Gray Reid

Computational Modeling and Machine Learning

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Skills

Scientific Computing

- Numerical Methods, HPC, MPI, OpenMP, CUDA, C, Python, Computational Modeling, Finite Difference, Spectral Methods, Monte Carlo, Optimization, Debugging, Profiling

Research

- Research Design, Data Analysis, Scientific Writing, Literature Review, Data Visualization, Teaching

Mathematics and Physics

- Linear Algebra, Calculus, Probability, Field Theory, PDEs, SDEs, ODEs, Optimization

Machine Learning

- PyTorch, Jax, Neural Networks, Deep Learning, Transformer, GRU, LSTM, CNN, RNN, Reinforcement Learning

Education

PhD Physics *Vancouver, BC, Canada*

University of British Columbia *2024*

- Developed high-performance numerical simulations of gravitational collapse improving resolution and accuracy by several orders of magnitude over state-of-the-art AMR simulations without significantly increasing computational cost
- Developed expertise in computational modeling, numerical methods, high performance computing, debugging and optimization of massively parallel systems

BSc Honours Physics *Wolfville, NS, Canada*

Acadia University *2012*

- Highlighted deficiencies in existing techniques for modeling TEM imaging of materials and developed new methods for addressing these deficiencies

Select Awards

NSERC CGSD

University of British Columbia

- National doctoral scholarship awarded for distinguished academic performance and potential for research contributions

Four Year Fellowship

University of British Columbia

- Competitive fellowship offered by the University of British Columbia to doctoral students

NSERC CGSM

University of British Columbia

- National scholarship awarded to a select group of masters students across Canada on the basis of academic excellence

Governor General's Medal

Acadia University

- Awarded to the student graduating with the highest academic standing in an approved college

Profile

- Recent PhD graduate in computational physics with extensive expertise in scientific computing, numerical methods, and machine learning. Specializes in developing and optimizing novel algorithms for large-scale simulations and data analysis. Demonstrated ability to improve computational efficiency and accuracy in complex physical systems modeling, achieving significant improvement over state-of-the-art techniques.
- Seeking to transition from academic research to projects in AI or quantitative finance. Eager to apply advanced mathematical modeling and machine learning techniques to tackle challenging problems in industry. Committed to leveraging strong research and teaching background to drive innovation and contribute to high-impact teams in tech or finance sectors.

Select Publications

Topics In Numerical Relativity

PhD Thesis *2023*

- Presents a series of studies in numerical relativity investigating stability, hyperbolicity and critical phenomena using highly efficient and optimized numerical methods

Universality in the Critical Collapse of the Einstein-Maxwell System

Physical Review D *2023*

- Investigates the threshold of black hole formation for the Maxwell field via a state of the art in-lab AMR code and PDE discretization library

Reference Metric Approach to the Z4 System

Physical Review D *2023*

- Derives a novel formulation of the Z4 system of General Relativity using a reference metric approach and demonstrates its stability through a pseudodifferential first order reduction

Stability of Nonminimally Coupled Topological-Defect Boson Stars

Physical Review D *2024*

- Investigates the stability of nonminimally coupled topological-defect boson stars using both linear stability analysis and direct simulation

References

Matthew Choptuik *Professor*

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- PhD supervisor at UBC

Jeremy Heyl *Professor*

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- PhD committee member at UBC

William Unruh *Professor*

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- PhD committee member at UBC