

DAVID J. DANIEL

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EXPERIENCE

Los Alamos National Laboratory, NM. *Technical Staff Member, 2001-present.*

Member of the Resilient Technologies team in the Advanced Computing Laboratory (CCS-1).

A primary developer of the Los Alamos Message Passing Interface (LA-MPI), an end-to-end network-failure-tolerant message-passing system designed for terascale clusters. This MPI compliant library is in use on production platforms at LANL.

Contributor to Open MPI, a new and extensible implementation of MPI.

Research in parallel algorithms, particularly with regard to achieving robustness and efficiency in complex scientific and predictive simulations.

I am also involved in projects related to the thermodynamics of high explosives.

Alpha Processor, Inc., Concord, MA. *Software Consultant / Member of Technical Staff, 1998-2001.*

Development of technology to promote the Alpha processor in the commodity marketplace.

Ported Linux kernel to newly developed 1- and 2-processor Alpha 21264 motherboards. Developed Linux bootstrap software for AlphaBIOS based systems.

Investigation of techniques for “appliancizing” Alpha systems with a view to constructing resilient clusters for the web server, web cache and HPC markets.

Designed and implemented intranet database and information systems in Perl (CGI) for securely tracking inventory and engineering processes in a distributed environment.

Axil Computer, Inc., Concord, MA. *Member of Technical Staff, 1995-1998.*

Development of 8-way SMP Intel processor based systems for the Windows NT server market.

Parallelized digital logic simulation applications (Verilog simulators) to run on a 16 node Meiko CS-2 system, making feasible simulations of entire system boards.

Investigated multi-processor (using WIN32 and POSIX threads) and I/O performance issues, including engineering tests for large-scale database benchmarking (TPC-C).

Developed end-user Windows NT applications in C++ using MFC, and C, including multi-threaded graphical tools for system testing with diagnostics, and an NT service for periodic system monitoring. Both of these were shipped bundled with the system.

Meiko Scientific Corp., Waltham, MA. *Software Application Analyst, 1993-1995.*

U. S. technical marketing of the Meiko CS-2, a distributed memory parallel supercomputer.

Implemented, ported and optimized customer applications and/or benchmarks (C, Fortran; PVM, MPI, HPF; sequential, message-passing, data-parallel) critical to achieving major sales. These were predominantly codes from government agencies (LLNL, LANL, SNL, KAPL, NOAA, NASA).

Directed and participated in numerical software library development for the CS-2, including sequential and parallel FFT libraries, dense and sparse linear solvers.

Los Alamos National Laboratory, NM. *Post-doctoral fellow, 1990-1992.*

Active member of a world-leading group in the study of the strong (QCD) and weak interactions of quarks by numerical simulation using Monte Carlo methods.

Extensive investigation of the hadron mass spectrum in simulations of lattice QCD using improved overlap techniques and robust statistical fitting procedures. Introduced a new approach to the study of meson wave functions and form-factors in lattice QCD.

Developed and maintained large simulation and statistical analysis codes (C, Fortran) for vector and parallel supercomputers (Cray YMP and Thinking Machines CM-2) and Unix workstations.

University of Edinburgh, Scotland. *Research fellow, 1988-1990.*

Numerical simulations of lattice QCD focusing on meson wave functions and exclusive meson-meson scattering cross-sections. Analytical study of Chern-Simons theory (a topologically interesting quantum field theory) using perturbation theory.

Centre Nationale de la Recherche Scientifique, Marseille, France. *Research associate, 1987-1988.*

Mathematical analysis of the strong nuclear force in small volumes, in order to better interpret the results of finite-size numerical simulations of lattice QCD.

EDUCATION

University of Edinburgh, Scotland. *Ph.D. in theoretical particle physics, 1987.*

Thesis, *Towards phenomenology from lattice quantum chromodynamics*, is a study of quark interactions using mathematical analysis and simulations on vector and parallel computers.

Major result is the derivation of algebraic and group-theoretical methods for the calculation of perturbative corrections to numerical estimates of two- and four-fermion matrix elements in the staggered fermion version of lattice QCD.

