

DAVID H. BAILEY

6 Feb 2010

Current Position:

Chief Technologist, Computational Research Dept., Lawrence Berkeley National Laboratory
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Academic Background:

B.S. 1972, mathematics, Brigham Young University
Ph.D. 1976, mathematics, Stanford University

Professional Society Memberships:

American Mathematical Society (AMS)
Association for Computing Machinery (ACM)
IEEE Computer Society (IEEE-CS)
Mathematical Association of America (MAA)
Society for Industrial and Applied Mathematics (SIAM)

Major Awards (most recent listed last):

1. *The Sidney Fernbach Award (1993)*. This award is presented by the IEEE Computer Society at the annual Supercomputing conferences for outstanding contributions to the field of high performance computing. It is one of the three most prestigious awards in the field.
2. *The Chauvenet Prize (1993)*. This award is presented by the Mathematical Association of America (MAA) at the annual AMS-MAA conferences, for outstanding mathematical articles. See paper #9 in the Papers section below.
3. *The Merten Hasse Prize (1993)*. This award, which is also granted by the MAA, is presented annually for outstanding mathematical articles. See paper #9 in the Papers section below.
4. *The H. Julian Allen Award (1995)*. This award is presented annually by NASA Ames Research Center for outstanding research work and papers.
5. *CSE "Algorithms of the Century (2000)"*. The PSLQ algorithm, which was defined in a paper co-authored by Helaman Ferguson, myself and Stephen Arno, was named one of the ten "algorithms of the century" by the editors of *Computing in Science and Engineering*.
6. *BYU Honored Alumnus, College of Physical and Mathematical Sciences (2001)*. This is awarded annually by the Brigham Young University Alumni Association.
7. *Nominee for \$100,000 "Edge of Computation" Prize (2006)*. This award was granted for a leading-edge contribution in computational science. The list of 48 nominees included many of the world's most distinguished figures in computer science and technology. See http://www.edge.org/3rd_culture/prize05/prize05_index.html.
8. *2008 ACM Gordon Bell Prize: Special Award for Algorithmic Innovation*. This award is presented by the Association for Computing Machinery at the annual Supercomputing conferences, with funds provided by computer pioneer Gordon Bell. See paper #107 in the Papers section below.

Note: I am the only person to have received major awards from both the IEEE Computer Society (#1 above) and the Mathematical Association of America (#2 and #3 above). I am one of only a handful to have received major awards from both the Association of Computing Machinery (#8 above) and the Mathematical Association of America (#2 and #3 above).

Overview of Recent Research Activities:

High performance computing. I am a leading figure in the field of high-performance scientific computing. My best-known paper in the field, “The NAS Parallel Benchmarks,” is still widely cited in performance studies of scientific computer systems. I currently co-lead the Performance Engineering Research Institute (PERI), a ten-institution research project funded by the U.S. Department of Energy, which is aimed at understanding and improving performance of scientific computations on high-end computer systems. I have served on numerous editorial boards and program committees in the field. I have received both the Sidney Fernbach Award and the ACM Gordon Bell Prize (see Major Awards above). These two awards, together with the Seymour Cray Award (which selection committee I chaired for three years), are the three most prestigious honors in the field of high-performance computing.

Computational and experimental mathematics. I am also a leading figure in the field of “experimental” and computational mathematics. My best-known paper in this area (co-authored with Peter Borwein and Simon Plouffe) describes a new formula for the mathematical constant pi, which was discovered using my computer implementation of the PSLQ algorithm. In two more recent papers, Richard Crandall of Reed College and I demonstrated a connection between these formulas and a fundamental question about digit randomness in mathematical constants such as pi. I have co-authored three books and a CD-ROM reference on experimental mathematics. Feature articles on experimental mathematics written by myself and my colleague Jonathan Borwein have recently appeared in the *Notices of the American Mathematical Society* (2005) and in the *American Mathematical Monthly* (2006). I have received the Chauvenet Prize and the Merten Hesse Prize from the Mathematical Association of America (see Major Awards above). I also operate a website devoted to experimental mathematics: <http://www.experimentalmath.info>.

Teaching and other work. In 2000, I taught the U.C. Berkeley graduate course “Applications in Parallel Computing” jointly with Dr. Robert Lucas. I have organized several conferences and workshops, including the Petaflops Algorithms Conference (1997), MSRI Minorities in Applied Mathematics (1998), MSRI Parallel Symbolic Computation (1998), the Experimental Mathematics Workshop (2004) and the Experimental Mathematics in Action 2-day course (2006). I have given over 100 presentations at seminars and professional meetings (see Presentations below).

Previous Positions

1972-1976: Stanford University, Stanford, CA. I taught courses in calculus to undergraduate students, in addition to my studies in probability and ergodic theory leading to the Ph.D.

1976-1980: Department of Defense, Washington, DC. I worked on highly mathematical and computationally intensive problems of interest to DOD.

1980-1982: TRW, Inc., Sunnyvale, CA. I helped develop computational software for a defense electronics contractor.

1982-1984: SRI International, Menlo Park, CA. I worked on a DOD-funded research project.

1984-1998: NASA Ames Research Center, Moffett Field, CA. I worked for a large supercomputer center with hundreds of users nationwide. I published papers on numerical algorithms, parallel computing, computing technology and performance analysis. I also supervised a research group in computational algorithms and applications. I was a lead author of the NAS Parallel Benchmarks, which was developed by our group to assess and compare the sustained performance of scientific supercomputers. I also participated in (and in one case personally directed) several large supercomputer procurements.

