

# GREGORY D. LANDWEBER

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*Born:* June 14, 1971

Princeton, NJ

**Education**

**Harvard University**, Ph.D. and A.M. in Mathematics, June, 1999.

Dissertation advised by C. H. Taubes: *Dirac Operators on Loop Spaces*.

**Oxford University**, M.Sc. in Mathematics, November, 1994.

**Cambridge University**, Certificate of Advanced Study in Mathematics with Distinction (Tripos, Part III), June, 1993.

**Princeton University**, A.B. in Mathematics *summa cum laude*, June, 1992.

Certificate in Musical Performance (Bassoon), June, 1992.

**Positions**

**Bard College**, Assistant Professor, 2007–present.

**Held**

**University of Oregon**, Assistant Professor, 2001–2007.

**University of Toronto/Fields Institute**, Visitor/Researcher, 2004–2005.

**Mathematical Sciences Research Institute**, Post Doctoral Fellow, 2000–2001.

**Microsoft Research**, Post Doctoral Researcher, Theory Group, 1999–2000.

**Harvard University**, Teaching Fellow, 1997–1999.

**Harvard University**, Course Assistant, 1995–1996.

**Honors**

**University of Oregon Faculty Summer Research Award**

on *Low dimensional off-shell supersymmetry*, 2006.

**National Science Foundation Graduate Research Fellowship**

Department of Mathematics, Harvard University, 1994–1997.

**British Marshall Scholar**

Trinity College, Cambridge (1992–1993) and New College, Oxford (1993–1994).

**Trinity College Senior Scholar**, Trinity College, Cambridge, 1993.

**Awarded a Churchill Scholarship**, Declined, 1992.

**Phi Beta Kappa**, Princeton University, 1992.

**Covington Prize**, Princeton senior prize in mathematics, 1992.

**Brown Prize**, Princeton junior prize in mathematics, 1991.

**Class of 1861 Prize**, Princeton underclass prize in mathematics, 1990.

**Putnam Mathematical Competition**, Honorable mentions, 1989, 1990, 1991.

**USA Mathematical Olympiad**, Honorable mentions, 1988, 1989.

**Published  
Papers (14)**

Spin Holography via Dimensional Enhancement (w/Mike Faux).  
*Physics Letters B*, to appear.  
arXiv:0907.4543 [hep-th]

A Superfield for Every Dash-Chromotopology  
(w/Charles Doran, Mike Faux, Jim Gates, Tristan Hübsch, and Kevin Iga).  
*International Journal of Modern Physics A*, to appear.  
arXiv:0901.4970 [hep-th]

Frames for supersymmetry  
(w/Charles Doran, Mike Faux, Jim Gates, Tristan Hübsch, and Kevin Iga).  
*International Journal of Modern Physics A*, **24** (2009), no. 14, 2665–2676.  
arXiv:0809.5279 [hep-th]

Super-Zeeman embedding models on  $N$ -supersymmetric world-lines  
(w/Charles Doran, Mike Faux, Jim Gates, Tristan Hübsch, and Kevin Iga).  
*Journal of Physics A: Mathematical and Theoretical*, **42** (2009) 065402.  
arXiv:0803.3434 [hep-th]

On the matter of  $N = 2$  matter  
(w/Charles Doran, Mike Faux, Jim Gates, Tristan Hübsch, and Kevin Iga).  
*Physics Letters B* **659** (2008), no. 1–2, 441–446.  
arXiv:0710.5245 [hep-th]

The  $K$ -theory of abelian symplectic quotients (w/Megumi Harada).  
*Mathematical Research Letters* **15** (2008), no. 1, 57–72.  
arXiv:math.SG/0612660

Counter-examples to a putative classification of 1-dimensional  $N$ -extended supermultiplets (w/Charles Doran, Mike Faux, Jim Gates, Tristan Hübsch, and Kevin Iga).  
*Advanced Studies in Theoretical Physics* **2** (2008), no. 3, 99–111.  
arXiv:hep-th/0611060

Adinkras and the dynamics of superspace prepotentials  
(w/Charles Doran, Mike Faux, Jim Gates, Tristan Hübsch, and Kevin Iga).  
*Advanced Studies in Theoretical Physics* **2** (2008), no. 3, 113–164.  
arXiv:math-ph/0605269

On graph-theoretic identifications of Adinkras, supersymmetry representations and superfields  
(w/Charles Doran, Mike Faux, Jim Gates, Tristan Hübsch, and Kevin Iga).  
*International Journal of Modern Physics A* **22** (2007), no. 5, 869–930.  
arXiv:math-ph/0512016

Surjectivity for Hamiltonian  $G$ -spaces in  $K$ -theory (w/Megumi Harada).  
*Transactions of the AMS* **359** (2007), 6001–6025.  
arXiv:math.SG/0503609

Twisted representation rings and Dirac induction.  
*Journal of Pure and Applied Algebra* **206** (2006), no. 1–2, 21–54.  
arXiv:math.RT/0403524

Representation rings of Lie superalgebras.