Imperial College, London, England. *B.Sc. with 1st class honours in physics, 1984.*

H. L. Callendar prize for excellence in physics.

OTHER DETAILS

US citizen. Active DOE Q clearance.

Publications

- [1] David J. Daniel and T. D. Kieu. On the flavor interpretations of staggered fermions. *Phys. Lett.*, B175:73, 1986.
- [2] David J. Daniel, Simon Hands, T. D. Kieu, and Stephen N. Sheard. Weak matrix element calculations on the lattice using staggered fermions. *Phys. Lett.*, B193:85, 1987.
- [3] K. C. Bowler, David J. Daniel, T. D. Kieu, David G. Richards, and C. J. Scott. Nucleon wave functions from lattice gauge theories: Measurements of baryonic operators. *Nucl. Phys.*, B296:431, 1988.
- [4] David J. Daniel and Stephen N. Sheard. Perturbative corrections to staggered fermion lattice operators. *Nucl. Phys.*, B302:471, 1988.
- [5] David J. Daniel, Antonio Gonzalez-Arroyo, Chris. P. Korthals Altes, and Bo Soderberg. Energy spectrum of SU(2) YANG-MILLS fields with space-like symmetric twist. *Phys. Lett.*, B221:136, 1989.
- [6] David J. Daniel, Rajan Gupta, and David G. Richards. A calculation of the pion's quark distribution amplitude in lattice QCD with dynamical fermions. *Phys. Rev.*, D43:3715–3724, 1991.
- [7] David J. Daniel, Rajan Gupta, and David G. Richards. Pion properties from lattice QCD. *Nucl. Phys. B, Proc. Suppl.*, 20, 1991.
- [8] David J. Daniel, Antonio Gonzalez-Arroyo, and Chris P. Korthals Altes. The energy levels of lattice gauge theory in a small twisted box. *Phys. Lett.*, B251:559–566, 1990.
- [9] David J. Daniel and Nicholas Dorey. The Schwinger-Dyson equations and nonrenormalization in Chern-Simons theory. *Phys. Lett.*, B246:82–86, 1990.
- [10] David J. Daniel, Antonio Gonzales-Arroyo, and Chris. P. Korthals Altes. Small volume physics with twisted boundary conditions. *Nucl. Phys. B, Proc. Suppl.*, 20, 1991.
- [11] Rajan Gupta, David J. Daniel, Gregory W. Kilcup, A. Patel, and Stephen R. Sharpe. Matrix elements with Wilson fermions. *Nucl. Phys. Proc. Suppl.*, 26:337–340, 1992.
- [12] Rajan Gupta, David J. Daniel, Gregory W. Kilcup, Apoorva Patel, and Stephen R. Sharpe. The kaon b parameter with Wilson fermions. *Phys. Rev.*, D47:5113–5127, 1993.
- [13] David J. Daniel, Rajan Gupta, Gregory W. Kilcup, Apoorva Patel, and Stephen R. Sharpe. Phenomenology with Wilson fermions using smeared sources. *Phys. Rev.*, D46:3130–3145, 1992.
- [14] Rajan Gupta, David J. Daniel, and Jeffrey Grandy. Meson form-factors and wave functions with Wilson fermions. *Nucl. Phys. Proc. Suppl.*, 30:419–422, 1993.
- [15] Rajan Gupta, Tanmoy Bhattacharya, and David J. Daniel. Semileptonic form-factors of heavy-light mesons from lattice QCD. *hep-lat/9310007*, 1993.
- [16] Rajan Gupta, David J. Daniel, and Jeffrey Grandy. Bethe-Salpeter amplitudes and density correlations for mesons with Wilson fermions. *Phys. Rev.*, D48:3330–3339, 1993.
- [17] Richard L. Graham, Sung-Eun Choi, David J. Daniel, Nehal N. Desai, Ronald G. Minnich, Craig E. Rasmussen, L. Dean Risinger, and Mitchel W. Sukalski. A network-failure-tolerant message-passing system for terascale clusters. In *ICS '02: Proceedings of the 16th international conference on Supercomputing*, pages 77–83. ACM Press, 2002.
- [18] David J. Daniel, Nehal N. Desai, Richard L. Graham, L. Dean Risinger, and Mitch W. Sukalksi. LA-MPI: The Los Alamos Message Passing Interface. In *Proceedings of the Nuclear Explosives Code Developers' Conference, 2002, Monterey, September 2004*.