Press Reports (most recent listed last):

1. "Did You Ever Wonder?" LBNL website, Jul 2000: [HTML](#).
2. Charles Seife, "Pi Keeps 'Em Guessing," ScienceNow.Com, 27 Jul 2001: [HTML](#).
3. David Whitehouse, "How Random is Pi?" British Broadcasting Company, 23 July 2002: [HTML](#).
4. Charles Seife, "Randomly Distributed Slices of Pi," *Science*, 3 Aug 2001, pg. 793: [HTML](#).
5. Antonia Rotger, "Chaotische Dynamik in der Kreiszahl Pi," *Neue Zurcher Zeitung*, 9 Aug 2002.
6. Ivars Peterson, "Pi al a Mode," *Science News*, 1 Sep 2001, pg. 136-137 (cover story): [PDF](#).
7. W. Wayt Gibbs, "A Digital Slice of Pi," *Scientific American*, May 2003 [PDF](#).
8. Erica Klarreich, "Math Lab: Computer Experiments Are Transforming Mathematics," *Science News*, (Apr 24, 2004), pg. 266-268: [PDF](#).
9. J. L. Nazareth, "On Algorithmic Science and Engineering: An Emerging Core Discipline of Computing," *SIAM News*, 24 March 2006. [HTML](#).
10. Brian Hayes, "Foolproof," *American Scientist*, vol. 95, no. 1 (Jan-Feb 2007), pg. 10-15. [PDF](#).

Internet Presence

Google search statistics (6 Feb 2010):

Search key	Results estimated by Google
"David H Bailey" mathematics	2,800,000
"David H Bailey" computer	322,000

Number of page views (12 month period, 1 Feb 2009 through 31 Jan 2010):

http://crd.lbl.gov/~dhbailey	661,404
http://crd.lbl.gov/~dhbailey/dhbpapers	166,000 (subset of previous line)
http://www.experimentalmath.info	104,419

Professional Community Activities (most recent listed last)

1. Program Co-Chair, 1988 International Conference on Parallel Processing (1989).
2. Deputy Program Chairman, Supercomputing Conference (1990).
3. Program Committee, Supercomputing Conference (1991-1992, 1997-1999).
4. Program Committee, International Conference on Supercomputing (1991-1993).
5. Editor, *IEEE Transactions on Parallel and Distributed Computing* (1990-1993).
6. Tutorial Committee, Supercomputing '93 and Supercomputing '94 (1993-1994).
7. Program Committee, SIAM Parallel Processing Conference (1995).
8. Chair, Petaflops Algorithm Workshop (1997).
9. Tutorial Committee, Supercomputing Conference (1997).
10. Board of Governors, Institute for Mathematics and Applications (1996-1998).
11. Sidney Fernbach Award Committee (1995-1998); Chair (1996-1998).
12. Chair, MSRI Parallel Symbolic Computation Workshop (1998).
13. Governing Board, Supercomputing SIG, Association for Computing Machinery (1993-1999).
14. Technical Papers Chair, Supercomputing Conference (1999).
15. Program Committee, Petaflops-2 Conference (1999).
16. Gordon Bell Prize Committee (1996-1999); Chair (1998-1999).
17. Review Panel, DoE ASCI University Alliance program (1998-2000).
18. Review Committee, NSF Information Technology Research proposal review panel (2000).
19. Program Committee, International Conference on High Performance Computing (2000).
20. Vice Chair, International Parallel and Distributed Processing Symposium (2001).
21. Program Committee, IEEE Conference on Computer Arithmetic (2001-2003).
22. Board of Editors, *International Journal of High Speed Computing* (1992-present).
23. Board of Editors, *Journal of Supercomputing* (1994-present).
24. Technical Papers Committee, SC2002 conference (2002).
25. Co-Chair, Experimental Mathematics Workshop (2004).
26. Co-Chair, "Experimental Mathematics in Action," two-day MAA short course (2006).
27. RIACS Science Council (1999-2007); Chairman (2001-2006)
28. Board of Editors, *Intl. Journal of Computational Science and Engineering* (2006-present).
29. Program Committee, Intl. Conf. on Supercomputing (ISC07) (2007).
30. Program Committee, Intl. Conf. on Parallel and Distributed Computing (IPDPS08) (2007-2008).
31. Program Committee, Conference on Real Numbers and Arithmetic (2008).
32. Gordon Bell Prize Committee (1998-2007); Chairman (1998-2002, 2007).
33. Seymour Cray Prize Committee (2002-2007); Chairman (2005-2007).
34. Steering Committee, SCxx Conferences, IEEE Computer Society (2009-present).
35. Board of Editors, *Notices of the American Mathematical Society* (2009-present).
36. Program Committee, SciDAC 2009 (2009).

Presentations (since 2000; most recent listed last):

Online PDF files for recent presentations are available from the website

<http://crd.lbl.gov/~dhbailey/dhbtalks>.

1. "Are the Digits of Pi Random?" invited seminar talk, Center for Computing Sciences, Bowie, MD (Apr 2000). Similar talks were given at Harvey Mudd College (Jan 2001), U.C. Berkeley (Jan 2002, Nov 2002, Apr 2003), UCLA (Jun. 2002); LBNL Summer Lecture Series (Jun 2002); IDA CCR, La Jolla, CA (Nov 2002); IDA-CCR, Princeton, NJ (Jan 2003); and Lehman College, New York City (Jan 2003).
2. "Challenges of Future High-End Computing," invited plenary talk, SP World Conference (Jun 2000); also Johns Hopkins University (Feb 2001). This talk was reported in [Infoworld](#).
3. "Experimental Mathematics Meets High Performance Computing," Supercomputing 2002, Baltimore, MD (Nov 2002).
4. "Performance of Future High-End Computers," DOE Mission Computing Conference, Arlington, VA (Jun 2003).
5. "12 Ways to Fool the Masses: Scientific Malpractice in High-Performance Computing," International Parallel and Distributed Processing Symposium, Santa Fe, NM (May 2004). Similar talks were given at International Conference on Supercomputing, Heidelberg, Germany (Jun 2004), San Diego Supercomputer Center, Mar 2005, and at University of Texas, El Paso, (Apr 2005).
6. "Experimental Mathematics: Discovering New Formulas and Theorems," DIMACS-GERAD Workshop on Computers and Discovery, Montreal, Canada (Jun 2004). Similar talks were given at U.C. Davis (Jan 2004); University of Texas, El Paso (Apr 2005); and at Montclair State University, NJ (May 2005).
7. "21st Century High-End Computing," Lawrence Livermore Laboratory (Aug 2004). Similar talks were given at IBM Watson Research Center, Yorktown Heights, NY (May 2005); and High Performance Computing Systems Conference, Guelph, ON, Canada (May 2005).
8. "Highly Parallel, High-Precision Numerical Integration," Tulane University, New Orleans, LA (Apr 2005).
9. "Performance Modeling: Understanding the Present and Predicting the Future" (with Allan Snavely), Euro-Par 2005, Lisbon, Portugal (Sep 2005).
10. "Experimental Mathematics and the Normality of Pi," Oregon State University, Corvallis, OR (Nov 2005). Similar talks were given at Reed College, Portland, OR (Dec 2005); and at Simon Fraser University, Vancouver, BC, Canada (Jan 2006).
11. "Algorithms for Experimental Mathematics I" and "Algorithms for Experimental Mathematics II," MAA Short Course "Experimental Mathematics in Action," San Antonio, TX (Jan 2006).
12. "Experimental Mathematics: Pure or Applied Mathematics?" Simon Fraser University, Vancouver, BC, Canada (Mar 2006). Similar talk given at Brigham Young University, Provo, UT (May 2006).
13. "Power Efficiency and the Top500" (with John Shalf), Top500 Session, SC2006 (Nov 2006).
14. "Experimental Mathematics and High-Performance Computing," Mathematical Sciences Research Institute (MSRI) (Feb 2007).
15. "Computer-Assisted Discovery and Proof," invited talk, Conference on Proof Theory in Mathematics, Max Planck Institute, Bonn, Germany (Jun 2007). Similar talk given at Mathematical Sciences Research Institute, Berkeley, CA (Jun 2007).