*K-Theory* **36** (2005), no. 1–2, 115–168.

arXiv:math.RT/0403203

Multiplets of representations and Kostant’s Dirac operator for equal rank loop groups.

*Duke Mathematical Journal* **110** (2001), no. 1, 121–160.

arXiv:math.RT/0005057

Harmonic spinors on homogeneous spaces.

*Representation Theory* **4** (2000), 466–473 (electronic).

arXiv:math.DG/0005056

## Preprints

Dimensional Enhancement via Supersymmetry (w/Mike Faux and Kevin Iga).

arXiv:0907.3605 [hep-th]

Divided differences and the Weyl character formula in equivariant  $K$ -theory

(w/Megumi Harada and Reyer Sjamaar).

arXiv:0906.1629 [math.KT]

Adinkras for Clifford Algebras, and Worldline Supermultiplets

(w/Charles Doran, Mike Faux, Jim Gates, Tristan Hübsch, Kevin Iga, and Robert Miller).

arXiv:0811.3410 [hep-th]

Topology types of Adinkras and the corresponding representations of  $N$ -extended supersymmetry (w/Charles Doran, Mike Faux, Jim Gates, Tristan Hübsch, Kevin Iga, and Robert Miller).

arXiv:0806.005 [hep-th]

Off-shell supersymmetry and filtered Clifford supermodules

(w/Charles Doran, Mike Faux, Jim Gates, Tristan Hübsch, and Kevin Iga).

arXiv:math-ph/0603012

Singular instantons with  $SO(3)$  symmetry.

arXiv:math.DG/0503611

$K$ -theory and elliptic operators (expository).

arXiv:math.AT/0504555

## Conference Proceedings

Relating doubly-even error-correcting codes, graphs, and irreducible representations of  $N$ -supersymmetry

(w/Chuck Doran, Mike Faux, Jim Gates, Tristan Hübsch, and Kevin Iga),

in *Discrete and computational mathematics*, 53–71, eds. F. Liu *et al.*, Nova Science Publishers, Inc., New York, 2008.

arXiv:0806.0051

Construction of twisted  $K$ -theory classes from positive energy representations

Arbeitsgemeinschaft mit aktuellem Thema: Twisted K-Theory

*Oberwolfach Report* 46/2006, 2788–2791.

The topology of hyperkähler quotients (w/Megumi Harada and Graeme Wilkin)

*BIRS Workshop Report* 06rit317, August 19–26, 2006, **orangizer**.

Off-shell supersymmetry via graph theory and superspace (w/Chuck Doran)

*BIRS Workshop Report* 06frg313, July 22–29, 2006, **orangizer**.

- Conferences Organized** **Mid-Hudson Mathematics Conference for Undergraduates**, co-organizer and webmaster, Bard College, Fall 2009.
- Banff International Research Station**, Research in Teams, *The topology of hyperkähler quotients*, August 19–26, 2006.
- Banff International Research Station**, Focused Research Group, *Off-shell supersymmetry via graph theory and superspace*, July 22–29, 2006.
- AMS Special Session**, *K-theory in M-theory*, Eugene, OR, November 12–13, 2005.
- Research Talks** **Lehigh University Geometry and Topology Conference**, June 5, 2009.
- McMaster University**, Geometry & Topology Seminar and Colloquium, January 8–9, 2009.
- Institut Henri Poincaré**, Paris, France. Conference on *Representations of Lie Groups and Applications*, December 15–18, 2008.
- Bard College**. Mathematics and Computer Science Colloquium, February 9, 2007.
- Bennington College**. January 5, 2007.
- Winter 2006 CMS meeting**, Toronto, Session on *Poisson geometry and mathematical physics*, December 9, 2006.
- George Mason University**, Combinatorics, Algebra and Geometry Seminar, October 31, 2006.
- University of Maryland**, Geometry/Topology and Superstring Theory Seminars, October 30, 2006.
- University of Illinois at Urbana-Champaign**, Joint Topology/Geometry Seminar, October 26, 2006.
- Oberwolfach**, Germany, Workshop on *Twisted K-theory*, October 12, 2006.
- Johns Hopkins University**, Topology Seminar, September 18, 2006.
- Erwin Schrödinger International Institute for Mathematical Physics**, Vienna, Austria, Program on *Gerbes, Groupoids, and QFT*, July 20, 2006.
- University of Washington**, Algebra Seminar, March 28, 2006.
- University of Washington**, Two talks in Superseminar and Math/Physics Seminar, January 19, 2006.
- University of Toronto**, Symplectic Geometry Seminar, October 28, 2005.
- UC Berkeley**, Topology Seminar, September 21, 2005.
- Banff International Research Station**, Workshop on *Moment Maps in Various Geometries*, May 22, 2005.
- Rutgers University**, Geometry-Topology Seminar, April 19, 2005.
- Harvard University**, Gauge Theory Seminar, March 18, 2005.
- University of Toronto**, Symplectic Geometry Seminar, March 14, 2005.
- University of Washington**, *K-theory and SUSY* Workshop, February 10, 2005.
- University of Toronto**, Symplectic Geometry Seminar, November 8, 2004.

