

Matthew C. Kinsey

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EDUCATION

Ph.D., Physics

Georgia Institute of Technology, Atlanta, GA, August 2016

Field of Study: Computational Astrophysics and Numerical Relativity

Thesis Title: *General Relativistic Smoothed Particle Hydrodynamics: a Multi-Scale Formulation of Fluid Flow in Numerical Relativity*

Advised by: Prof. Pablo Laguna

B.S., Physics and Mathematics

Pennsylvania State University, State College, PA, May 2010

COMPUTER SKILLS

Languages (strong): C++98/11, Python, Cython, C, and Fortran 95.

Languages (some): Java, Perl, PHP and SQL.

Software: Bash, git, SVN, CVS, Mercurial, clang, GDB, Valgrind, gprof, Mathematica, L^AT_EX, Matlab, Maple.

Libraries: MPI, PyTorch, Tensorflow, Keras, Hadoop/MapReduce, Intel TBB, OpenMP, CUDA, OpenCL, OpenCV, HDF5, numpy, scipy, scikit-learn and pandas.

Other: Strong background in supercomputing applications, distributed computing, and UNIX system administration.

EXPERIENCE

Data Scientist (Senior Professional Staff I)

Jan 2017-Present

Johns Hopkins Applied Physics Laboratory, Laurel, MD

- Acted as a technical leader on multiple projects, mentoring junior staff and interfacing with various government sponsors.
- Applied deep learning methods to novel problems and data types.
 - Achieved state of the art accuracy on classification of radio modulations using a novel architecture.
 - Developed novel architecture for the detection and segmentation of multiple signals in large bandwidth SDR output.
 - Integrated multiple networks with GPU code to create a signal detection and characterization system for use on edge SDR platforms.
 - Applied graph neural networks to binary malware analysis and code stylometry (Work in progress).
 - Developed graph neural networks to approximate high computational complexity ($\mathcal{O}(N^2)$ or greater) graph algorithms in linear time.
- Developed and tested the generalized entropy based clustering algorithm, GALILEO, in Java, Cython, and C++ with MPI+OpenMP.
 - Responsible for multiple orders of magnitude speedup relative to the original Java/MapReduce version by using efficient HPC techniques in C++/Cython.
 - Demonstrated ideal scaling up to petabyte scale cyber datasets via MPI on HPC hardware.
 - Won the 2017 R. W. Hart Prize for Excellence in Independent Research & Development (IRAD).

Graduate Research Assistant Fall 2010-Dec 2017
Georgia Institute of Technology, Atlanta, GA

- Wrote a smoothed particle hydrodynamics solver for dynamical spacetimes from scratch.
 - Clean and performant code written in modern C++11 with analysis tools written in Python.
 - Designed to scale to tens of thousands of processors using MPI+OpenMP parallelism.
- Frequently processed and visualized datasets in the tens of terabytes. One such visualization was featured as the front page image of the LIGO website (<https://ligo.org>) during the announcement of the first detection of gravitational waves.
- Collaborated with Oak Ridge National Laboratory to interface the Adaptable IO System (ADIOS) with the Einstein Toolkit.
- Managed the central development server used by our research group. Duties included managing code repositories, security, as well as hosting a public/private webserver.

Graduate Assistant, School of Physics IT Fall 2015-Fall 2016
Georgia Institute of Technology, Atlanta, GA

- Acted as a member of the Physics IT support team. Duties consisted of building, maintaining and supporting the over 140 Linux machines used throughout the School of Physics.

Computational Physics Division Student Fellow Summer 2014
Los Alamos National Laboratory, Los Alamos, NM

- Researched particle methods and algorithms for use on highly parallel future architectures including GPUs and coprocessors.
- Developed a library to encapsulate highly scalable particle algorithms of use to scientific codes.
- Winner of the Methods & Algorithms Group's Outstanding Technical Poster award.

Graduate Teaching Assistant Fall 2010-Spring 2015
Georgia Institute of Technology, Atlanta, GA

- Instructed labs, held office hours, and graded for undergraduate courses including introductory mechanics, mathematical methods, and quantum mechanics as well as graduate-level electricity and magnetism.

Undergraduate Research Assistant Spring 2009-Fall 2010
Pennsylvania State University, State College, PA

- Ported Fortran 95 code to native Matlab for use by Prof. Sam Finn and the LIGO Scientific Collaboration. This code specifically pertained to the HEALPix (Hierarchical Equal Area, isoLatitude) pixelization of a sphere.
- Wrote additional tools related to analysis of spherical datasets and the visualization of such data via skymaps.

**EXTRA-
CURRICULAR
ACTIVITIES**

Elected Treasurer, Georgia Tech Graduate Student Government
Elected Senator, Georgia Tech Graduate Student Government
Eagle Scout, Boy Scout Troop 399, Montgomeryville, PA