16. “Experimental Mathematics and Optimization,” invited short course presentation, McMaster University, Canada (Aug 2007).
17. “High-Precision Arithmetic and Applications to Physics and Mathematics,” invited talk, International Symposium on Nonlinear Theory and its Applications (NOLTA2007) (Sep 2007).
18. “Experimental Mathematics: High-Performance Computing Meets Mathematical Research,” invited seminar, Research Institute for Symbolic Computing, Linz, Austria (Nov 2007). [PDF](#)
19. “Experimental Mathematics: Tools of the Trade,” invited seminar, Research Institute for Symbolic Computing, Linz, Austria (Nov 2007). [PDF](#)
20. “High-Performance Computing and Experimental Mathematics,” invited seminar, Oregon State University, Corvallis, OR (Dec 2007). Similar talks given at University of Oregon, Eugene, OR (Dec 2007) and Colorado State University, Fort Collins, CO (Dec 2007). [PDF](#)
21. “High-Performance, High-Precision Computation in Math, Physics and Engineering,” Pelz memorial lecture, Rutgers University, New Brunswick, NJ (Jan 2008). [PDF](#)
22. “High-Performance Computing and Mathematical Physics,” invited colloquium, DESY Institute, Berlin, Germany (Apr 2008). [PDF](#)
23. “Peter Borwein and High-Performance Computing,” keynote speech, Peter Borwein Conference, Simon Fraser University, Burnaby, CA (May 2008). [PDF](#)
24. “High-Precision Arithmetic and Mathematical Physics,” XII International Workshop on Advanced Computing and Analysis Techniques in Physics Research, Erice, Italy (Nov 2008); similar talk given at Swiss Federal Institute of Technology Zurich (ETH-Zurich), Zurich, Switzerland (Nov 2008). [PDF](#)
25. “Normal Numbers,” U. C. Berkeley Number Theory Seminar, Berkeley, CA (Dec 2008). [PDF](#)
26. “High-Precision Arithmetic and Experimental Mathematics,” presentation to Sun Microsystems, Berkeley, CA (Jan 2009). [PDF](#)
27. “High-Precision Numerical Integration on High-Performance Computers,” High-Dimensional Approximation 2009 (HDA’09), invited talk, Sydney, Australia (Feb 2009). [PDF](#)
28. “High-Precision Arithmetic and Mathematical Physics,” invited two-part seminar talk, Computer Algebra and Particle Physics, DESY, Zeuthen, Germany (Mar 2009). [PDF](#)
29. “Computing: The Third Mode of Scientific Discovery,” invited convocation talk, Grinnell College, Grinnell, Iowa (Apr 2009): [PDF](#)
30. “High-Precision Arithmetic and Experimental Mathematics,” invited seminar talk, Grinnell College, Grinnell, Iowa (Apr 2009). Similar talk given at East Coast Computer Algebra Day, Kingstown, RI (May 2009): [PDF](#)
31. “High-Precision Arithmetic and Mathematical Physics,” invited lecture, ENRAGE09, Max-Planck Institute, Dresden, Germany (May 2009): [PDF](#)
32. “Misleading Performance Claims in Parallel Computations,” invited talk, 2009 Design Automation Conference, San Francisco (Jul 2009): [PDF](#)
33. “Computing: The Third Mode of Scientific Discovery,” invited convocation talk, Grinnell College, Grinnell, Iowa (Apr 2009); updated version given at University of Newcastle, Australia (Aug 2009): [PDF](#)
34. “Experimental Mathematics Meets Mathematical Physics,” invited lecture, CARMA Workshop on Multidimensional Numerical Integration and Special Function Evaluation, University of Newcastle, Australia (Aug 2009), also given at Macquarie University (Dept. of Mathematics), Sydney, Australia (Aug 2009); updated version presented to Fields Institute Workshop on Experimentation in Number Theory, Simon Fraser University, Burnaby, BC Canada (Sep 2009): [PDF](#)

35. “Experimental Mathematics, Multicore Processors and Highly Parallel Computing,” University of Sydney (Dept. of Mathematics), Sydney, Australia, invited seminar (Sep 2009), also given at Macquarie University (Dept. of Electrical Engineering), Sydney, Australia (Sep 2009). [PDF](#)

Books and CD-ROM works (most recent listed last):

1. Jonathan M. Borwein and David H. Bailey, *Mathematics by Experiment: Plausible Reasoning in the 21st Century*, A. K. Peters, Wellesley, MA, 2004; second edition, 2008.
2. Jonathan M. Borwein, David H. Bailey, and Roland Girgensohn *Experimentation in Mathematics: Computational Paths to Discovery*, A. K. Peters, Wellesley, MA, 2004.
3. Jonathan Borwein, David Bailey and Roland Girgensohn, *Experiments in Mathematics*, CD-ROM, A. K. Peters, Wellesley, MA, 2006.
4. David H. Bailey, Jonathan M. Borwein, Neil Calkin, Roland Girgensohn, Russell Luke and Victor Moll, *Experimental Mathematics in Action*, A. K. Peters, Wellesley, MA, 2007.

