

Spencer Stirling

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citizenship: US

CURRENT ◇ **Assistant Professor/Postdoctoral Researcher, University of Utah, Utah USA**
2008 - Present: Braided categorical quantum mechanics, Topological quantum field theory, modular tensor categories, topological quantum computing, strongly-correlated condensed matter systems (e.g. fractional quantum Hall effect)
joint Physics/Mathematics appointment

EDUCATION ◇ **Ph.D. Mathematics, University of Texas at Austin, Texas USA**
2001 - 2008: Mathematical physics (topological quantum field theories, modular tensor categories, quantum mechanics, geometry)
Dissertation: *Abelian Chern-Simons theory with toral gauge group, modular tensor categories, and group categories*
Advisor: Daniel S. Freed

◇ **Visiting fellow, Institute for Theoretical Physics, Utrecht University, the Netherlands.**
2002-2003: Quantum field theory, statistical field theory, general relativity

◇ **B.S. Physics and B.S. Mathematics, University of Utah, Utah USA**
1996-2001: Magna cum laude in both degrees

◇ **Undergraduate researcher, Department of Physics, The Ohio State University, Ohio USA**
Summer 2000, 2001: Big Bang nucleosynthesis

◇ **Valedictorian, Taylorsville High School, Utah, Utah USA**
1996: Sterling scholar

RESEARCH INTERESTS Mathematical physics; Quantum field theory (topological and otherwise); Geometry; Ribbon and modular tensor categories; Categorical quantum mechanics; Quantum foundations, information, and computation; Strongly-correlated condensed matter physics. Other interests include quantum gravity.

PREDOCTORAL RESEARCH ◇ **Big Bang nucleosynthesis, Department of Physics, The Ohio State University**
Summer 2000, 2001: Research Experience for Undergraduates (REU)
Advisor: Robert Scherrer

· **Computational modeling** of Big Bang nucleosynthesis. Research over two summers to model the abundance of light elements created during the Big Bang. Modified existing Fortran code to take into account inhomogeneous neutrino concentration and wrote code in **C/C++**, **Perl**, and **Bash** to assist the modeling over a wide range of cases.
publication: see below

◇ **Scanning capacitance microscopy, Department of Physics, University of Utah**
1998-2000: Undergraduate Semiconductor research
Advisor: Clayton Williams

- **Computational modeling** of semiconductor imaging techniques. Designed and constructed a custom probe to measure the dielectric constant of thin films on semiconductor surfaces. Custom programmed hardware controller. Promoted to modeling for the main research group with proprietary Medici (2D) and Davinci (3D) toolkits from Avant. Wrote code in C/C++ (and some scripting in Bash) to create detailed models of electron/hole concentration and drift velocities in doped semiconductor samples.
publication: see below

- PUBLICATIONS
- ◇ Spencer D. Stirling and Yong-Shi Wu, *Braided categorical quantum mechanics I*, arXiv:0909.0988.
 - ◇ Spencer D. Stirling, *Abelian Chern-Simons theory with toral gauge group, modular tensor categories, and group categories*, arXiv:0807.2857.
 - ◇ Spencer D. Stirling and Robert J. Scherrer, *Big bang nucleosynthesis with gaussian inhomogeneous neutrino degeneracy*, Phys. Rev. D66 (2002) 043531.
 - ◇ V.V. Zavyalov, J.S. McMurray, S.D. Stirling, C.C. Williams, and H. Smith, *Two dimensional dopant and carrier profiles obtained by scanning capacitance microscopy on an actively biased cross-sectioned metal-oxide-semiconductor field-effect transistor*, J. Vac. Sci. Technol. B 18, 549 (2000).
- COMPUTER SKILLS
- ◇ 14+ years advanced Linux (Debian) experience. Networking, workstations, web/email/file servers, backup servers
 - ◇ Professional (industry) C/C++ programming experience.
 - ◇ Scientific modeling experience in C/C++ (undergraduate level)
 - ◇ Various levels of exposure to Perl, Bash, Tcl/Tk, Java, MySQL, PHP, CGI, Fortran, Python
 - ◇ Corporate MS Windows networking
 - ◇ Excellent technical writing skills
 - ◇ Excellent oral and written communication skills
 - ◇ Author of online Linux technical documentation, <http://www.spencerstirling.com/computergeek/computernotes.html>
- TEACHING EXPERIENCE
- ◇ **Assistant Professor, Department of Mathematics and Department of Physics**, University of Utah
2008 - Present:
 - Partial Differential Equations for Engineers
 - Quantum Field Theory (with Carleton Detar)
 - Graduate Statistical Mechanics (with Daniel Mattis)
 - ◇ **Assistant Instructor, Department of Mathematics**, University of Texas at Austin
2005 - 2008:
 - Calculus
 - Precalculus
 - Arithmetic, geometry, and probability for educators
 - ◇ **Teaching Assistant, Department of Mathematics**, University of Texas at Austin
2004 - 2005:
 - Honors differential equations (under William Guy)
 - Vector calculus (under Charles Friedman)
 - Calculus (under Efraim Armendariz)

