

# Greg Kuperberg

## Curriculum Vitae

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### Personal

Born July 4, 1967 in Gdańsk, Poland.  
Citizenship United States of America, Naturalized November 1979.

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### Education

1987-1991 **Ph.D.**, *University of California, Berkeley*, Mathematics.  
Advisor: Andrew Casson  
1983-1987 **A.B.**, *Harvard University*, Mathematics.  
Magna Cum Laude with Highest Honors  
1982-1983 *Oklahoma State University*, courses in mathematics.  
1979-1982 *Auburn University*, courses in mathematics.

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### Support

2013-2016 **National Science Foundation Award**, CCF #1319245, \$358,501.  
2010-2014 **National Science Foundation Award**, CCF #1013079, \$275,550.  
2006-2010 **National Science Foundation Award**, DMS #0606795, \$144,742.  
2003-2006 **National Science Foundation Award**, DMS #0306681, \$100,000.  
2000-2003 **National Science Foundation Award**, DMS #0072342, \$71,100.  
1997-1999 **National Science Foundation Award**, DMS #9704125, \$65,025.  
1995-1996 **National Science Foundation Award**, DMS #9423300, \$10,000 (in joint grant).

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### Honors

2012 **Fellow of the American Mathematical Society.**  
1998 **Sloan Foundation Research Fellowship.**  
1991-1994 **NSF Postdoctoral Fellowship in Mathematics.**  
1990 **Sloan Foundation Graduate Fellowship in Mathematics.**  
1990 **Morrey Prize**, UC Berkeley Department of mathematics.  
1987 **NSF Graduate Fellowship in Mathematics.**  
1987 **Putnam Mathematics Competition**, 9th place.  
1986 **Putnam Mathematics Competition**, 8th place.

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### Employment

2001–present **Professor of Mathematics**, *University of California, Davis*.

- 2010-2011 **Visiting Professor**, *University of Grenoble*.
- 2004-2005 **Visiting Professor**, *Cornell University*.
- 1997-2001 **Associate Professor of Mathematics**, *University of California, Davis*.
- 1996-1997 **Assistant Professor of Mathematics**, *University of California, Davis*.
- 1995-1996 **Gibbs Assistant Professor of Mathematics**, *Yale University*.
- 1992-1995 **L. E. Dickson Instructor in Mathematics**, *University of Chicago*.
- 1991-1992 **Adjunct Assistant Professor**, *University of California, Berkeley*.

### Internships

- Summer 1987, 1988, 1991 **SCAMP**, *Center for Communications Research*, Princeton, NJ.
- Spring 1990 **Teaching assistant**, *University of California, Berkeley*, Berkeley, CA.
- Summer 1986 **Internship**, *Los Alamos National Laboratory*, Los Alamos, NM.
- Summer 1985 **Internship**, *Microelectronics and Computer Technology Corp.*, Austin, TX.
- Summer 1984 **Computer programmer**, Santa Fe, NM.
- 1982-1983 **Game developer**, *Orion Software*, Auburn, AL.

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### Professional Service

- 2007-present Co-maintainer, Mathematics Jobs Wiki.
- 2003-present Chair, mathematics advisory committee for the arXiv.
- 1997-present Maintainer, Front for the arXiv.
- 1997-present Moderator for the mathematics arXiv.
- Appellate math moderator; math.CO and math.GT category moderator.
- 2006-2008 Questions Committee for the Putnam Competition.
- 2006 Veterinarian of the Complexity Zoo; Creator of Complexity Zoology.
- 1997-2003 Member, mathematics advisory committee for the arXiv.

