

## William Michael Kallfelz

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*Research/ teaching home pages:* <http://www.glue.umd.edu/~wkallfel/index.html>  
<http://www.csus.edu/cpns/research.html>

### *I. Education*

- **Ph.D., Committee of Philosophy and the Sciences (CPaS) (admitted: Fall 2003), Department of Philosophy, University of Maryland at College Park.** Advisor & Chair of dissertation committee: Dr. Jeffrey Bub. **Dissertation Title:** *Clifford Algebra: A Case for Geometric and Ontological Unification.* **Dissertation Defense date:** April 10, 2008. **Final version of dissertation submitted (with revisions) for archiving/publishing:** April 17, 2008. **Graduation date:** May 23, 2008.
- **Ph.D. student, Physics, Georgia Institute of Technology (1995-2001).** Advisor: Dr. David Finkelstein.
- **Master of Science, Applied Mathematics, Georgia Institute of Technology,** area of specialty: discrete mathematics. Awarded December 1996.
- **Master of Theological Studies (*cum laude*), Emory University.** Advisor: Dr. David Pacini. Awarded December 1996.
- **Master of Science, Physics, Georgia Institute of Technology.** Awarded June 1993.
- **Master of Science, Department of Geophysical Sciences, Georgia Institute of Technology:** Awarded: September 1991
- **Bachelor of Science in Physics (with honor), Georgia Institute of Technology.** Awarded: June, 1989.

### *II. Areas of Specialization/Competence*

- **Area of Specialization:** Philosophy of physics, philosophy of science.
- **Area of Competence:** Philosophy of language, process philosophy.
- **Other areas of competence/specialization:** Mathematical physics (research & teaching since 1995), mathematics (teaching since 1995).

### *III. Distinctions & Publications*

#### Books

- *Clifford Algebra: A Case for Geometric and Ontological Unification.* (published June 24, 2009) ISBN: 978-3-639-16423-7. Saarbruecken: VDM Verlagsservicegesellschaft mbH.

Available on Amazon:

<http://tinyurl.com/kallfelz-Clifford-Alg>

### Papers/ Publications

- Kallfelz, William M., "A Response to G.B. Bagci's 'Ghirardi-Rimini-Collapse Theory and Whiteheadian Process Philosophy'," submitted to *Process Studies, Natural Sciences Focus Section*, Pete Gunter, ed. (In press)  
[http://terpconnect.umd.edu/%7Ewkallfel/Kallfelz\\_response\\_Bagci.pdf](http://terpconnect.umd.edu/%7Ewkallfel/Kallfelz_response_Bagci.pdf)
- Kallfelz, William M., "Physical Emergence and Process Ontology," *World Futures: The Journal of General Evolution*, special issue on process thought and natural science, special editors: Franz Riffert and Timothy Eastman, vol. 65 issue 1, 2009, pp. 42-60.
- Kallfelz, William M., "Embedding Fundamental Aspects of the Relational Blockworld Interpretation in Geometric (or Clifford) Algebra" (posted: April 5<sup>th</sup>, 2007)  
<http://philsci-archive.pitt.edu/archive/00003278/>
- Kallfelz, William M., "Methodological Fundamentalism: or Why Batterman's Different Notions of 'Fundamentalism' may not Make a Difference" (posted: June 16, 2006)  
<http://philsci-archive.pitt.edu/archive/00002801/>
- Kallfelz, William M. "Getting Something Out of Nothing: Towards a Future Information Theory Based on Vacuum Microtopology," *Proceeding to the International Congress of Nanotechnology 2005. October 31, 2005-November 4, 2005, San Francisco.* (CD Rom) Paper also posted at:  
<http://www.glue.umd.edu/~wkallfel/Kallfelznanotechpaper.pdf>
- Kallfelz, William M., "Contracting Batterman's Asymptotic 'No-Man's Land:' Reduction Rejoins Explanation." (posted: August 15, 2005) <http://philsci-archive.pitt.edu/view/confandvol/91.html>
- Kallfelz, William M: "The History of Physics in Georgia" *The New Georgia Encyclopaedia (on-line)* published 9/01/2005  
<http://www.georgiaencyclopedia.org/nge/Article.jsp?id=h-2776>
- David R Finkelstein & W. M Kallfelz, "Organism And Physics," *Process Studies* (Winter 1998 vol 27 no 3)  
<http://www.mnsi.net/~bwhitney/blw-12resources-3.html>
- Kallfelz, William M. *Process Studies* (Winter 1998 vol 27 no 3) (Book Review) "Sunny Auyang's 'How is Quantum Field Theory Possible?'"  
<http://www.mnsi.net/~bwhitney/blw-12resources-3.html>

