High Dimensional Space for Stochastic Collocation Methods on Arbitrary Sparse Samples", *AIP Conference Proceedings*, **1558**, 906–909, 2013.

Archibald, Deiterding, Hauck, Jakeman, and Xiu, "Approximation and Error Estimation in High Dimensional Space for Stochastic Collocation Methods on Arbitrary Sparse Samples", *Exascale Research Conference*, Portland, OR, USA, 2012.

Norman, Larkin, Archibald, Carpenter, and Anamtharaj, "The Path to Accelerating the Community Atmospheric Model Spectral Element Dynamical Core on Hybrid Multi-Core Systems", *KIAPS International Symposium on Global NWP System Modeling*, 2012.

Archibald, Chakoumakos, and Zhuang, "Characterizing the Elements of Earth's Radiative Budget: Applying Uncertainty Quantification to the CESM", Special issue Empowering Science: ICCS 2012, *Journal of Computational Science: Procedia*, **5**(2), 85 – 89, 2012.

Liu, Martha, Nelson, Archibald, Pannala, Andrewsa and Nanda, "TXM-XANES Studies on High Voltage Lithium Rich Composite Cathodes: 3D Morphology and Phase at Nanoscale", *MRS abstract*, 2012.

Surace, Yan, Archibald, Saxena, and Feng, "Structural Damage Detection using the Polynomial Annihilation Edge Detection Method", *Australian Journal of Structural Engineering*, 2012.

Rao, Evans, and Archibald, "Emulation to Simulate Low Resolution Atmospheric Data", *ORNL/TM-2012/317* (www.osti.gov/servlets/purl/1051448/ ), 2012.

Nanda, Bilheux, Voisin, Veith, Archibald, Walker, Allu, Dudney, and Pannala, "Anomalous Discharge Product Distribution in Lithium-Air Cathodes", *The Journal of Physical Chemistry*, **116**(15), 8401 – 8408, 2012.

Archibald, Chakoumakos, and Zhuang, "Characterizing the Elements of Earth's Radiative Budget: Applying Uncertainty Quantification to the CESM", *Procedia Computer Science*, **9**, 1014–1020, 2012.

Norman, Larkin, Archibald, Carpenter, Anantharaj, Micikevicius, and Evans, "Porting the Community Atmosphere Model - Spectral Element Code to Utilize GPU Accelerators" *Cray User Group, CUG*, 2012.

Carpenter, Archibald, Evans, Larkin, Micikevicius, Rosinski, Schwarzmeier, and Taylor, "Progress Towards Accelerating HOMME on Hybrid Multi–Core Systems", *Int. J. High Perf. Comput. Appl.*, **27**, 335–347, 2012.

Jakeman, Archibald, and Xiu, "Characterization of Discontinuities in High-dimensional Stochastic Problems on Adaptive Sparse Grids", *Journal of Computational Physics*, **230**(10), 3977–3997, 2011.

Archibald, Fann, and Shelton, "Adaptive Discontinuous Galerkin Methods in Multiwavelets Bases", *Applied Numerical Mathematics*, **61**(7), 2011.

Archibald, Drake, Evans, and White III, "Multiwavelet Discontinuous Galerkin Accelerated ELP Method for the Shallow Water Equations on the Cubed Sphere", *Monthly Weather Review*, **139**(2), 457–473, 2011.

Filippi, Archibald, Bhaduri, and Bright "Hyperspectral Agricultural Mapping using Support Vector Machine-Based Endmember Extraction (SVM-BEE)", *Optics Express*, **17**(26), 23823–23842, 2009.

Archibald, Drake, Evans, and White III, "Time acceleration methods for convection on the cubed sphere", *Computational Science*, 253–262, 2009.

Archibald, Gelb, Saxena, and Xiu, "Discontinuity Detection in Multivariate Space for Stochastic Simulations", *Journal of Computational Physics*, **228**(7), 2676–2689, 2009.

Filippi and Archibald, "Support Vector Machine-Based Endmember Extraction", *IEEE Transaction on Geoscience and Remote Sensing*, **47**(3), 771–791, 2009.

Archibald, Gelb, and Yoon, "Determining the Locations of Discontinuities in the Derivatives of Functions", *Applied Numerical Mathematics*, **58**(5), 577–592, 2008.

White III, Evans, Archibald, Drake, Worley, and Kothe, "Acceleration of Time Integration", *Cray User Group, CUG, Helsinki, Finland, May 5-8*, 2008.

de Almeida, Birdwell Jr., Tsouris, DePaoli, and Archibald, "Developing a Predictive Model for Nuclear Fuel Reprocessing Separations", *Nuclear Separation Science Conference Proceedings*, 2008.

