MATTHEW ALAN THOMPSON, PHD

Phone: 623-252-4369 Email: fortran@gmail.com

EDUCATION

1999-2007 **University of Colorado at Boulder**, Boulder, CO, USA
PhD, Chemistry
From Femtoseconds to Nanoseconds: Simulation of IBr^- Photodissociation Dynamics in CO_2 Clusters

1995-1999 **The Colorado College**, Colorado Springs, CO, USA
Otis A. and Margaret T. Barnes Chemistry Scholar
BA, *summa cum laude*, Chemistry

PROFESSIONAL AND RESEARCH EXPERIENCE

2012-Present **Senior Software Test Engineer**
Science Systems and Applications, Inc. (SSAI, Awarded follow-on contract from SAIC)

2009-2012 **Senior Scientific Software Engineer**
Science Applications International Corporation (SAIC)
Support of the Global Modeling and Assimilation Office at NASA Goddard Space Flight Center

- Successfully adapted the GEOS-5 global atmospheric model for use with NVIDIA GPUs by converting the existing Fortran code into CUDA Fortran.
- Demonstrated speedups of 10-15x within the full model with radiation, moist, turbulence, and gravity wave drag physics routines. Excluding data transfer, achieved kernel speedups of 25-50x.
- Successfully transitioned the GEOS-5 shortwave radiation kernel for use on the Intel Xeon Phi for use in both Offload and Native modes.
- Experienced with building, setting up, running, and analyzing results from the GEOS-5 Global Circulation Model with various compilers and on various workstations and supercomputers.
- Successfully built and maintained on various clusters and with various compilers the required libraries for the GEOS-5 GCM including HDF5, NetCDF, cURL, and ESMF.

2007-2009 **National Research Council Postdoctoral Fellowship**
Naval Research Laboratory (Advisor: Brett Dunlap)
Investigation on the use of genetic algorithms for optimization of analytic density functional theory (DFT)

- Constructed and integrated a genetic algorithm in Python with existing analytic DFT code leading to better results than previous efforts.
- Leveraged Parallel Python and MPI to rapidly parallelize genetic algorithm on a per-node and per-core basis for use on workstations and clusters.

2000-2007 **Graduate Research Assistant**
University of Colorado at Boulder (Advisor: Robert Parson)
Nonadiabatic molecular dynamics and high-level (MRCI and CR-CCSD(T)) electronic structure calculations of $IBr^-(CO_2)_n$ and $ICl^-(CO_2)_n$

- Predicted the later-confirmed appearance and disappearance of a long-time absorption recovery process in near-infrared photodissociation of intermediate-size clusters.
- Mentored fellow students and researchers in installation and use of Linux and quantum chemistry programs on local workstations and clusters.

COMPUTING SKILLS

Programming

- Proficient in FORTRAN 77 and Fortran 95/2003/2008 including Intel and PGI Compilers
- Proficient in Python, Parallel Python, and iPython
- Proficient with sed/awk, bash, tcsh, and zsh shell scripts
- Proficient with CVS, Subversion, and Trac version control software
- Experience in C, C++, Perl, and Ruby
- Experience with NetCDF 4, HDF5, ESMF, cURL, and CDO

Parallel Computing

- Proficient with CUDA C and Fortran including use of PGI Accelerator/OpenACC pragmas
- Proficient with OpenMP 4.0
- Experience with Intel Xeon Phi in Offload and Native modes
- Proficient with PBS queueing system, Global Arrays, and MPI (MPICH, OpenMPI, MVAPICH2, MPT) and MPI-I/O
- Experience in integrating Parallel Python with various multi-core workstation and multi-node cluster architectures

Quantum Chemistry

- Proficient with GAMESS-US and Molpro including modification of source code
- Experience with Gaussian 98 and Gaussian 03

System Administration

- Broad experience at both user and administrative level with various distributions of Linux (Red Hat, Fedora, Gentoo, Ubuntu), Compaq Tru64 Alpha, OS X, and Windows XP/Vista
- Proficient with PC, Apple, and printer hardware installation and troubleshooting