### Conference Presentations & Colloquia

- **Emergence and Reduction in the Sciences, Center for Philosophy of Science, University of Pittsburgh, Pitt-Paris II, December 11-13, 2009, invited discussant.**
- **New Mexico State University, Department of Philosophy Talk, September 23, 2009.**  
["Transformation Reduction 'Precisified' Through Structuralism"](#)
- **Philosophy & Religious Studies Colloquium, University of Central Washington, February 17, 2009.** ["Models and Asymptotes: A Dialogue between Pre-Modern and Post-Modern Epistemic Modes"](#)
- **Natural Science Seminar Series, University of Central Washington, October 10, 2008.**  
["Response to Jay Bachrach's 'Physics and Time'"](#)

- **Philosophy Department Colloquium, University of Maryland, December 7, 2007.** “Methodological Fundamentalism.” Presentation slides: <http://www.glue.umd.edu/~wkallfel/KallfelzDec7Colloquiumsl.pdf>
- **“New Directions in the Foundations of Physics,” American Center for Physics, College Park, Maryland.** Invited discussant to this annual conference from 2003-2008. <http://carnap.umd.edu/philphysics/conference.html>
- **CPaS Colloquium, University of Maryland, December 5, 2007.** “Geometric-Algebraic Approaches to Quantum Physics” Presentation slides: <http://www.glue.umd.edu/~wkallfel/Cliffalgpresentation.pdf>
- **International Congress of Nanotechnology: Building Infrastructure for the Next Frontier, October 31, 2005-November 4, 2005, San Francisco.** “Getting Something Out of Nothing: Towards a Future Information Theory Based on Vacuum Microtopology” Presentation slides: <http://www.ianano.org/Presentation-ICNT2005/Lectures.html>
- **Department of History and Philosophy University of Virginia’s College at Wise Medieval-Renaissance Conference XIX,** “The Character of Asymptotic Thought in the Works of Nicholas of Cusa.”. [http://www.wise.virginia.edu/college\\_relations/documents/medrensched05.pdf](http://www.wise.virginia.edu/college_relations/documents/medrensched05.pdf) Presentation slides: [http://www.glue.umd.edu/~wkallfel/Asymptote\\_Cusa\\_Kallfelz.pdf](http://www.glue.umd.edu/~wkallfel/Asymptote_Cusa_Kallfelz.pdf)
- **1999 Centennial Meeting of the American Physical Society,** “Some Correspondence Principles between Clifford Quantization and Spacetime Topology.” Abstract posted at <http://flux.aps.org/meetings/YR99/CENT99/abs/S7900006.html>

