JASON M LARKIN

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CAREER OVERVIEW AND OBJECTIVE

I have extensive experience performing experimental and numerical studies in condensed matter physics with an emphasis on nanoscale transport, fluid dynamics, and nonlinear analysis. My interests include complex systems modeling, multi-language development for applications in high-performance parallel computing, and open-source collaboration to improve the way research is performed and results are disseminated.

EDUCATION

Carnegie Mellon University Pittsburgh, PA ● PhD Mechanical Engineering, 2013 GPA: 3.85/4.00

    Thesis: Vibrational Mode Properties of Disordered Solids from High-Performance Atomistic Simulations and Calculations. Numerically investigated thermal properties of crystal alloys, glasses, and organic materials using classical and *ab initio*-based atomistic techniques.

    Coursework: molecular/electron structure · nanoscale transport phenomena · numerical methods

University of Pittsburgh Pittsburgh, PA ● MS Mechanical Engineering, 2009 GPA: 3.70/4.00

    Thesis: Statistics of Particle Concentrations in Free-Surface Turbulence. Performed experiments using novel 2D and 3D flow configurations to study turbulence as a nonlinear dynamical system.

    Coursework: quantum and statistical physics · turbulence · chaos and nonlinear phenomena

University of Pittsburgh Pittsburgh, PA ● BS Mechanical Engineering, 2007 GPA: 3.20/4.00

    Research: Used FEM to design a model arterial bifurcation for *in vivo* study.

Steel Center AVTS Jefferson Hills, PA ● CADD Certification, 2002 GPA: 3.80/4.00

    Coursework: Trained in CAD using Autodesk's AutoCAD (15.6) and Inventor (5.3) to produce machined products by CAM and human machining.

EXPERIENCE

SpiralGen, Inc. (2013-2014) ***Software Engineer***
Spiral: tool to create automatically optimized/platform-tuned digital signal processing and numerical kernels.

- Used integration work for DARPA projects (HACMS, PERFECT) to help create commercial version of the Spiral tool.
  - Designed and developed Jenkins CI environment for build/testing.
  - Helped develop NSIS installer for Spiral tool and integration with Jenkins CI.
  - Developed help to Spiral's documentation using Doxygen.
  - Created native (C/C++/Fortran) and interpreted (Cython and Mex) example implementations of Spiral-generated code.
  - Helped develop HCOL implementations of robot control kernels (PID, Euler) for HACMS project.
- **HACMS:** DARPA project to create technology for the construction of high-assurance cyber-physical systems.
  - Integrated and tested Spiral-generated, high-assurance code with simulated Webots and physical Black-i Landshark robots using ROS.
  - Developed integrated Pentagon demo for HACMS using ROS, Webots, and TkInter.
  - Developed an automated and virtualized ROS test system for the Spiral-generated robot controller kernels.
  - Collaborated with a large/diverse team of labs (HRL, SRI) and universities (CMU, MIT, Princeton, UIUC, UPenn).
- **PERFECT:** DARPA project to seek revolutionary approaches and to research and develop the technologies and techniques to provide the power efficiency required to enable embedded computing systems.
  - Helped develop an installable version of the Spiral tool with an Eclipse plug-in to generate platform-optimized FFTs.

Carnegie Mellon University (2010-2012) ***Teaching Assistant-Heat Transfer***

- Topics in conduction, convection, and radiation. Supervised recitations and substituted for lectures.

University of Pittsburgh (2008) ***Teaching Assistant-Advanced Fluid Mechanics***

- Topics in viscous flow, boundary layer theory, and scale similarity.

University of Pittsburgh (2007-2009) ***Lecturer-Physics***

- Lectured to students and faculty on mathematics, bio-physics, turbulence, statistical and nonlinear phenomena.

Precision Therapeutics (2006-2007) ***Intern-Technology Development***

- Worked with team of software developers and laboratory equipment specialists.
- Used CAD to fabricate components of optical microscopes and laboratory automation controls.

SKILLS

- **Computing Languages:** Matlab, Python, C/C++, Fortran, Java, LaTeX, Shell, Perl, Markdown, HTML, CSS mixed-language development (Cython, Mex).
- **Software Development:** SCM (svn, git, Jenkins), make/cmake, Visual Studio/MSBuild, Eclipse, NSIS, Doxygen.
- **Compilers/Compilation**: GNU, Intel C/C++, Visual Studio, MinGW, Cython, Mex, Ant.
- **High-Performance Computing:** Linux/Unix cluster administration/computing, parallel computation (MPI, OpenMP), SSE/AVX vectorization.
- **Cloud Computing:** Amazon Web Services, Cloud9, Virtualization (VirtualBox, VMWare).

- **General Computing:** Linux/Unix OS (Ubuntu, Red Hat, CentOS, Mac), Windows OS, Microsoft Office, Libre/Open Office, GIMP.
- **Open-Source Development:** Github, GULP, LAMMPS, ROS, arXiv.
- **Modeling:** atomistic simulation, quantum chemistry, nanoscale transport, statistical and nonlinear analysis, computational fluid dynamics.
- **Hardware:** optics/lasers, DI/DO AI/AO interfaces, simple automation, machining, circuitry, simple robotics control.

PROJECTS

- **Quantum Mechanics-Driven Prediction of Nanostructure Thermal Conductivity:** served as investigator under the AFOSR with collaborators at Carnegie Mellon and University of Pittsburgh, performing calculations on the DOD's HPCMP.
- **disorder:** a comprehensive repository of open-source code and data from my PhD thesis, hosted on Github.
- **ntpy:** created this open-source collaborative effort between members of NTPL and University of Toronto.
- **GULP:** international collaboration with Julian Gale at the Nanochemistry Research Institute at Curtin University.
- **Statistics of Free-Surface Turbulence:** international collaboration with Alain Pumir at ENS Lyon, France.

PUBLICATIONS (SELECTED, 11 TOTAL)

- "Origin of the Exceptionally Low Thermal Conductivity of Fullerene Derivative PCBM Films", (in progress).
- "Decorrelating a Compressible Turbulent Flow: an Experiment", Physical Review E 82, 016301 (2010).

PRESENTATIONS (SELECTED, 15 TOTAL)

- "Evaluation of the Virtual Crystal Approximation for Predicting Thermal Conductivity", J.M. Larkin (speaker), A.J.H. McGaughey, 2013 MRS Spring Meeting San Francisco, CA.
- "The Generalized Fractal Dimensions of a 2-D Compressible Turbulence", J. Larkin (speaker), M. Bandi, W. Goldburg, 2008 American Physical Society March Meeting New Orleans, LA.

HONORS

- 2012 ASME MHNMT International Summer Heat Transfer Conference Top 5 Technical Paper
- 2011 Bennett Conference Best Presentation
- 2011 ICES Northrop-Gruman Fellow
- 2007-2009 NSF Graduate Student Research Grant University of Pittsburgh Department of Physics.

MEMBERSHIPS

- American Physical Society · American Society of Mechanical Engineers · Materials Research Society · Society of Industrial and Applied Mathematics · DOD High Performance Computing Modernization Program