MIT, Topology Seminar, October 18, 2004.

AMS Special Session on *Strings and Branes*, Lawrenceville, NJ, April 17, 2004.

Oregon State University, Colloquium, April 22, 2003.

AMS Special Session on *Symplectic Geometry*, UC Irvine, November 11, 2001.

Fields Institute, Toronto, Workshop on *Hamiltonian Group Actions and Quantization*, June 9, 2001.

UC San Diego, Colloquium, April 5, 2001.

Penn State, Geometric Functional Analysis Seminar, February 5, 2001.

University of Toronto, Symplectic Geometry Seminar, October 23, 2000.

Influence of Physics on Topology Conference, UCSD, August 18, 2000.

Lehigh University Geometry and Topology Conference, June 12, 2000.

Reed College, *Introduction to String Theory*, November 11, 1999.

Microsoft Research, Theory Group Seminar, *String Theory for Mathematicians*. 14 lectures given from August 13, 1999 to March 1, 2000. Notes available on web site.

Harvard University, Gauge Theory Seminar, May 7, 1999.

University of Oregon, 18 talks in seminars, Institute for Theoretical Science.

Talks at Matriculation Ceremony, Invited Faculty Speaker, August 27, 2009.

Bard College Bard Four Campus Math/Science Colloquium, Poster Session, Poster on Supersymmetry & Adinkras, May 17, 2009.

Faculty Seminar, Symmetry and Supersymmetry, April 29, 2009.

Bard Math Circle Problem Solving Group, Binomial Coefficients, April 5, 2009.

Math/CS Seminar, Calculus, Supersized, September 25, 2008.

Language & Thinking, String Theory, August 27, 2007 and August 14, 2008.

Pi Day, What Archimedes didn't know about  $\pi$ , March 14, 2008.

Math/CS Seminar, Introduction to  $\LaTeX$ , October 4, 2007, February 26, 2008, and March 3, 2009.

Math/CS Seminar, Introduction to  $K$ -theory, November 29, 2007.

Teaching at Bard College Undergraduate Courses: Calculus I, Calculus II, Differential Equations, Linear Algebra ( $\times 2$ ), Advanced Linear Algebra, Topology, Differential Geometry, Problem Solving Seminar ( $\times 2$ ), Numerical Analysis, Coding Theory, Data Structures, String Theory.

Tutorials: Lie Algebras (Mona Merling), Matrix Theory (Dexin Zhou), Numerical Differential Equations (Peter Golbus), Quantum Field Theory (Marjorie Schillo), Mathematical Computation (three students).

Senior Projects: Zach Hamaker (Clifford algebras), Sylvia Naples (Supersymmetry), Dexin Zhou (Financial Mathematics), Zhechao Zhou (Graph Connectivity), Viriya Ratanasangpunth, Fang Song, Alexandru Vladoi.

**BPI Senior Project:** Julian Cowell (Quaternions).

**Senior Project Boards:** Peter Jaros (Computer Science), Evan Sangaline (Physics), Mona Merling (Mathematics), Morgon Kanter (Computer Science), Marjorie Schillo (Physics).

**MAT Academic Research Project:** Anna Casteen (Coding Theory).

**Moderation Boards:** Jackie Bow, Ni Gu, Alison Mutter, Fang Song, Elias Haloran\*, Zhexiu Tu\*, Alexandru Vladoi\*, Lexi Carver\*, Jonathan Fivelsdal\*, Abbie Stevens, Jackie Stone, Zana Tran (\* indicates that I wrote the moderation report).