### Distinctions

- **Fetzer-Franklin Fund,** quantum praxiology research fund (\$190,000) awarded March 24, 2008. “Logical Causality in Quantum Mechanics.” Research team: Dr. Michael Epperson (Philosophy of Science Specialist and Team Leader and Principal Investigator), Dr. Timothy Eastman (Space Physicist and Project Manager and Principal Co-Investigator), Dr. David R. Finkelstein (Senior Quantum Physicist), Dr., Henry Stapp (Senior Quantum Physicist). Consultants: Dr. Efstratios Manousakis (Physicist), Dr. Jorge Nobo (Philosopher), Dr. George W. Shields (Philosopher), Dr. Mohsen-Shiri Garakani (Mathematical Physicist), William Kallfelz (Physics and Philosophy of Science). Research team homepage: <http://www.c-p-n-s.org/research.html>
- **Science and Transcendence Advanced Research Series (STARS) Research Planning Grant** (\$20,000), awarded June 15, 2007. “Quantum Physical Investigations into the Causal and Logical Orders and the Physical Basis of Possibility.” Research team: Dr. Timothy Eastman (Space Physicist and Project Manager), Dr. Michael Epperson (Philosophy of Science Specialist and Team Leader), Dr. David R. Finkelstein (Senior Quantum Physicist), Dr. Mohsen-Shiri Garakani (Mathematical Physicist), William Kallfelz (Mathematical Physicist), Dr. Henry Stapp (Senior Quantum Physicist). [http://www.ctns.org/stars\\_planning.html](http://www.ctns.org/stars_planning.html)
- **Participant, Center for Quantum Studies, George Mason University, (Fairfax, Virginia).** Workshop/Seminar: “Non-Locality in Quantum Dynamics,” hosted by Drs. Yakir Aharonov and Sandu Popescu, February 12-13, 2007.
- **CNT (Committee of New Technologies), University of Maryland at College Park.** Invited to serve two-year term (Fall 2004-Spring 2006.)
- **National Science Foundation Grant Recipient;** for attending IQSA 2004 (International Quantum Structures Association Biennial Meeting) meeting, held July 17-22, at the University of Denver, Colorado. (<http://qs2004.math.du.edu>.)

- **Georgia Council of the Humanities:** Commission to write “The History of Physics in Georgia” to appear in the on-line *NewGeorgia Encyclopedia*. Originally commissioned: March 1, 2003. <http://www.georgiaencyclopedia.org/nge/Home.jsp>
- **SRT (Small Radio Telescope)** Constructed, maintained & supervised the Small Radio Telescope project at Piedmont College (AY 2002-2003.)
- **KIRA 2002/1998:** Recipient, alumni fellowship (2002 conference). Recipient of graduate/post-graduate fellowship interdisciplinary program in sciences and humanities (held at Amherst College MA August 1 1998-August 15, 1998.) <http://www.kira.org/>
- **IDS 300 Science and Religion (Piedmont College)** Assisted in design of course conceived and directed by Dr Carlton Adams, winner of **Templeton Grant 2001**.
- **NASA Group Achievement Award** for contributions of the Global Tropospheric Western Pacific Science and Project Teams (GTE/PEM-West) Jan 1992-Sept 1992.

#### *IV. Employment:*

- **Visiting Assistant Professor (August 20, 2009 – May 20, 2010) Department of Philosophy, New Mexico State University, Las Cruces, NM.**
- **Lecturer (Sept 24, 2008 – June 20, 2009), Department of Philosophy and Religious Studies, University of Central Washington, Ellensburg, WA.**
- **Teaching Assistant (2005 - 2008), Department of Philosophy, University of Maryland at College Park.**
- **Adjunct Professor, Department of Engineering, Computer Science & Technology. (2004 –2008), Capitol College, Laurel, MD.**
- **Instructor, John Hopkins University- Center for Talented Youth Summer Program:** Instructor, Fast-Paced Physics (Sessions I & II) June-August, 2006-2009 – Skidmore College site, Saratoga Springs, NY. Instructor, Fast-Paced Physics (Session II) July-August, 2005 – Franklin & Marshall College site, Lancaster, PA.. Instructor, Discrete Mathematics (Session I) June-July, 2004 –Roger Williams University site, Bristol, RI.
- **Undergraduate Advisor and Graduate Administrative Assistant (2004 - 2005), Department of Philosophy, University of Maryland at College Park.**
- **Graduate Research Assistant (Level II) Committee of Philosophy and the Sciences (CPaS) (2003 –2004) University of Maryland at College Park.**
- **Assistant Professor of Mathematics and Physics: Piedmont College, Departments of Mathematics & Natural Sciences: August 2000-July 2003.**
- **Visiting Lecturer, Georgia State University, Department of Mathematics and Computer Information Sciences, June 1999-June 2000.**
- **Instructor (mathematics), Atlanta College of Art, Department of Liberal Arts and Sciences (Spring & Fall 2001, Fall 1997)**
- **Instructor (mathematics), Georgia State University, Department of Mathematics and Computer Information Sciences, April 1995-May 1999.**
- **Instructor (physics) Clayton State University, Department of Arts and Sciences, January 1997-March 1997.**