Technical Papers (most recent listed last):

Online PDF copies of many of these articles are available at the links below, or at the website <http://crd.lbl.gov/~dhbailey/dhbpapers>. In many cases, minor differences exist between these preprint copies and the published versions.

1. David H. Bailey, “Vector Computer Memory Bank Contention,” *IEEE Transactions on Computers*, vol. C-36, no. 3 (Mar. 1987), pg. 293-298. [PDF](#)
2. David H. Bailey, “A High-Performance Fast Fourier Transform Algorithm for the Cray-2,” *Journal of Supercomputing*, vol. 1, no. 1 (Jul 1987), pg. 43-60. [PDF](#)
3. David H. Bailey, “The Computation of Pi to 29,360,000 Decimal Digits Using Borweins’ Quarcally Convergent Algorithm,” *Mathematics of Computation*, vol. 50, no. 181 (Jan. 1988), pg. 283-296. [PDF](#)
4. David H. Bailey, “Numerical Results on the Transcendence of Constants Involving Pi, E, and Gamma,” *Mathematics of Computation*, vol. 50, no. 181 (Jan 1988), pg. 275-281. [PDF](#)
5. David H. Bailey, “A High-Performance FFT Algorithm for Vector Supercomputers,” *International Journal of Supercomputer Applications*, vol. 2, no. 1 (1988), pg. 82-87. [PDF](#)
6. David H. Bailey, “Extra-High Speed Matrix Multiplication on the Cray-2,” *SIAM Journal on Scientific and Statistical Computing*, vol. 9, no. 3, (May 1988), pg. 603-607. [PDF](#)
7. Don A. Calahan and David H. Bailey, “Measurement and Analysis of Memory Conflicts on Vector Multiprocessors,” in Joanne L. Martin, ed., *Performance Evaluation of Supercomputers*, North-Holland, 1988, pg. 83-106. [PDF](#)
8. David H. Bailey and Helaman R. P. Ferguson, “A Strassen-Newton Algorithm for High-Speed Parallelizable Matrix Inversion,” *Proceedings of Supercomputing 1988*, Oct 1988, pg. 419-424.
9. Jonathan M. Borwein, Peter B. Borwein and David H. Bailey, “Ramanujan, Modular Equations, and Approximations to Pi,” *American Mathematical Monthly*, Mar. 1989, pg. 201-219. This paper was later cited for both the Chauvenet Prize and the Merten Hesse Prize, awarded by the Mathematical Association of America. [PDF](#)
10. David H. Bailey and H. R. P. Ferguson, “Numerical Results on Relations Between Numerical Constants Using a New Algorithm,” *Mathematics of Computation*, vol. 53, no. 188 (Oct 1989), pg. 649-656. [PDF](#)

11. David H. Bailey, Horst D. Simon, John T. Barton and Martin J. Fouts, "Floating Point Arithmetic in Future Supercomputers," *International Journal of Supercomputer Applications*, vol. 3, no. 3 (1989), pg. 86-90. [PDF](#)
12. David H. Bailey, "FFTs in External or Hierarchical Memory," *Journal of Supercomputing*, vol. 4, no. 1 (Mar 1990), pg. 23-35. [PDF](#)
13. David H. Bailey, Eric Barszcz, Rod A. Fatoohi, Horst D. Simon and Sisira Weeratunga, "Performance Results on the Intel Touchstone Gamma Prototype," *Proceedings of the Fifth Distributed Memory Computing Conference*, Apr 1990, pg. 1236-1245. [PDF](#)
14. David H. Bailey, "In Response to the Fate of Fortran-8X," *Communications of the ACM*, vol. 33, no. 4 (Apr 1990), pg. 391-392. [PDF](#)
15. David H. Bailey, King Lee, and Horst D. Simon, "Using Strassen's Algorithm to Accelerate the Solution of Linear Systems," *Journal of Supercomputing*, vol. 4., no. 4 (Jan 1991), pg. 357-371. [PDF](#)
16. David H. Bailey and P. N. Swarztrauber, "The Fractional Fourier Transform and Applications," *SIAM Review*, vol. 33 no. 3 (Sep 1991), pg. 389-404. Please also see the errata note that follows this item. [PDF](#)
17. David H. Bailey, "Errata to 'The Fractional Fourier Transform and Applications,'" manuscript, 1991. [PDF](#)
18. David H. Bailey, "Performance of Two of the NAS Parallel Benchmarks," *Proceedings of Supercomputing 1991*, Nov 1991, pg. 166-173. [PDF](#)
19. David H. Bailey, et. al, "The NAS Parallel Benchmarks," *International Journal of Supercomputer Applications*, vol. 5, no. 3 (Fall 1991), pg. 66-73. [PDF](#)
20. Helaman R. P. Ferguson and David H. Bailey, "A Polynomial Time, Numerically Stable Integer Relation Algorithm," manuscript, 1991. [PDF](#)
21. David H. Bailey, "Experience with Parallel Computers at NASA Ames", *International Journal of High Speed Computing*, vol. 5, no. 1 (1993), pg. 51-62. [PDF](#)
22. David H. Bailey, "Twelve Ways to Fool the Masses When Giving Performance Results on Parallel Computers," *Supercomputing Review*, Aug 1991, pg. 54-55. [PDF](#)
23. David H. Bailey, "How Useful Are Today's Parallel Computers?," *Computers in Physics*, vol. 6, no. 2 (Mar./Apr. 1992), pg. 216. [PDF](#)
24. David H. Bailey, Eric Barszcz, Leo Dagum and Horst D. Simon, "NAS Parallel Benchmark Results," *Proceedings of Supercomputing 1992*, Nov 1992, pg. 386-393. [PDF](#)
25. David H. Bailey, Eric Barszcz, Leo Dagum and Horst D. Simon, "NAS Parallel Benchmark Results," *IEEE Parallel and Distributed Technology*, Feb 1993, pg. 43-51. [PDF](#)
26. David H. Bailey, "Misleading Performance Reporting in the Supercomputing Field", *Scientific Programming*, vol. 1., no. 2 (Winter 1992), pg. 141-151. [PDF](#)
27. David H. Bailey, "Multiprecision Translation and Execution of Fortran Programs," *ACM Transactions on Mathematical Software*, vol. 19, no. 3, Sep 1993, pg. 288-319. [PDF](#)
28. David H. Bailey, "Unfavorable Strides in Cache Memory Systems," *Scientific Programming*, vol. 4 (1995), pg. 53-58. [PDF](#)
29. David H. Bailey and P. N. Swarztrauber, "A Fast Method for the Numerical Evaluation of Continuous Fourier Transforms," *SIAM Journal on Scientific Computing*, vol. 15, no. 5 (Sep 1994), pg. 1105-1110. [PDF](#)
30. David H. Bailey, "RISC Microprocessors and Scientific Computing," *Proceedings of Supercomputing '93*, IEEE Computer Society, 1993, pg. 645-654. [PDF](#)