**Summer Research Students:** Dexin Zhou, Zechao Zhou.

**Service at Bard College** **Informational Resources Council**, 2009–present.

**Library, Bookstore & Computer Committee**, 2009–present.

**Fellowships and Awards Committee**, Worked with Rhodes, Marshall, Fulbright, and Watson scholarship candidates, and reviewed candidates for internal scholarships, 2007–present. Attended Marshall advisors meeting at Union College, July 10, 2009.

**Matriculation Ceremony**, Invited Faculty Speaker, August 27, 2009.

**Distinguished Scientist Lecture**, Invited and coordinated visit of S. James Gates, Jr., the John S. Toll Professor of Physics and Director of the Center for String and Particle Theory at the University of Maryland (and subsequently appointed to the President’s Council of Advisors on Science and Technology), March 12–13, 2009.

**Bard Prison Initiative**, Gave lecture at Woodbourne Prison, January 30, 2008, and advised Julian Cowell’s senior project on quaternions (Spring 2008).

**MAT Program**, Gave presentations on  $\text{\LaTeX}$  during the summers of 2008 and 2009, and advised Anna Casteen’s academic research project on coding theory (Fall 2008).

**Mathematics Search Committee**, Interviewed candidates at AMS/MAA joint meeting in San Diego, January 6–9, 2008.

**Physics Search Committee**, 2008.

**Computer Science Search Committee**, 2008.

**Putnam Mathematics Competition**, Coached Bard team (ranked 41/545), supervised exam, provided meals and party, December 1, 2007 and December 6, 2008.

**Webmaster**, Revised and maintained the Mathematics Program web site.

**Interdisciplinary Teaching**, Taught CMSC 201: Data Structures (Fall 2008), and a physics tutorial on Quantum Field Theory (Fall 2008).

**Course Development**, Developed new courses on Numerical Analysis and Coding Theory for applied students, Advanced Linear Algebra for students going to graduate school, and String Theory for non-majors.

**Mathematics and Computer Science Seminar**, Invited outside speakers Michael Faux (SUNY Oneonta), Robert Miller (University of Washington), Charles Doran (University of Alberta), and Megumi Harada (McMaster University).

**Superadvising**, advised and registered first-year students, August 27–28, 2009.

**Open House for Accepted Students**, represented the Mathematics Program at the Academic Program Fair on April 26, 2008 and April 18, 2009.

**Mid-Hudson Mathematics Conference for Undergraduates**, co-organizer and webmaster, Fall 2009.

**National Science Foundation REU Grant Proposal**, co-writing proposal for a Bard College Research Experience for Undergraduates grant, Fall 2009 (pending).

**Teaching at  
University  
of Oregon**

**Online Row Reducer, Linear Algebraator**. Computer tools for linear algebra.  
**Course Coordinator**, Linear Algebra, 2005-2006.

**Undergraduate Courses:** Linear Algebra ( $\times 3$ , highest recorded student evaluation score at UO), Numerical Analysis ( $\times 2$ , perfect student evaluation score), Differential Equations ( $\times 2$ ), Discrete Mathematics, Business Calculus (highest student evaluation score at UO for the large lecture class since 2000).

**Graduate Courses:** Differential Geometry ( $\times 2$ ),  $K$ -theory ( $\times 2$ ), Graduate Topology Seminar ( $\times 2$ ), Symplectic Geometry, Lie Groups, Characteristic Classes.

**Reading Courses:** Linear Algebra, Quantum Physics, many graduate courses.

**Course Evaluation Scores:** Available at <http://courseevals.uoregon.edu/>.

**Graduate  
Students**

**Ph.D. Advisor:** Peter Dolan.

**Ph.D. Committee:** 9 students in mathematics, physics, and computer science.

**Other**

Referee for the National Science Foundation, *Communications in Mathematical Physics*, the *Journal of Differential Geometry*, *Advances in Mathematics*, *Advances in Theoretical and Mathematical Physics*, and the *Journal of K-Theory*.

Reviewer for AMS Mathematical Reviews / MathSciNet (8 signed reviews).

Hosts the Symplectic Geometry Conferences wiki and my own mathematical software on [Cohomology.com](http://Cohomology.com).

Author of the free arXiv iPhone app, for browsing the arXiv.org e-print archive hosted by the Cornell University Library.

Award winning Macintosh shareware author (*Kaleidoscope*, etc.), 1991–2002.