#### *V. Dissertation Topic, Advisor, Abstract<sup>1</sup>:*

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<sup>1</sup> 350 words

Title of Document: CLIFFORD ALGEBRA: A CASE FOR GEOMETRIC AND ONTOLOGICAL UNIFICATION

William Michael Kallfelz, PhD., 2008

Directed By: Distinguished University Professor and Chair of the Committee for Philosophy and the Sciences, Jeffrey Bub, Department of Philosophy

Robert Batterman's ontological insights (2002, 2004, 2005) are apt: Nature abhors singularities. "So should we," responds the physicist. However, the *epistemic* assessments of Batterman concerning the matter prove to be less clear, for in the same vein he writes that singularities play an essential role in certain classes of physical theories referring to certain types of critical phenomena. I devise a procedure ("methodological fundamentalism") which exhibits how singularities, at least in principle, may be avoided *within the same classes of formalisms* discussed by Batterman. I show that we need not accept some divergence between explanation and reduction (Batterman 2002), or between epistemological and ontological fundamentalism (Batterman 2004, 2005).

Though I remain sympathetic to the 'principle of charity' (Frisch (2005)), which appears to favor a pluralist outlook, I nevertheless call into question some of the forms such pluralist implications take in Robert Batterman's conclusions. It is difficult to reconcile some of the pluralist assessments that he and some of his contemporaries advocate with what appears to be a countervailing trend in a burgeoning research tradition known as Clifford (or geometric) algebra.

In my critical chapters (2 and 3) I use some of the demonstrated formal unity of Clifford algebra to argue that Batterman (2002) conflates central aspects of a physical theory's ontology with its purely mathematical content. Carefully distinguishing the two, and employing Clifford algebraic methods reveals a symmetry between reduction and explanation that Batterman overlooks. I refine this point by indicating that geometric algebraic methods are an active area of research in computational fluid dynamics, and applied in modeling the behavior of droplet-formation appear to instantiate a "methodologically fundamental" approach.

I argue in my introductory and concluding chapters that the model of inter-theoretic reduction and explanation offered by Fritz Rohrlich (1988, 1994) provides the best framework for accommodating the burgeoning pluralism in philosophical studies of physics, with the presumed claims of formal unification demonstrated by physicists choices of mathematical formalisms such as Clifford algebra. I show how Batterman's insights can be reconstructed in Rohrlich's

framework, preserving Batterman's important philosophical work, minus what I consider are his incorrect conclusions.