31. David H. Bailey, R. Krasny and R. Pelz, "Multiple Precision, Multiple Processor Vortex Sheet Roll-Up Computation," *Proceedings of the Sixth SIAM Conference on Parallel Processing for Scientific Computing*, 1993, SIAM, Philadelphia, pg. 52-56. [PDF](#)
32. David H. Bailey, Jonathan M. Borwein and Roland Girgensohn, "Experimental Evaluation of Euler Sums", *Experimental Mathematics*, vol. 3, no. 1 (1994), pg. 17-30. [PDF](#)
33. David H. Bailey, "A Fortran-90 Based Multiprecision System," *ACM Transactions on Mathematical Software*, vol. 21, no. 4 (Dec 1995), pg. 379-387. [PDF](#)
34. David H. Bailey, "On The Computational Cost of FFT-Based Linear Convolutions", manuscript, Jun 1996. [PDF](#)
35. David H. Bailey, Jonathan M. Borwein and Richard E. Crandall, "On the Khintchine Constant," *Mathematics of Computation*, vol. 66 (1997), pg. 417-431. [PDF](#)
36. David H. Bailey, Peter B. Borwein and Simon Plouffe, "On the Rapid Computation of Various Polylogarithmic Constants," *Mathematics of Computation*, vol. 66, no. 218 (Apr 1997), pg. 903-913. [PDF](#)
37. David H. Bailey and Simon Plouffe, "Recognizing Numerical Constants," *Proceedings of the Workshop on Organic Mathematics*, Canadian Mathematical Society, vol. 20 (1997), pg. 73-88. [PDF](#)
38. David H. Bailey, Jonathan M. Borwein, Peter B. Borwein and Simon Plouffe, "The Quest for Pi," *Mathematical Intelligencer*, vol. 19, no. 1 (Jan 1997), pg. 50-57. [PDF](#)
39. Helaman R. P. Ferguson, David H. Bailey and Stephen Arno, "Analysis of PSLQ, An Integer Relation Finding Algorithm," *Mathematics of Computation*, vol. 68, no. 225 (Jan 1999), pg. 351-369. [PDF](#)
40. David H. Bailey, "Onward to Petaflops Computing," *ACM Communications*, vol. 40, no. 6 (Jun 1997), pg. 90-92. [PDF](#)
41. David H. Bailey, Rupak Biswas and Rob Van Der Wijngaart, "NAS Applications and Advanced Architectures," NAS Technical Report NAS-97-031, NASA Ames Research Center (Nov 1997). [PDF](#)
42. David H. Bailey, "Little's Law and High Performance Computing," manuscript, 1997. [PDF](#)
43. David H. Bailey, "Finding New Mathematical Identities via Numerical Computations," *ACM SIGNUM*, vol. 33, no. 1 (Jan 1998), pg. 17-22 [PDF](#)
44. David H. Bailey, "Challenges of Future High-End Computing," in Jonathan Schaeffer, ed., *High Performance Computer Systems and Applications*, Kluwer Academic Press, Boston, 1998. [PDF](#)
45. David H. Bailey and David J. Broadhurst, "Parallel Integer Relation Detection: Techniques and Applications," *Mathematics of Computation*, vol. 70, no. 236 (Oct 2000), pg. 1719-1736; LBNL-44481. [PDF](#)
46. David H. Bailey and David J. Broadhurst, "A Seventeenth-Order Polylogarithm Ladder," 1999; LBNL-44640. [PDF](#)
47. David H. Bailey, "Integer Relation Detection," *Computing in Science and Engineering*, Jan-Feb, 2000, pg. 24-28; LBNL-44639. [PDF](#)
48. Adrian T. Wong, Leonid Oliker, William T. C. Kramer, Teresa L. Kaltz and David H. Bailey, "Evaluating System Effectiveness in High Performance Computing Systems," Nov 1999; LBNL-44542. [PDF](#)
49. David H. Bailey and Jonathan M. Borwein, "Experimental Mathematics: Recent Developments and Future Outlook," in Bjorn Engquist and Wilfried Schmid, ed., *Mathematics Unlimited -- 2001 and Beyond*, Springer, 2001, pg. 51-66; LBNL-44637. [PDF](#)