Chapman, Long, Datskos, Archibald, and Sepaniak, "Differentially Ligand-Functionalized Microcantilever Arrays for Metal Ion Identification and Sensing", *Analytical Chemistry*, **79**(18), 7062–7068, 2007.

Lavrik, Archibald, Grbovic, and Datskos, "Uncooled MEMS IR Imagers with Optical Readout and Image Processing", *Proceedings of the SPIE*, **6542**, 2007.

Archibald and Fann, "Feature Selection and Classification of Hyperspectral Images with Support Vector Machines", *IEEE Geoscience and Remote Sensing Letters*, **4**(4), 674–677, 2007.

Archibald, Datskos, Devault, Lamberti, Lavrik, Noid, Sepaniak, and Dutta, "Independent Component Analysis of Nanomechanical Responses of Cantilever Arrays", *Analytica Chimica Acta*, **584**, 101–105, 2007.

Sanes, OKeefe, Archibald, and Bienenstock, "Single-Trial Prediction of Discrete Hand Movements with Electroencephalography", *Human Brain Mapping*, 2006.

Archibald, Gelb, Gottlieb, and Ryan, "One-Sided Post-Processing for the Discontinuous Galerkin Method Using ENO Type Stencil Choosing and the Local Edge Detection Method", *Journal of Scientific Computing*, **28**, 2-3, 167–190, 2006.

Archibald, Gelb, and Yoon, "Polynomial Fitting for Edge Detection in Irregularly Sampled Signals and Images", *SIAM Journal on Numerical Analysis*, **43**, 259–279, 2005.

Archibald, Hu, Gelb, and Farin, "Improving the Accuracy of Volumetric Segmentation Using Pre-Processing Boundary Detection and Image Reconstruction", *IEEE Transactions on Image Processing*, **13**, No. 4, 2004.

Archibald, Chen, Gelb, and Renaut, "The Improvement of Human Brain Segmentation Through the use of the Gegenbauer Reconstruction Method as a Pre-Processing Step", *NeuroImage*, **20**, 489–502, 2003.

Archibald and Gelb, "Reducing the Effects of Noise in MRI Reconstruction", *Biomedical Imaging, Proceedings, 2002 IEEE International Symposium on*, 497–500, 2002.

Gelb and Archibald, "Reducing the Gibbs Ringing Artifact in MRI Scans While Maintaining Tissue Boundary Integrity", *Biomedical Imaging, Proceedings, 2002 IEEE International Symposium on*, 923–926, 2002.

Archibald and Gelb, "A Method to Reduce the Gibbs Ringing Artifact in MRI Scans While Keeping Tissue Boundary Integrity", *IEEE Transactions of Medical Imaging*, **21**, 305–319, 2002.

Archibald and Gelb, "Reducing The Effects of Noise in Boundary Detection", *Journal of Scientific Computing*, **17**, 167–180, 2002.

**Funded Grants – Only PI, Co-PI and Leadership Role**

**Fusion Reactor Design and Assessment** *ASCR–BES/DOE*
Design Thrust Lead: Rick Archibald **October 2023-September 2028**
Develop machine learning technology to run and design next generation fusion reactors. Total award 12M.

**Analysis and Machine Learning for Large Scientific Data** *General Electric*
PI: Rick Archibald **October 2023-September 2025**
Develop analysis and machine learning methods for large turbine simulations. Total award 0.4M.

**Compression Methods for Streaming Scientific Data** *ASCR/DOE*
PI: Rick Archibald **October 2021-September 2024**
Develop data compression methods for streaming scientific data. Total award 2.4M.

**Frameworks, Algorithms and Scalable Technologies for Mathematics (FASTMath5)** *ASCR/DOE*
PI (Data Analytic Lead): Rick Archibald **October 2020–September 2025**
Develop data analytic and machine learning tools for high performance computing. Total award

18M.

**Frameworks, Algorithms and Scalable Technologies for Mathematics (FASTMath4)** *ASCR/DOE*
PI (Data Analytic Lead): Rick Archibald **October 2017–September 2020**
Develop data analytic and machine learning tools for high performance computing. Total award 18M.

**Accurate Quantified Mathematical Methods for Neutron Science** *ASCR/DOE*
PI: Rick Archibald **October 2014–September 2017**
Solved mathematical challenges for Neutron sciences. Total award 2.4M.

**Sparse Recovery for Scientific Data** *ASCR/DOE*
Co-PI: Rick Archibald **October 2014–September 2017**
Sparse recovery methods for HPC datasets. Total award 1.5M.