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### Publications

- Greg Kuperberg. Identifying lens spaces using discrete logarithms, arXiv:1509.02887.
- Greg Kuperberg. Algorithmic homeomorphism of 3-manifolds as a corollary of geometrization, arXiv:1508.06720.
- Gil Kalai and Greg Kuperberg. Contagious error sources would need time travel to prevent quantum computation. *Phys. Rev. A*, 92(2):022345, 2015, arXiv:1412.1907.
- Yang An, Matthew Baker, Greg Kuperberg, and Farbod Shokrieh. Canonical representatives for divisor classes on tropical curves and the matrix-tree theorem. *Forum Math. Sigma*, 2(e24):25, 2014, arXiv:1304.4259.
- Benoît Kloeckner and Greg Kuperberg. The Cartan-Hadamard Conjecture and the Little Prince, arXiv:1303.3115.
- Greg Kuperberg, Shachar Lovett, and Ron Peled. Probabilistic existence of regular combinatorial structures, arXiv:1302.4295.
- Benoît Kloeckner and Greg Kuperberg. A refinement of Günther's candle inequality. *Asian J. Math*, 19(1):121-134, 2015, arXiv:1204.3943.

- Greg Kuperberg. Another subexponential-time quantum algorithm for the dihedral hidden subgroup problem, arXiv:1112.3333.
- Greg Kuperberg. Another subexponential-time quantum algorithm for the dihedral hidden subgroup problem. *8th Conference on the Theory of Quantum Computation, Communication and Cryptography*, 22:20–34, 2013, arXiv:1112.3333.
- Greg Kuperberg. Knottedness is in NP, modulo GRH. *Adv. Math.*, 256:493–506, 2014, arXiv:1112.0845.
- Greg Kuperberg, Shachar Lovett, and Ron Peled. Probabilistic existence of rigid combinatorial structures. *Proceedings of the 44th symposium on Theory of Computing*, pages 1091–1106, 2012, arXiv:1111.0492.
- Alex Arkhipov and Greg Kuperberg. The bosonic birthday paradox. *Geom. Topol. Monogr.*, 18:3pp, 2012, arXiv:1106.0849.
- Bruce Fontaine, Joel Kamnitzer, and Greg Kuperberg. Spiders, buildings, and geometric Satake. *Compos. Math.*, 149(11):1871–1912, 2013, arXiv:1103.3519.
- Greg Kuperberg. Norms as a function of  $p$  are linearly independent in finite dimensions. *Amer. Math. Monthly*, 119(7):1pp, 2012, arXiv:1102.5026.
- Greg Kuperberg and Nik Weaver. A von Neumann algebra approach to quantum metrics. *Mem. Amer. Math. Soc.*, 215(1010):1–80, 2012, arXiv:1005.0353.
- Robert König, Greg Kuperberg, and Ben Reichardt. Quantum computation with Turaev-Viro codes. *Ann. Phys.*, 325:2707–2749, 2010, arXiv:1002.2816.
- Rahul Jain, Iordanis Kerenidis, Greg Kuperberg, Miklos Santha, Or Sattath, and Shengyu Zhang. On the power of a unique quantum witness. *Innov. Comput. Sci.*, pages 470–481, 2010, arXiv:0906.4425.
- Greg Kuperberg. Denseness and Zariski denseness of Jones braid representations. *Geom. Topol.*, 15:11–39, 2011, arXiv:0909.1881.
- Greg Kuperberg. How hard is it to approximate the Jones polynomial? *Theory Comput.*, 11:183–219, 2015, arXiv:0908.0512.
- Greg Kuperberg and Michael Zieve. Analogues of the Jordan-Hölder theorem for transitive  $g$ -sets, arXiv:0712.4142.
- Greg Kuperberg. From the Mahler conjecture to Gauss linking integrals. *Geom. Funct. Anal.*, 18(3):9pp, 2008, arXiv:math/0610904.
- Scott Aaronson and Greg Kuperberg. Quantum versus classical proofs and advice. *Theory Comput.*, 3:129–157, 2007, arXiv:quant-ph/0604056.
- Greg Kuperberg. Special moments. *Compos. Math.*, 34(4):853–870, 2005, arXiv:math/0408360.
- Greg Kuperberg. Numerical cubature from Archimedes’ hat-box theorem. *SIAM J. Numer. Anal.*, 44(3):908–935, 2006, arXiv:math/0405366.
- Greg Kuperberg. Numerical cubature using error-correcting codes. *SIAM J. Numer. Anal.*, 44(3):897–907, 2006, arXiv:math/0402047.