### *VI. Recent Courses Taught and TA'd*

- **Business Ethics (PHIL 302), Department of Philosophy, New Mexico State University, Fall Semester-2009.** Visiting Assistant Professor  
Syllabus available: <http://terpconnect.umd.edu/~wkallfel/Phil302SyllabusKallfelz.pdf>
- **Ethics (PHIL 223G), Department of Philosophy, New Mexico State University, Fall Semester-2009.** Visiting Assistant Professor  
Syllabus available: <http://terpconnect.umd.edu/~wkallfel/Phil223GsyllabusKallfelz.pdf>
- **The Art of Wondering (PHIL 101G) Department of Philosophy, New Mexico State University, Fall Semester-2009.** Visiting Assistant Professor  
Syllabus available <http://terpconnect.umd.edu/~wkallfel/Phil101GSyllabusKallfelz.pdf>
- **Current Ethical Issues (PHIL 210: 1 section), Department of Philosophy and Religious Studies, University of Central Washington, Fall & Winter Quarters, 2008-2009.** Lecturer and Primary Instructor.  
Syllabus available: [http://terpconnect.umd.edu/~wkallfel/Phil210Syllabus\\_Winter09Kallfelz.pdf](http://terpconnect.umd.edu/~wkallfel/Phil210Syllabus_Winter09Kallfelz.pdf)
- **Introduction to Logic (PHIL 201: 2 sections), Department of Philosophy and Religious Studies, University of Central Washington, Winter and Spring Quarters, 2008-2009.** Lecturer and Primary Instructor.  
Syllabi available: <http://terpconnect.umd.edu/~wkallfel/PHIL201001SyllabusKallfelz.pdf>  
<http://terpconnect.umd.edu/~wkallfel/PHIL201002SyllabusKallfelz.pdf>
- **The Meaning of Life (PHIL 115: 2 sections), Department of Philosophy and Religious Studies, University of Central Washington, Fall Quarte, 2008 & Spring Quarter, 2009** Lecturer and Primary Instructor.  
Syllabi available: [http://terpconnect.umd.edu/~wkallfel/Phil115\\_001SyllabusKallfelz.pdf](http://terpconnect.umd.edu/~wkallfel/Phil115_001SyllabusKallfelz.pdf)  
[http://terpconnect.umd.edu/~wkallfel/Phil115\\_002SyllabusKallfelz.pdf](http://terpconnect.umd.edu/~wkallfel/Phil115_002SyllabusKallfelz.pdf)
- **Philosophy of Science (PHIL 250), Department of Philosophy, University of Maryland, Fall Semester, 2007.** Primary Instructor. See my course website for all relevant details: <http://www.glue.umd.edu/%7Ewkallfel/PHIL250/index.html>
- **Calculus I, II (MA 261-262), Department of Engineering, Computer Science & Technology, Fall 2007-Spring 2008.** See my course website for all relevant details: <http://www.glue.umd.edu/%7Ewkallfel/MA261-2/index.html>
- **Contemporary Moral Issues (PHIL 140), Department of Philosophy, University of Maryland, Spring Semesters, 2007 & 2008.** Teaching Assistant. See my TA website for all relevant details: <http://www.glue.umd.edu/%7Ewkallfel/Phil140Spring2007-8/index.html>
- **Laplace and Fourier Analysis (MA 360), Department of Engineering, Computer Science & Technology, Fall 2007-Spring 2008.** Primary Instructor. See my course website for all relevant details: <http://www.wam.umd.edu/%7Ewkallfel/MA360/>
- **Numerical Analysis (MA 355) Department of Engineering, Computer Science & Technology, Fall 2007-Spring 2008.** Primary Instructor. Course materials: [http://www.glue.umd.edu/%7Ewkallfel/MATH355\\_Capitol%20College/](http://www.glue.umd.edu/%7Ewkallfel/MATH355_Capitol%20College/)
- **Introduction to Cognitive Science (PHIL 280), Department of Philosophy, University of Maryland, Spring Semesters, 2006.** Grader. See my section website for all relevant details <http://www.wam.umd.edu/%7Ewkallfel/PHIL280/>

- **Introduction to Philosophy (PHIL 100), Department of Philosophy, University of Maryland, Fall 2005, Spring & Fall 2006.** Teaching Assistant. See my TA website for all relevant details:  
<http://www.glue.umd.edu/%7Ewkallfel/PHIL100Fall2006/WK/index.htm>
- **Fast-Paced Physics (PHYW-A) Center for Talented Youth, Johns Hopkins University Summer Programs, Summer Sessions I & II<sup>2</sup> 2009, 2008, 2007, 2006, 2005 (Session II only).** Primary Instructor. Text: Giancoli, *General Physics* (a college-level trigonometry based text). For more information, see:  
<http://cty.jhu.edu/summer/summer-programs.html>
- **Discrete Mathematics (DMAT) Center for Talented Youth, Johns Hopkins University Summer Programs, Summer 2004 (session II only).** Primary Instructor. Text: Grimaldi, *Discrete Mathematics and Applications* (a college-level text). For more information, see: <http://cty.jhu.edu/summer/summer-programs.html>
- **General Physics I, II (Phys 211-212), Department of Natural Sciences, Piedmont College, Demorest, GA, Fall 2000-Spring 2003.** Primary Instructor. Course Materials: [http://www.wam.umd.edu/%7Ewkallfel/phy211\\_212/](http://www.wam.umd.edu/%7Ewkallfel/phy211_212/)
- **Modern Abstract Algebra (Math 315) Department of Mathematics, Piedmont College, Demorest, GA, Fall 2000-Spring 2003 (selected semesters).** Primary Instructor. Course Materials: <http://www.wam.umd.edu/%7Ewkallfel/m315/>
- **Discrete Mathematics (Math 200) Department of Mathematics, Piedmont College, Demorest, GA, Spring 2001, 2002, 2003.** Primary Instructor. Course Materials: [http://www.wam.umd.edu/%7Ewkallfel/M200\\_7/](http://www.wam.umd.edu/%7Ewkallfel/M200_7/)
- **Elementary Statistics (Math 210) Department of Mathematics, Piedmont College, Demorest, GA, 2000-2003 (selected semesters).** Primary Instructor. Course Materials: <http://www.wam.umd.edu/%7Ewkallfel/M210/>
- **Interdisciplinary Studies (IDS 300), Science and Religion, Piedmont College, Demorest, GA, Spring 2002.** Co-Instructor. See my lectures posted at: <http://www.wam.umd.edu/%7Ewkallfel/SciRelKallfelz.pdf>