General

- Proficient with Microsoft Office and OpenOffice products
- Proficient with TeX, LaTeX, and BibTeX
- Experience with HTML, XHTML, MathML and CSS

AWARDS AND SCHOLARSHIPS

2007	National Research Council Postdoctoral Fellowship
1999	Phi Beta Kappa
1999	Alpha Lambda Delta Book Award
1999	Merck Award in Chemistry
1996	CRC Press Freshman Chemistry Achievement Award
1996	Alpha Lambda Delta
1995-1999	Otis A. and Margaret T. Barnes Chemistry Scholar
1995-1999	Hach Scientific Foundation Scholar
1995-1999	First Bank System Foundation Scholar

ORGANIZATIONS

2012-Present	Association for Computing Machinery

TALKS GIVEN

2013 Programming Weather, Climate, and Earth-System Models on Heterogeneous Multi-core Platforms Workshop, Boulder, CO
Continued Efforts in Adapting the GEOS-5 AGCM to Accelerators : Successes and Challenges

2012 Programming Weather, Climate, and Earth-System Models on Heterogeneous Multi-core Platforms Workshop, Boulder, CO
Progress in Adapting the GEOS-5 GCM to CUDA FORTRAN: Successes and Challenges

2011 Programming Weather, Climate, and Earth-System Models on Heterogeneous Multi-core Platforms Workshop, Boulder, CO
Lessons Learned from Adapting GEOS-5 GCM Physics to CUDA Fortran

2006 JILA, Boulder, CO
Nonadiabatic MD Simulations of $IBr^-(CO_2)_n$ Photodissociation

POSTERS PRESENTED

2008 American Conference on Theoretical Chemistry 2008, Evanston, IL
Analytic Density-Functional Theory Optimization with a Parallel Genetic Algorithm

2007 American Physical Society, March Meeting, Denver, CO
Nonadiabatic MD Simulations of $IBr^-(CO_2)_n$ Photodissociation

2006 American Chemical Society, Fall Meeting, San Francisco, CA
Nonadiabatic MD Simulations of $IBr^-(CO_2)_n$ Photodissociation

PUBLICATIONS

L. Sheps, E. M. Miller, S. Horvath, M. A. Thompson, R. Parson, A. B. McCoy, and W. C. Lineberger.
Solvent-mediated charge redistribution in photodissociation of IBr^- and $IBr^-(CO_2)$.
J. Chem. Phys., 134(18):184311, 2011

L. Sheps, E. M. Miller, S. Horvath, M. A. Thompson, R. Parson, A. B. McCoy, and W. C. Lineberger.
Solvent-mediated electron hopping: Long-range charge transfer in $IBr^-(CO_2)$ photodissociation.
Science, 328(5975):220–224, 2010

M. A. Thompson, J. P. Martin, J. P. Darr, W. C. Lineberger, and R. Parson.
A combined experimental/theoretical investigation of the near-infrared photodissociation of $IBr^-(CO_2)_n$.
J. Chem. Phys., 129:224304, 2008

M. A. Thompson and B. I. Dunlap.
Optimization of analytic density functionals by parallel genetic algorithm.
Chem. Phys. Lett., 463:278–282, 2008

V. Dribinski, J. Barbera, J. P. Martin, A. Svendsen, M. A. Thompson, R. Parson, and W. C. Lineberger.
Time-resolved study of the solvent induced recombination in size-selected $IBr^-(CO_2)_n$ clusters.
J. Chem. Phys., 125:133405, 2006

T. Sanford, S.-Y. Han, M. A. Thompson, R. Parson, and W. C. Lineberger.
Photodissociation dynamics of $IBr^-(CO_2)_n$, n<15.
J. Chem. Phys., 122:054307, 2005

T. Sanford, D. Andrews, J. Rathbone, M. Taylor, F. Muntean, M. Thompson, A. B. McCoy, R. Parson, and W. C. Lineberger.
Time resolved solvent rearrangement dynamics.
Faraday Discuss., 127:383–394, 2004

References available upon request.