- Włodzimierz Kuperberg Greg Kuperberg, Krystyna Kuperberg. Lattice packings with gap defects are not completely saturated. *Beiträge Algebra Geom.*, 45(1):267–273, 2004, arXiv:math/0303366.
- Greg Kuperberg. A subexponential-time quantum algorithm for the dihedral hidden subgroup problem. *SIAM J. Comput.*, 35(1):170–188, 2005, arXiv:quant-ph/0302112.
- Greg Kuperberg. Finite, connected, semisimple, rigid tensor categories are linear. *Math. Res. Lett.*, 10(4):411–421, 2003, arXiv:math/0209256.
- Greg Kuperberg. Scholarly mathematical communications at a crossroads. *Nieuw Arch. Wisk. (5)*, 3(3):262–264, 2002, arXiv:math/0210144.
- Greg Kuperberg. What is a virtual link? *Algebr. Geom. Topol.*, 3:587–591, 2003, arXiv:math/0208039.
- Jason Cantarella, Greg Kuperberg, Rob Kusner, and John M. Sullivan. The second hull of a knotted curve. *Amer. J. Math.*, 125(6):1335–1348, 2003, arXiv:math/0204106.
- David Eppstein, Greg Kuperberg, and Günter M. Ziegler. Fat 4-polytopes and fatter 3-spheres. *Monogr. Textbooks Pure Appl. Math.*, 253:239–265, 2003, arXiv:math/0204007.
- Greg Kuperberg. The capacity of hybrid quantum memory. *IEEE Trans. Inform. Theory*, 49(6):1465–1473, 2003, arXiv:quant-ph/0203105.
- Greg Kuperberg. A tracial quantum central limit theorem. *Trans. Amer. Math. Soc.*, 357(2):459–471, 2005, arXiv:math/0202035.
- Greg Kuperberg. A generalization of Filliman duality. *Proc. Amer. Math. Soc.*, 131(12):3893–3899, 2003, arXiv:math/0112066.
- Greg Kuperberg. Kasteleyn cokernels. *Electron. J. Combin.*, 9(#R29):30pp, 2002, arXiv:math/0108150.
- Greg Kuperberg. Symmetry classes of alternating-sign matrices under one roof. *Ann. of Math. (2)*, 156(3):835–866, 2002, arXiv:math/0008184.
- Greg Kuperberg and Dylan P. Thurston. Finite-type 3-manifold invariants via cut-and-paste topology, arXiv:math/9912167.
- Greg Kuperberg. Random words, quantum statistics, central limits, random matrices. *Methods Appl. Anal.*, 9(1):101–119, 2002, arXiv:math/9909104.
- Greg Kuperberg. Notions of denseness. *Geom. Topol.*, 4:277–292, 2000, arXiv:math/9908003.
- Greg Kuperberg. The bottleneck conjecture. *Geom. Topol.*, 3:119–135, 1999, arXiv:math/9811119.
- Greg Kuperberg. Circumscribing constant-width bodies with polytopes. *New York J. Math.*, 5:91–100, 1999, arXiv:math/9809165.
- Mikhail Khovanov and Greg Kuperberg. Web bases for  $sl(3)$  are not dual canonical. *Pacific J. Math.*, 188(1):129–153, 1999, arXiv:q-alg/9712046.