50. Adrian T. Wong, Leonid Oliker, William T. C. Kramer, Teresa L. Kaltz and David H. Bailey, "System Utilization Benchmark on the Cray T3E and IBM SP," *Fifth Workshop on Job Scheduling*, May 1999; also published in *Job Scheduling Strategies for Parallel Processing*, Dror G. Feitelson and Larry Rudolph, ed. Springer, 2000, pg. 56-67; LBNL-45141. [PDF](#)
51. David H. Bailey and Richard E. Crandall, "On the Random Character of Fundamental Constant Expansions," *Experimental Mathematics*, vol. 10, no. 2 (Jun 2001), pg. 175-190; LBNL-45583. [PDF](#).
52. Adrian T. Wong, Leonid Oliker, William T. C. Kramer, Teresa L. Kaltz and David H. Bailey, "ESP: A System Utilization Benchmark," *Proceedings of SC2000*, Nov 2000; LBNL-48595 [PDF](#)
53. David H. Bailey, "A Compendium of BBP-Type Formulas for Mathematical Constants," Nov 2000; LBID-2383. [PDF](#)
54. Yozo Hida, Xiaoye S. Li and David H. Bailey, "Algorithms for Quad-Double Precision Floating Point Arithmetic," *15th IEEE Symposium on Computer Arithmetic*, IEEE Computer Society, 2001, pg. 155-162; LBNL-48597. [PDF](#)
55. Yozo Hida, Xiaoye S. Li and David H. Bailey, "Quad-Double Arithmetic: Algorithms, Implementation, and Application," Oct 2000; LBNL-46996. [PDF](#)
56. X. S. Li, J. W. Demmel, D. H. Bailey, G. Henry, Y. Hida, J. Iskandar, W. Kahan, A. Kapur, M. C. Martin, T. Tung, D. J. Yoo, "Design, Implementation and Testing of Extended and Mixed Precision BLAS," *ACM Transactions on Mathematical Software*, vol. 28, no. 2 (Jun 2002), pg. 152-205; LBNL-45991. [PDF](#)
57. David H. Bailey, "How Fast Is My Beowulf?," in Thomas Sterling, ed., *Beowulf Cluster Computing with Linux*, and in *Beowulf Cluster Computing with Windows*, MIT Press, 2001; LBNL-48598. [PDF](#)
58. David H. Bailey and Richard E. Crandall, "Random Generators and Normal Numbers," *Experimental Mathematics*, vol. 11, no. 4 (2002), pg. 527-546; LBNL-46263. [PDF](#)
59. David H. Bailey and Daniel J. Rudolph, "An Ergodic Proof that Rational Times Normal is Normal", Feb 2002; LBNL-51142. [PDF](#)
60. David H. Bailey, David Broadhurst, Yozo Hida, Sherry Li and Brandon Thompson, "High Performance Computing Meets Experimental Mathematics," *Proceedings of SC2002*; LBNL-51143. [PDF](#)
61. David H. Bailey, "A Reclusive Kind of Science," *Computing in Science and Engineering*, Sept-Oct 2002, pg. 79-81; LBNL-53650. [PDF](#)
62. David H. Bailey and Alexei M. Frolov, "Universal Variational Expansion for High-Precision Bound-State Calculations in Three-Body Systems," *Journal of Physics B: Atomic, Molecular and Optical Physics*, vol. 35, no. 20 (28 Oct 2002), pg. 4287-4298; LBNL-51144. [PDF](#)
63. David H. Bailey, Yozo Hida, Xiaoye S. Li and Brandon Thompson, "ARPREC: An Arbitrary Precision Computation Package," Sept 2002; LBNL-53651. [PDF](#)
64. David H. Bailey, Jonathan M. Borwein, Richard E. Crandall and Carl Pomerance, "On the Binary Expansions of Algebraic Numbers," *Journal of Number Theory Bordeaux*, vol. 16 (2004), pg. 487-518; LBNL-53654. [PDF](#)
65. Alexei M. Frolov and David H. Bailey, "Highly Accurate Evaluation of the Few-Body Auxiliary Functions and Four-Body Integrals," *Journal of Physics B: Atomic, Molecular and Optical Physics*, vol. 36, no. 9 (14 May 2003), pg. 1857-1867; LBNL-53657. [PDF](#)

66. C. William McCurdy, Horst D. Simon, William G. C. Kramer, Robert F. Lucas, William E. Johnston and David H. Bailey, "Future Directions in Scientific Supercomputing," *Computer Physics Communications*, vol. 147 (2002), pg. 34-39; LBNL-53659. [PDF](#)
67. David H. Bailey, "A Hot-Spot Proof of Normality for the Alpha Constants," Jan 2005; LBNL-53658. [PDF](#)
68. David H. Bailey, "Java Meets Numerical Analysis," *Scientific Programming*, vol. 12 (2004), no. 1, pg. 59-60. [PDF](#)
69. David H. Bailey and Xiaoye S. Li, "A Comparison of Three High-Precision Quadrature Schemes," *Proceedings of the Real Numbers and Computing Conference*, Lyon, France, Sep 2003. See revised version in next item.
70. David H. Bailey, Xiaoye S. Li and Karthik Jeyabalan, "A Comparison of Three High-Precision Quadrature Schemes," *Experimental Mathematics*, vol. 14 (2005), no. 3, pg 317-329. LBNL-53652. [PDF](#)
71. David H. Bailey, Jonathan M. Borwein, Vishal Kapoor and Eric Weisstein, "Ten Problems in Experimental Mathematics," *American Mathematical Monthly*, vol. 113, no. 6 (Jun 2006), pg. 481-409; LBNL-57486. [PDF](#)
72. David H. Bailey, "High-Precision Arithmetic in Scientific Computation," *Computing in Science and Engineering*, May-Jun, 2005, pg. 54-61; LBNL-57487. [PDF](#)
73. David H. Bailey and Allan S. Snavely, "Performance Modeling: Understanding the Present and Predicting the Future," *Proceedings of Euro-Par 2005*, Lisbon, Portugal, Sep 2005; LBNL-57688. [PDF](#).
74. David H. Bailey, "A Pseudo-Random Number Generator Based on Normal Numbers," Dec 2004; LBNL-57489. [PDF](#)
75. David H. Bailey and Michal Misiurewicz, "A Strong Hot Spot Theorem," *Proceedings of the American Mathematical Society*, vol. 134 (2006), no. 9, pg. 2495-2501; LBNL-53656. [PDF](#)
76. David H. Bailey and Jonathan M. Borwein, "Experimental Mathematics: Examples, Methods and Implications," *Notices of the American Mathematical Society*, vol. 52, no. 5 (May 2005), pg. 502-514; LBNL-57490. [PDF](#)
77. David H. Bailey, "Review of The Siam 100-Digit Challenge: A Study in High-Accuracy Numerical Computing," *Bulletin of the American Mathematical Society*, vol. 42 (2005), no. 4, pg 545-548. [PDF](#)
78. Horst Simon, William Kramer, William Saphir, John Shalf, David Bailey, Leonid Oliker, Michael Banda, C. William McCurdy, John Hules, Andrew Canning, Marc Day, Philip Colella, David Serafini, Michael Wehner and Peter Nugent, "Science-Driven System Architecture: A New Process for Leadership Class Computing," *Journal of the Earth Simulator*, vol. 2, no. 1 (Jan 2005), pg 1-9. [PDF](#)
79. David H. Bailey and Jonathan M. Borwein, "Highly Parallel, High-Precision Numerical Integration," Jun 2006; LBNL-57491. [PDF](#)
80. Piotr Luszczek, Jack J. Dongarra, David Koester, Rolf Rabenseifner, Bob Lucas, Jeremy Kepner, John McCalpin, David Bailey and Daisuke Takahashi, "Introduction to the HPC Challenge Benchmark Suite," Apr 2005; LBNL-57493. [PDF](#)
81. David H. Bailey, Jonathan M. Borwein and David M. Bradley, "Experimental Determination of Apery-Like Identities for Zeta(2n+2)," *Experimental Mathematics*, vol. 15 (2006), pg. 281-289; LBNL-57581. [PDF](#)
82. David H. Bailey and Alexei M. Frolov, "Positron Annihilation in the Bipositronium Ps sub 2", *Physical Review A*, vol. 72 (11 July 2005), pg 014501-1 to 014501-4; LBNL-58247. [PDF](#)

