Curriculum Vitae

Dave Bayer

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Born

November 29, 1955, Rochester, New York. United States citizen.

Education

B.A. with Highest Honors, Swarthmore College, June 1977.
Ph.D., Harvard University, June 1982. Thesis advisor: Heisuke Hironaka.

Positions

Teaching Fellow, Harvard University, 1978-82.
Ritt Assistant Professor, Columbia University, 1982-90.
Visiting Assistant Professor, Barnard College, 1987-88.
Visiting Lecturer on Mathematics, Harvard University, 1988-89.
Associate Professor, Barnard College, 1990-1995.
Member, Mathematical Sciences Research Institute, 1995-1996, 2002-2003.
Math Consultant, *A Beautiful Mind* (feature film), 2001.
Professor, Barnard College, 1995-present.

Software

Macaulay: A system for computation in algebraic geometry and commutative algebra, with M. Stillman. Source and object code available for Unix and Macintosh computers. www.math.columbia.edu/~bayer/Macaulay.html

Patents

Method and apparatus for optimizing system operational parameters, with N. Karmarkar and J. Lagarias, United States patent 4,744,027, May 10, 1988.

Publications

1. The division algorithm and the Hilbert scheme, Ph.D. Thesis, Harvard University, June 1982.
   `www.math.columbia.edu/~bayer/thesis/thesis.html`

2. Quantum statistics for distinguishable particles, with J. Tersoff, *Phys. Rev. Lett.* **50** (1983), no. 8, 553–554.

3. The design of Macaulay: a system for computing in algebraic geometry and commutative algebra Source, with M. Stillman, *Symsac '86—Proceedings of the 1986 symposium on symbolic and algebraic manipulation*, Association for Computing Machinery, New York, NY, 1986, 157–162. A.C.M. order number 505860.

4. A criterion for detecting m-regularity, with Michael Stillman, *Invent. Math.* **87** (1987), no. 1, 1–11.

5. A theorem on refining division orders by the reverse lexicographic order, with Michael Stillman, *Duke Math. J.* **55** (1987), no. 2, 321–328.

6. On the complexity of computing syzygies, with Mike Stillman, *J. Symbolic Comput.* **6** (1988), 135–147.

7. Standard bases and geometric invariant theory I. Initial ideals and state polytopes, with Ian Morrison, *J. Symbolic Comput.* **6** (1988), 209–217.

8. The nonlinear geometry of linear programming I. Affine and projective scaling trajectories, with J. C. Lagarias, *Trans. Amer. Math. Soc.* **314** (1989), no. 2, 499–526.

9. The nonlinear geometry of linear programming II. Legendre transform coordinates, with J. C. Lagarias, *Trans. Amer. Math. Soc.* **314** (1989), no. 2, 527–581.

10. *Macaulay User Manual*, with M. Stillman and M. Stillman, 168 pages, 1989.
    `www.math.columbia.edu/~bayer/Macaulay.html`

11. Graph curves, with David Eisenbud, *Adv. Math.* 86 (1991), no. 1, 1–40.

12. Karmarkar's linear programming algorithm and Newton's method, with J. C. Lagarias, *Math. Programming* **50** (1991), no. 3 (Ser. A), 291–330.

13. Trailing the dovetail shuffle to its lair, with Persi Diaconis, *Ann. Appl. Probab.* **2** (1992), no. 2, 294–313.

14. Computation of Hilbert functions, with Mike Stillman, *J. Symbolic Comput.* **14** (1992), no. 1, 31–50.

15. Some matrices related to Green's conjecture, with Mike Stillman, in *Free resolutions in commutative algebra and algebraic geometry (Sundance, UT, 1990)*, ed. D. Eisenbud and C. Huneke, Res. Notes Math., vol. 2, Jones and Bartlett, Boston, MA, 1992. ISBN 0-86720-285-8.

16. Improving the efficiency and reliability of digital time-stamping, with S. Haber and W. S. Stornetta, in *Sequences II: Methods in Communication, Security, and Computer Science*, ed. R.M. Capocelli, A. De Santis, U. Vaccaro, 329–334, Springer-Verlag, New York, 1993.

17. Gröbner bases and extension of scalars, with A. Galligo and M. Stillman, in *Computational Algebraic Geometry and Commutative Algebra*, Symposia Mathematica Volume XXXIV, ed. D. Eisenbud, L. Robbiano, 198–215, Cambridge University Press, 1993. ISBN 0512-442-184.

18. What can be computed in algebraic geometry?, with David Mumford, in *Computational Algebraic Geometry and Commutative Algebra*, Symposia Mathematica Volume XXXIV, ed. D. Eisenbud, L. Robbiano, 1–48, Cambridge University Press, 1993. ISBN 0512-442-184.

19. Ribbons and their canonical embeddings, with David Eisenbud, *Trans. Amer. Math. Soc.* **347** (1995), no. 3, 719–756.

20. Monomial resolutions, with Irena Peeva and Bernd Sturmfels, *Math. Res. Lett.* **5** (1998), no. 1-2, 31–46.
`www.math.columbia.edu/~bayer/papers/Monomial_BPS98`

21. Cellular resolutions of monomial modules, with Bernd Sturmfels, *J. Reine Angew. Math.* **502** (1998), 123–140.
`www.math.columbia.edu/~bayer/papers/Cellular_BS98`

22. Extremal Betti numbers and applications to monomial ideals, with Hara Charalambous and Sorin Popescu, *J. Algebra* **221** (1999), no. 2, 497–512.
`www.math.columbia.edu/~bayer/papers/Betti_BCP99`

23. Proof – A Theater Review, *Notices of the A.M.S.*, October 2000, Volume 47, Number 9, 1082–1084.
`www.ams.org/notices/200009/rev-bayer.pdf`

24. Syzygies of Lawrence Unimodular Ideals, with Sorin Popescu and Bernd Sturmfels, *J. Reine Angew. Math.* **534** (2001), 169–186.
`www.math.columbia.edu/~bayer/papers/Unimodular_BPS99`

25. Reverse search for monomial and toric ideals, with Amelia Taylor, accepted pending revision.

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