### VII. Graduate Coursework

<i>Seminars</i>	<i>Title</i>	<i>Course Giver</i>	<i>Date</i>	<i>Grade</i>
Phil858B	<i>Seminar in Logic and Philosophy of Science</i>	Dr. John Horty	Spring semester, 2007	A-
Phil808B	<i>Seminar in Semantics and Pragmatics</i>	Dr. Paul Pietroski	Fall semester, 2006	A
Phil808B	<i>Seminar in Advanced Philosophy of Science</i>	Dr. Mathias Frisch	Spring semester, 2006	A-
Phil879B	<i>Seminar in the Architecture of Mind</i>	Dr. Peter Carruthers	Fall semester, 2005	A-

<sup>2</sup> For a total of six weeks (each session lasts three weeks) , seven hours a day of contact time = 105 contact hours per session

	Phil868	<i>Seminar in Ceteris Paribus Laws</i>	Dr. Michael Morreau	Fall semester, 2005	B
	Phil868	<i>Seminar in Emergence</i>	Dr. Michael Silberstein	Spring semester, 2005	A
	Phil858P	<i>Seminar in Quantum Information Theory</i>	Dr. Jeffrey Bub	Fall semester, 2004	B+
	Phil858	<i>Seminar in Causation</i>	Dr. Mathias Frisch	Spring semester, 2004	B+
<b>Specialized CPaS-Related Courses</b>	Phil688Q	<i>Philosophy of Physics</i>	Dr. Jeffery Bub	Fall semester, 2003	A
	Phil688S	<i>Philosophy of Space and Time</i>	Dr. Mathias Frisch	Spring semester, 2005	A-
	Hist 609	<i>Readings in History of Science &amp; Technology</i>	Dr. Robert Friedel	Spring semester, 2005	A-
	Phys 7143	<i>Group Theory and Quantum Mechanics</i>	Dr. John Wood (Georgia Inst. of Tech)	Winter quarter, 1999	A
	Phys 8103	<i>Quantum Information Theory</i>	Dr. T.A.B. Kennedy (Georgia Inst. of Tech)	Fall quarter, 1998	A
	Math 8153	<i>Seminar in Variational methods in Quaanum Many-body theory</i>	Dr. Evans Harrell (Georgia Inst. of Tech)	Spring quarter, 1998	A
	Phys 7150	<i>Quantum Logic</i>	Dr. David Finkelstein (Georgia Inst. of Tech)	Spring quarter, 1997	A
<b>Other Specialized Courses (AOC, etc.)</b>	Phil 788G	<i>Research In Philosophy of Language</i>	Dr. S. J. Odell	Spring semester, 2006	A
	Phil 688Q	<i>Philosophical Logic: Frege's Theorem</i>	Dr. Paul Pietroski	Fall semester, 2005	A
	Phil 688Y	<i>Logical Theory</i>	Dr. Michael Morreau	Fall semester, 2004	B

<b><i>Philosophy Core Course</i></b>	Phil 670	<i>Epistemology</i>	Dr. Christopher Cherniak	Fall semester, 2004	B+
	Phil 651	<i>Philosophy of Science</i>	Dr. Jeffrey Bub	Spring semester, 2004	B+
	Phil 640	<i>Value Theory</i>	Dr. Patricia Greenspan	Spring semester, 2004	B+
	Phil 660	<i>Metaphysics, Mind, and Language</i>	Dr. Paul Pietroski	Fall semester, 2003	A