- ◇ **Teaching Assistant, Department of Physics**, University of Utah
1998 - 2001:
 - Mechanics, wave phenomena, electromagnetism (under Charlie Jui, Pierre Sokolsky, Gale Dick each for 1 year)

WORK
EXPERIENCE

- ◇ **C/C++ programmer**, Create-A-Check, Inc., Salt Lake City, Utah USA
1996-1998
 - C/C++ custom programming.
 - Designed and implemented internal product testing and responsible for major software releases.
 - Author of large amount of internal technical documentation.
 - Provided advanced support to customers with escalated issues beyond abilities of regular support.
 - Small (50+ machines) corporate MS Windows network management.
- ◇ **Linux network administrator**, World Institute for Conservation and Environment, Shepherdstown, West Virginia USA
2001-Present
 - Small business web and mail servers, file servers, backup servers, and firewalling for nature conservation organization
 - MS Windows integration with Linux network

AWARDS

- ◇ **Geometry Research Group Fellowship**, Department of Mathematics, University of Texas at Austin (2007)
- ◇ **NSF VIGRE Fellowship**, Department of Mathematics, University of Texas at Austin (2001, 2003)
- ◇ **Theoretical Physics (TPU) Fellowship**, Utrecht University, the Netherlands (2002)
- ◇ **International Study Abroad Scholarship**, University of Texas at Austin (2002)
- ◇ **NSF REU Research Scholarship**, Department of Physics, The Ohio State University (2000)
- ◇ **University of Utah, 1996-2001**
 - Honors at Entrance Scholarship
 - Kennecott Scholarship
 - Semiconductor Research Corporation Research Scholarship
 - Utah Mathematics Faculty Nominee Scholarship
 - Stephen E. Newman, Jr. Mathematics Scholarship
 - Physics Outstanding Junior Scholarship
 - Physics Outstanding Sophomore Scholarship
- ◇ **Taylorsville High School, 1996**
 - Valedictorian
 - Sterling Scholar

INVITED
TALKS

- ◇ **Invited speaker, Baylor University**, Waco, Texas (Oct. 2009)
Fusion Categories and Applications conference
- ◇ **Featured lecturer, University of Queensland, Quantum Information Science Initiative**, Brisbane, Australia (Feb. 2008)
Delivered two-week mini-course about TQFTs and modular tensor categories

◇ **Invited speaker, Texas A&M**, College Station, Texas (Apr. 2008)

- CONFERENCES ◇ **Modular Categories and Applications**, Bloomington, Indiana (2009)
- ◇ **NSF-CBMS Conference on Knots and Topological Quantum Computing**, Edmond, Oklahoma (2008)
- ◇ **Oporto Conference on Knot Homology and Physics**, Faro, Portugal (2007)
- ◇ **Texas Geometry and Topology Conference**, Rice University (2006)
- ◇ **Texas Geometry and Topology Conference**, University of Texas at Austin (2005)
- ◇ **Texas Geometry and Topology Conference**, Texas Tech (2005)
- ◇ **Loop Quantum Gravity in the Americas**, Perimeter Institute (2004)

INTERESTS Hiking/mountaineering, camping, skiing. Music and movies. Linux.