- [19] Richard L. Graham, Sung-Eun Choi, David J. Daniel, Nehal N. Desai, Ronald G. Minnich, Craig E. Rasmussen, L. Dean Risinger, and Mitchel W. Sukalski. A network-failure-tolerant message-passing system for terascale clusters. *Int. J. Parallel Program.*, 31(4):285–303, 2003.
- [20] Rob T. Aulwes, David J. Daniel, Nehal N. Desai, Richard L. Graham, L. Dean Risinger, Mitch W. Sukalski, and Mark A. Taylor. Network fault tolerance in LA-MPI. In *Recent Advances in Parallel Virtual Machine and Message Passing Interface: 10th European PVM/MPI User's Group Meeting, Venice, Italy, September 29 - October 2, 2003, Proceedings*. Springer-Verlag, September 2004.
- [21] Rob T. Aulwes, David J. Daniel, Nehal N. Desai, Richard L. Graham, L. Dean Risinger, and Mitch W. Sukalski. LA-MPI: The design and implementation of a network-fault-tolerant MPI for terascale clusters. Technical Report LA-UR-03-0939, Los Alamos National Laboratory, 2003.
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- [23] Jeffrey M. Squyres, Vishal Sahay, P. Kambadur, Brian Barrett, Andrew Lumsdaine, Ralph H. Castain, David J. Daniel, Richard L. Graham, Timothy S. Woodall, Mitch W. Sukalski, Thara Angskun, George Bosilca, Graham E. Fagg, Edgar Gabriel, and Jack J. Dongarra. A component architecture of message passing middleware. In *Cluster '04*, June 2004.
- [24] Edgar Gabriel, Richard L. Graham, Ralph H. Castain, David J. Daniel, Timothy S. Woodall, Mitch W. Sukalski, Graham E. Fagg, Edgar Gabriel, George Bosilca, Thara Angskun, Jack J. Dongarra, Jeffrey M. Squyres, Vishal Sahay, Prabhanjan Kambadur, Brian Barrett, and Andrew Lumsdaine. Open MPI: Goals, concept, and design of a next generation MPI. In *Recent Advances in Parallel Virtual Machine and Message Passing Interface: 11th European PVM/MPI Users' Group Meeting Budapest, Hungary, September 19 - 22, 2004. Proceedings*. Springer-Verlag, September 2004.
- [25] Timothy S. Woodall, Ralph H. Castain, David J. Daniel, Richard L. Graham, Mitch W. Sukalski, Graham E. Fagg, Edgar Gabriel, George Bosilca, Thara Angskun, Jack J. Dongarra, Jeffrey M. Squyres, Vishal Sahay, Prabhanjan Kambadur, Brian Barrett, and Andrew Lumsdaine. Open MPI's TEG point-to-point communications methodology: Comparison to existing implementations. In *EuroPVM/MPI*. Springer-Verlag, September 2004.
- [26] Richard L. Graham, Ralph H. Castain, David J. Daniel, Timothy S. Woodall, Mitch W. Sukalski, Graham E. Fagg, Edgar Gabriel, George Bosilca, Thara Angskun, Jack J. Dongarra, Jeffrey M. Squyres, Vishal Sahay, Prabhanjan Kambadur, Brian Barrett, and Andrew Lumsdaine. TEG: A high-performance, scalable, multi-network point-to-point communications methodology. In *EuroPVM/MPI*. Springer-Verlag, September 2004.
- [27] R. H. Castain, T. S. Woodall, D. J. Daniel, J. M. Squyres, B. Barrett, and G. E. Fagg. The Open Run-Time Environment (OpenRTE): A Transparent Multi-Cluster Environment for High-Performance Computing. In *Proceedings, 12th European PVM/MPI Users' Group Meeting, Sorrento, Italy, September 2005*.