- Greg Kuperberg. Another low-technology estimate in convex geometry. *Math. Sci. Res. Inst. Publ.*, 34:117–121, 1999, arXiv:math/9804023.
- Greg Kuperberg. An exploration of the permanent-determinant method. *Electron. J. Combin.*, 5(#R46):16pp, 1998, arXiv:math/9810091.
- Gábor Fejes Tóth, Greg Kuperberg, and Włodzimierz Kuperberg. Highly saturated packings and reduced coverings. *Monatsh. Math.*, 125(2):127–145, 1998, arXiv:math/9511225.
- Greg Kuperberg. Jaeger’s Higman-Sims state model and the  $B_2$  spider. *J. Algebra*, 195(2):487–500, 1997, arXiv:math/9601221.
- Greg Kuperberg. Another homogeneous, non-bihomogeneous Peano continuum. *Bull. Polish Acad. Sci. Math.*, 44(4):457–460, 1996, arXiv:math/9712206.
- Daniel Gordon, Greg Kuperberg, Oren Patashnik, and Joel Spencer. Asymptotically optimal covering designs. *J. Combin. Theory Ser. A*, 75(2):270–280, 1996, arXiv:math/9511224.
- Greg Kuperberg. Four symmetry classes of plane partitions under one roof. *J. Combin. Theory Ser. A*, 75(2):295–315, 1996, arXiv:math/9506225.
- Greg Kuperberg. Spiders for rank 2 Lie algebras. *Comm. Math. Phys.*, 180(1):109–151, 1996, arXiv:q-alg/9712003.
- Greg Kuperberg. Non-involutory Hopf algebras and 3-manifold invariants. *Duke Math. J.*, 84(1):83–129, 1996, arXiv:q-alg/9712047.
- Greg Kuperberg and Krystyna Kuperberg. Generalized counterexamples to the Seifert conjecture. *Ann. of Math. (2)*, 144(2):239–268, 1996, arXiv:math/9802040.
- Greg Kuperberg. Detecting knot invertibility. *J. Knot Theory Ramifications*, 5(2):173–181, 1996, arXiv:q-alg/9712048.
- Greg Kuperberg. Another proof of the alternating-sign matrix conjecture. *Internat. Math. Res. Notices*, 1996(3):139–150, 1996, arXiv:math/9712207.
- Greg Kuperberg. A volume-preserving counterexample to the Seifert conjecture. *Comment. Math. Helv.*, 71(1):70–97, 1996, arXiv:math/9504230.
- Daniel Gordon, Greg Kuperberg, and Oren Patashnik. New constructions for covering designs. *J. Combin. Des.*, 3(4):269–284, 1995, arXiv:math/9502238.
- Greg Kuperberg. Symmetries of plane partitions and the permanent-determinant method. *J. Combin. Theory Ser. A*, 68(1):115–151, 1994, arXiv:math/9410224.
- Greg Kuperberg. Self-complementary plane partitions by Proctor’s minuscule method. *European J. Combin.*, 15(6):545–553, 1994, arXiv:math/9411239.
- Greg Kuperberg and Oded Schramm. Average kissing numbers for non-congruent sphere packings. *Math. Res. Lett.*, 1(3):339–344, 1994, arXiv:math/9405218.
- Greg Kuperberg. The quantum  $G_2$  link invariant. *Internat. J. Math.*, 5(1):61–85, 1994, arXiv:math/9201302.
- Greg Kuperberg. Quadrisecants of knots and links. *J. Knot Theory Ramifications*, 3(1):41–50, 1994, arXiv:math/9712205.

Noam Elkies, Greg Kuperberg, Michael Larsen, and James Propp. Alternating-sign matrices and domino tilings, II. *J. Algebraic Combin.*, 1(3):219–234, 1992, arXiv:math/9201305.

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Greg Kuperberg. A low-technology estimate in convex geometry. *Internat. Math. Res. Notices*, 1992(9):181–183, 1992, arXiv:math/9211216.

Greg Kuperberg. Involutory Hopf algebras and 3-manifold invariants. *Internat. J. Math.*, 2(1):41–66, 1991, arXiv:math/9201301.

Greg Kuperberg and Włodzimierz Kuperberg. Double-lattice packings of convex bodies in the plane. *Discrete Comput. Geom.*, 5(4):389–397, 1990.