

# Matthew C. Kinsey

---

691 Juniper St NE, Apt 3  
Atlanta, GA 30308  
(267) 664-4387  
mkinsey.com  
kins [at] gatech.edu

## 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

GPA: 3.79

*B.S.*, Physics and Mathematics

Pennsylvania State University, State College, PA, May 2010

GPA: 3.49 (3.72 within Physics and 3.52 within Mathematics)

## COMPUTER SKILLS

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

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

**Software:** Bash, git, SVN, CVS, Mercurial, Mathematica, L<sup>A</sup>T<sub>E</sub>X, Matlab, Maple, Nginx, Apache and Adobe Photoshop/GIMP.

**Libraries:** Message Passing Interface (MPI), Intel TBB, OpenMP, CUDA, OpenCL, OpenCV, HDF5, numpy, scipy, matplotlib, scikit-learn and pandas.

**Operating Systems:** UNIX/Linux (Ubuntu, Red Hat, Debian, Arch) and Windows.

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

## EXPERIENCE

*Graduate Research Assistant*

Fall 2010-Present

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 thousands of processors using MPI+OpenMP parallelism.
  - Leverages a hierarchical spatial hashing algorithm to perform highly scalable N-nearest neighbor searches on distributed data.
  - Interfaced with the open source Cactus Code/Einstein Toolkit (<https://einsteintoolkit.org/>) code base which performs fully relativistic black hole simulations on distributed systems.
- Wrote a geodesic ray tracing code for use with the Einstein Toolkit.
- 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.

- Guided and trained other graduate and undergraduate students in the use of a massive and complex code base.
- 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-Present  
 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.

*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.

*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.

*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.

*Supervisor* Fall 2007-Spring 2010  
 South Food District, State College, PA

- Responsible for the training and regular supervision of over three hundred student employees.

**EXTRA-CURRICULAR ACTIVITIES**

Elected Treasurer, Georgia Tech Graduate Student Government

- Duties included maintaining the record of all Student Government financial transactions, providing reports on overall finances, and preparing annual budget of over \$5 million.

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