Matthew R. Terry, Ph.D.

1612 Parker St. Apt D • Berkeley, CA 94703 •
me@mattterry.net • 608.658.4316
GitHub • LinkedIn • StackOverflow

Objective

I am seeking a position employing computational tools in the analysis and solution of scientific and technical problems. I am a US citizen and currently hold a Department of Energy "Q" clearance.

Education and Training

- **Lawrence Livermore National Laboratory** Post-doctoral research, 2010-present
  Inertial Fusion and High Energy Density Physics Target Design
- **University of Wisconsin-Madison** Ph.D. Nuclear Engineering, 2010
  "Effect of Different Charged Particle Stopping Power Models on ICF Ignition"
- **University of Wisconsin-Madison** M.S. Nuclear Engineering, 2006
- **Georgia Institute of Technology** B.S. Nuclear and Radiological Engineering, 2004

Computational Physicist Engineer

I am by temperament an engineer, by training a physicist, and by practice a software developer. For the last 9 years, my research has focused on using practical computational methods to model and understand the behavior of high energy density plasmas, that is, ionized matter with pressure greater than 10^6 times atmospheric pressure and temperatures exceeding 10^4 K. I have studied in detail, shock hydrodynamics, fusion burn kinetics, and inertial fusion design.

Intrinsic to my scientific research is the development of software. Among my software projects I have:

1. Developed Monte Carlo charged particle transport packages for two radiation hydrodynamics codes "Bucky" (University of Wisconsin-Madison) and "Draco" (University of Rochester, Laboratory for Laser Energetics). These were developed to study the physics of fusion burn kinetics in high density plasmas.
2. Developed a platform to automate the design of certain aspect of an inertial fusion target design. It uses parallel optimization techniques to optimize laser timing and intensity features. In practice, multiple-day exercise are replaced by a single 4 hour batch job.

I am conversant in numerical methods for solving partial differential. I have significant experience with Lagrangian hydrodynamics, Monte Carlo solutions to the Boltzmann Equation, and compatible finite different methods. I am interested in large scale numerical optimization, especially techniques using concurrent function evaluations.

High Performance Python Expert

I have been developing scientific software for more than a decade and Python for nearly 9 years. I have experience running Python in parallel environments on large computing clusters and am comfortable processing "big data". My scientific analysis tools are all developed in Python and make extensive use of the NumPy/SciPy ecosystem as well as interfacing with external code/libraries when appropriate. I have extensive experience developing convenient Python interfaces to high performance, compiled libraries using tools such as Cython, f2py, and SWIG.

Among my Python projects I:

1. Develop and maintain an analysis library ("Honcho") for pre-processing, post-processing, and embedded steering of the radiation-hydrodynamics program HYDRA. Honcho regularly processes 100s of GB in a single interactive session.

2. Develop "Yoink", a tool to reverse engineer scientific data from rasterized images. Besides interpolating points from line plots, it can invert colormapped images to return the original scalar field. Yoink is developed on top of Matplotlib and is platform independent.

3. Converted a rigid legacy Fortran program to a script-able Python-based program without loss of performance.

In addition to Python, I have worked with C, C++, Fortran (legacy Fortran 77 and modern Fortran 90+), and Go. I am a vim, git, and LaTeXuser and am at home with the command-line.

Scientific Computing Community Advocate

I am an advocate for computing competency in the sciences. While in graduate school, I helped found The Hacker Within, a peer learning group for scientific computing and open source tools. Additionally, I teach scientists software development skills as an instructor with Software Carpentry.

I am an active participant of the Python scientific computing community (SciPy, Matplotlib, Scikit-Image). As a recurring member of the Scientific Computing in Python program committee, I help set the technical program for the 2012 and 2013 conference. I am a member of the UC-Berkely py4science community and a member of the NumFocus Foundation, a non-profit which promotes the use of accessible and reproducible computing in science and technology and is affiliated with the Python scientific computing ecosystem.

Publications

Refereed Journals

[1] J J Barnard, R. M. More, M R Terry, A Friedman, Enrique Henestroza, A E Koniges, J. W. Kwan, A. Ng, P. A. Ni, W. Liu, B G Logan, E. Startsev, and A Yuen. NDCX-II Target Experiments and Simulations [accepted]. *Nuclear Instruments and Methods in Physics Research A*, 2013.

[2] M R Terry, L.J. Perkins, and S. M. Sepke. Design of a DT-Ablator Shock Ignition Target for the National Ignition Facility. *Physics of Plasmas*, 2012.

[3] Joseph Koning and Matthew Terry. Automation of Inertial Fusion Target Design with Python. In Stéfan van der Walt and Jarrod Millman, editors, *Proceedings of the 10th Python in Science Conference*, pages 1–5, 2011.

[4] Matthew R Terry. *Effect of Different Charged Particle Stopping Power Models on ICF Ignition*. PhD thesis, University of Wisconsin-Madison, 2010.

[5] W M Stacey, V L Beavers, W A Casino, J R Cheatham, Z W Friis, R D Green, W R Hamilton, K W Haufler, J D Hutchinson, W J Lackey, R A Lorio, J W Maddox, J Mandrekas, A A Manzoor, C A Noelke, C D E Oliveira, M Park, D W Tedder, M R Terry, and E A Hoffman. A Subcritical, Gas-Cooled Fast Transmutation Reactor with a Fusion Neutron Source. *Nuclear Technology*, 150(May), 2005.

Invited Talks

[1] Matthew Terry. The Python Ecosystem or Scientific Computing. In *Guest Lecture at University of San Francisco*, 2013.

[2] Matthew Terry. Tamped Heavy Ion Targets. In *19th International Symposium on Heavy Ion Inertial Fusion*, 2012.