

## Curriculum Vitae

### Dave Bayer

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A linked vita is available online at [www.math.columbia.edu/~bayer/vita.html](http://www.math.columbia.edu/~bayer/vita.html)

### 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.  
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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://www.math.columbia.edu/~bayer/papers/Unimodular_BPS99)
25. Syzygies and graph colorings, with Sorin Popescu, in preparation.
26. Reverse search for monomial and toric ideals, with Amelia Taylor, in preparation.

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