**A Mathematical Environment for Quantifying Uncertainty: Integrated and Optimized at the Extreme Scale** *ASCR/DOE*
Co-PI: Rick Archibald **October 2013–September 2016**
Develop uncertainty quantification methods and theory at scale . Total award 4.2M.

**Advanced Dynamically Adaptive Algorithms for Stochastic Simulations on Extreme Scales** *ASCR/DOE*
PI: Rick Archibald **October 2010–September 2013**
Advanced stochastic methods for computational simulation. Total award 1.3M.

## Service

**Computer and Applied Mathematics Division** *ORNL*
Group Leader **October 2019– Present**
Data analytics and machine group leader. Have the responsibility to help run all aspects of the group.

**Computer and Applied Mathematics Division** *ORNL*
Group Deputy Leader **October 2016– September 2019**
Advisor to the Computational and Applied Mathematics group leader. Have the responsibility to help run all aspects of the half the group.

**Division Operational Committee** *ORNL*
Member **December 2012– February 2015**
Scientific member of Computer and Applied Mathematics Division operational committee. Responsible for setting operation policy for the division.

**Advisory Board for KIAPS** *Soul, South Korea*
Member **December 2011–November 2012**
Reviewed, provided guidance, and loaned expertise to the newly formed Korean Institute of Atmospheric Prediction Systems (KIAPS).

**Computer and Applied Mathematics Division Distinguish Seminar Series** *ORNL*
Leader **October 2008–September 2010**
Directed distinguished seminar series for division, responsible for all aspects, from targeting speakers to facilitating interactions with staff.

## Affiliations

**Applied Mathematic for Modern Challenges** *Journal*

Associate Editor **September 2022– Present**
Associate Editor for the American Institute for Mathematic Journal titled Applied Mathematic for Modern Challenges, focusing on computational mathematics and applications.

**AI for Science, Energy, and Security** *ORNL*
Lead Organizer **August 2022**
Developed, organized, and executed ORNL lab wide workshop to that developed a roadmap for the future of AI in science, energy, and security.

**Institute of Functional Imaging of Materials** *ORNL*
Mathematics Lead **September 2014– 2021**
One of three leads for the Institute of Functional Imaging of Materials, focusing on mathematical methods and theory for experimental data at ORNL. Coordinate a team of thirty members on the mathematical research directions of the institute.

**Ugly Data Days** *ORNL*
Lead **September 2017**
Promote collaboration between experimental scientist and experts in data analytics at ORNL (UDD).

**International Journal of Computer Mathematics** *Journal*
Associate Editor **September 2012– 2018**
Associate Editor for the International Journal of Computer Mathematics, focusing on computational mathematics and applications.

**Climate Change Science Institute** *ORNL*
Member **September 2009– 2016**
Founding member of the Climate Change Science Institute, which consists of hundreds of scientist across ORNL. Part of interdisciplinary team that is delivering a new climate model to the Department of Energy, with a focus of national energy needs and predictions, and running at the highest possible resolution on world class computing facilities. Actively part of mathematical and computational work for this climate model.

## Collaborators (past 48 months) and coeditors (past 24 months)

A. Agrawal (Northwestern University); P. Balaprakash (Argonne National Laboratory); Y. Cao (Auburn University); A. Choudhary (Northwestern University); E. Chow (Georgia Institute of Technology); E. DAzevedo (Oak Ridge National Laboratory); J. Dongarra (University of Knoxville); M. Doucet (Oak Ridge National Laboratory); O. Dyck (Oak Ridge National Laboratory); K. Evans (Oak Ridge National Laboratory); D.J. Gardner (Lawrence Livermore National Laboratory); C. Hauck (Oak Ridge National Laboratory); W.T. Heller (Oak Ridge National Laboratory); S. Kalinin (Oak Ridge National Laboratory); Q. Kang (Northwestern University); P. Laiu (Oak Ridge National Laboratory); W.K. Liao (Northwestern University); K. Law (Florida State University); S. Lee (Northwestern University); S. Madireddy (Argonne National Laboratory); V. Sobes (University of Knoxville); B. Sumpter (Oak Ridge National Laboratory); X. Tu (University of Kansas); M. Taylor (Sandia Laboratories); C. Woodward (Lawrence Livermore National Laboratory);

## Graduate Advisor

Anne Gelb (Arizona State University)

**Graduate and postdoctoral advisees (past 60 months)**

F. Bao (Florida State University); R. Bernard (Western Washington University); R. Tuo (Texas A&M University);