83. David H. Bailey and Jonathan M. Borwein, "Effective Error Bounds in Euler-Maclaurin-Based Quadrature Schemes," Jun 2005; LBNL-58246. [PDF](#) Condensed version in *Proceedings of the 2006 High-Performance Computing Conference (HPCS)*: [PDF](#)
84. David H. Bailey and Jonathan M. Borwein, "Future Prospects for Computer-Assisted Mathematics," *Notes of the Canadian Mathematical Society*, vol. 37, no. 8 (Dec 2005), pg. 2-6; LBNL-59060. [PDF](#)
85. David H. Bailey, "Tanh-Sinh High-Precision Quadrature," *International Journal of Computational Science and Engineering*, to appear, Jan 2006; LBNL-60519. [PDF](#)
86. David H. Bailey, Jonathan M. Borwein and Richard E. Crandall, "Box Integrals," *Journal of Computational and Applied Mathematics*, vol. 206 (2007), pg. 196-208; LBNL-59962. [PDF](#) | Box integral data: [PDF](#); [LaTeX](#)
87. David H. Bailey, Jonathan M. Borwein and Richard E. Crandall, "Integrals of the Ising Class," *Journal of Physics A: Mathematical and General*, vol. 39 (2006), pg. 12271-12302; LBNL-59963. [PDF](#) | Ising data: [PDF](#); [LaTeX](#)
88. Leonid Oliker, Rupak Biswas, Rob Van der Wijngaart, David H. Bailey and Allan Snavely, "Performance Evaluation and Modeling of Ultra-Scale Systems," *Parallel Processing for Scientific Computing*, SIAM, Philadelphia, PA, 2006; LBNL-58054. [PDF](#)
89. Hongzhang Shan, Erich Strohmaier, Ji Qiang, David H. Bailey, and Kathy Yelick, "Performance Modeling and Optimization of a High Energy Colliding Beam Simulation Code," *Proceedings of SC2006*, Nov 2006; LBNL-60180. [PDF](#)
90. David H. Bailey, David Borwein, Jonathan M. Borwein and Richard Crandall, "Hypergeometric Forms for Ising-Class Integrals," *Experimental Mathematics*, vol. 16 (2007), no. 3, pg. 257-276; LBNL-61037. [PDF](#)
91. David H. Bailey, "The BBP Algorithm for Pi," manuscript, Sep 2006. [PDF](#)
92. David H. Bailey and Jonathan M. Borwein, "Finding General Explicit Formulas for Ising Integral Recursions," manuscript, Oct 2006. [PDF](#)
93. David H. Bailey, "Book Review: Accuracy and Reliability in Scientific Computing," by Bo Einarsson, ed., *Scientific Programming*, vol. 14 (2006), pg. 41-42. [PDF](#)
94. David H. Bailey and Jonathan M. Borwein, "Computer-Assisted Discovery and Proof," Victor Moll, ed., *Tapas in Experimental Mathematics*, Contemporary Mathematics, American Mathematical Society, May 2008, pg. 21-52. [PDF](#)
95. David H. Bailey and Jonathan M. Borwein, "Solution to Monthly Problem #11275," manuscript, Feb 2007. [PDF](#)
96. David H. Bailey and Jonathan M. Borwein, "Solution to Monthly Problem #11277," manuscript, Mar 2007. [PDF](#)
97. David H. Bailey, Richard E. Crandall and Jonathan M. Borwein, "Resolution of the Quinn-Rand-Strogatz Constant of Nonlinear Physics," *Experimental Mathematics*, to appear, Jun 2007; LBNL-63729. [PDF](#)
98. David H. Bailey, Robert Lucas, Paul Hovland, Boyana Norris, Kathy Yelick, Dan Gunter, Bronis de Supinski, Dan Quinlan, Pat Worley, Jeff Vetter, Phil Roth, John Mellor-Crummey, Allan Snavely, Jeff Hollingsworth, Dan Reed, Rob Fowler, Ying Zhang, Mary Hall, Jacque Chame, Jack Dongarra, Shirley Moore, "Performance Engineering: Understanding and Improving the Performance of Large-Scale Codes," *CT Watch Quarterly*, vol. 3, no. 4 (Nov 2007), pg. 18-23; LBNL-63730. [PDF](#)
99. David H. Bailey, Jonathan M. Borwein, Richard E. Crandall and Deirdre K. Manna, "New Representations for Spin Integrals," manuscript, Aug 2007.

100. David H. Bailey, "On a Tan Product Conjecture," manuscript, Aug 2007; LBNL-570E. [PDF](#)
101. David H. Bailey, "A Non-Normality Result," manuscript, Aug 2007; LBNL-568E. [PDF](#)
102. Natalie J. Durgin, Sofia M. Garcia, Tamara Flournoy and David H. Bailey, "'Syncing' Up with the Quinn-Rand-Strogatz Constant: Hurwitz-Zeta Functions in Non-Linear Physics," Sep 2007; LBNL-63718. [PDF](#)
103. David H. Bailey, "Review of *An Introduction to Parallel and Vector Scientific Computing*," to appear in *Scientific Programming*, vol. 16 (2008), pg. 97-98. [PDF](#)
104. David H. Bailey, Jonathan M. Borwein, David Broadhurst and M. Lawrence Glasser, "Elliptic Integral Evaluations of Bessel Moments," *Journal of Physics A: Mathematical and General*, vol. 41 (2008), pg. 205203; LBNL-63719. [PDF](#); journal copy: [PDF](#)
105. David H. Bailey, "Resolving Numerical Anomalies in Scientific Computation," manuscript, Jan 2008; LBNL-548E. [PDF](#) | [Gzipped code file](#)
106. David H. Bailey and Jonathan M. Borwein, "High-Precision Numerical Integration: Progress and Challenges," manuscript, Feb 2008; LBNL-547E. [PDF](#)
107. Lin-Wang Wang, Byounghak Lee, Hongzhang Shan, Zhengji Zhao, Juan Meza, Erich Strohmaier and David H. Bailey, "Linearly Scaling 3D Fragment Method for Large-Scale Electronic Structure Calculations," *Proceedings of SC08*, Nov 2008; LBNL-959E. Gordon Bell Prize finalist in the "Special" category. [PDF](#)
108. Samuel Williams, Kaushik Datta, Jonathan Carter, Leonid Oliker, John Shalf, Kathy Yelick and David H. Bailey, "PERI -- Auto-Tuning Memory-Intensive Kernels for Multicore," *Journal of Physics: Conference Series*, vol. 125 (2008), Nov. 2008; LBNL-845E. [PDF](#)
109. David Bailey, Jacqueline Chame, Chun Chen, Jack Dongarra, Mary Hall, Jeffrey K. Hollingsworth, Paul Hovland, Shirley Moore, Keith Seymour, Jaewook Shin, Ananta Tiwari, Sam Williams, Haihang You, "PERI Auto-Tuning," *Journal of Physics: Conference Series 125* (2008), Nov. 2008. [PDF](#)
110. David H. Bailey, "Can An Evolutionary Process Generate English Text?", *Biological Theory*, to appear, Oct 2009; LBNL-2159E. [PDF](#)
111. David H. Bailey and Jonathan M. Borwein, "High-Precision Computation and Mathematical Physics," *XII Advanced Computing and Analysis Techniques in Physics Research*, 2008, to appear; LBNL-2160E. [PDF](#)
112. David H. Bailey, Jonathan M. Borwein and Jorg Waldvogel, "Problem Proposed for the American Mathematical Monthly," manuscript, Jan 2009 (appeared in the Monthly's May 2009 problem section); LBNL-2137E. [PDF](#)
113. David H. Bailey and Jonathan M. Borwein, "Solution to Monthly Problem #11410," manuscript, Feb 2009; LBNL-2140E. [PDF](#)
114. David H. Bailey and Jonathan M. Borwein, "Solution to Monthly Problem #11418," manuscript, Mar 2009; LBNL-2179E. [PDF](#)
115. David H. Bailey, Jonathan M. Borwein and Richard E. Crandall, "Advances in the Theory of Box Integrals," *Mathematics of Computation*, to appear, Jun 2009; LBNL-2161E. [PDF](#)
116. David H. Bailey, "PSLQ: An Algorithm to Discover Integer Relations," *Computer Algebra Rundbrief*, no 45 (Oct 2009), pg. 8-11; LBNL-2144E. [PDF](#)
117. David H. Bailey and Jonathan M. Borwein, "Experimental Mathematics and Computational Statistics," to appear in Edward Wegman, Yasmin H. Said and David W. Scott, editors, *Wiley Interdisciplinary Reviews: Computational Statistics*, Apr 2009; LBNL-2180E. [PDF](#)
118. David H. Bailey, "Misleading Performance Claims in Scientific Computation," *Proceedings of DAC2009*, 2009, to appear; LBNL-2181E. [PDF](#)

119. J. Meza, S. Campbell, and D. Bailey, "Mathematical and Statistical Opportunities in Cyber Security," Lawrence Berkeley National Laboratory Technical Report, LBNL-1667E, March 2009; LBNL-1667E. [PDF](#)
120. David H. Bailey and Jonathan M. Borwein, "Experimental Computation with Oscillatory Integrals," Victor Moll, ed., *Tapas in Experimental Mathematics II*, Contemporary Mathematics, American Mathematical Society, to appear, Nov 2009; LBNL-2158E. [PDF](#)
121. Bronis R. de Supinski, Sadaf Alam, David H. Bailey, Laura Carrington, Chris Daley, Anshu Dubey, Todd Gamblin, Dan Gunter, Paul Hovland, Heike Jagode, Karen Karavanic, Gabriel Marin, John Mellor-Crummey, Shirley Moore, Boyana Norris, Leonid Oliker, Cathie Olschansky, Philip C. Roth, Martin Schulz, Sameer Shende, Allan Snively, Wyatt Spear, Mustafa Tikir, Jeff Vetter, Pat Worley and Nick Wright, "Modeling the Office of Science Ten Year Facilities Plan: The PERI Architecture Tiger Team," *Journal of Physics*, to appear, Jun 2009. [PDF](#)
122. Zhengji Zhao, Juan Meza, Byounggak Lee, Hongzhang Shan, Eric Strohmaier, David Bailey and Lin-Wang Wang, "The Linearly Scaling 3D Fragment Method for Large Scale Electronic Structure Calculations," *Journal of Physics: Conference Series*, to appear, Jun 2009; LBNL-2162E. [PDF](#)
123. David H. Bailey, Jonathan M. Borwein, David Broadhurst and Wadim Zudilin, "Experimental Mathematics and Mathematical Physics," Victor Moll, ed., *Tapas in Experimental Mathematics II*, Contemporary Mathematics, American Mathematical Society, to appear, Nov 2009; LBNL-2163E. [PDF](#)
124. David H. Bailey, "The NAS Parallel Benchmarks," David Padua, ed., *Encyclopedia of Parallel Computing*, Springer, to appear, Nov 2009. [PDF](#)
125. David H. Bailey, Jonathan M. Borwein and Roberto Barrio, "High-Precision Computation: Mathematical Physics and Dynamics," manuscript, Nov 2009. [PDF](#)
126. David H. Bailey and Jonathan M. Borwein, "The Greatest Mathematical Discovery?", manuscript, Feb 2010. [PDF](#)