

CARL S. MCTAGUE
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Education.

- Cambridge University (UK).
 - PhD Student in Geometry under the supervision of Burt Totaro (2006–present).
 - Part III of the Mathematical Tripos with Distinction (2004–5).
- University of Cincinnati (USA).
 - BA in Mathematics, College of Arts and Sciences (1999–2004).
 - BA in Composition, College Conservatory of Music (CCM) (2000–4).
- Walnut Hills High School, Cincinnati, Ohio (1993–9).

Research experience.

- Research in spatially extended dynamical systems with Jim Crutchfield at the Santa Fe Institute (2001–4):
 - Graduate Fellow, Santa Fe Institute (Summer 2004).
 - Visiting Researcher, Santa Fe Institute (Summers 2002 and 2003).
 - NSF “REU” Undergraduate Intern, Santa Fe Institute (Summer 2001).
- Data Analysis for Gene Somoza, Medications Development Research Unit, Cincinnati, funded by the National Institute on Drug Abuse (Part-Time) (1997–9).

Honors and awards.

- *NSF Graduate Research Fellowship* (2005–present).
- Bursary from the Cambridge Overseas Trusts (2006–present).
- *Fulbright Scholar* at Ruprecht-Karls-Universität Heidelberg, Germany (2005–6).
- Tutorial Prize from St Edmund’s College, Cambridge (2005).
- Bursary from the Cambridge Overseas Trusts (2004–5).
- McKibbin Medal (essentially *co-valedictorian* of University of Cincinnati College of Arts and Sciences) (2004).
- Phi Beta Kappa (2004).
- Alternate for *Marshall Scholarship* (2003).
- *Goldwater Scholar* (2002–4).
- University of Cincinnati Mathematics Department Awards: Gulden and Kieval Scholarships (2003, 2004); Hancock Scholarship (2002); and Kieval Scholarship (2001).
- University of Cincinnati Greenholz Scholarship (2001).
- University of Cincinnati Engineering MEDA Full Scholarship (1999–2002).
- University of Cincinnati Cincinnati Scholarship (1999–2003).
- Dean’s List, University of Cincinnati (1999–2004).
- Tau Beta Pi Engineering Honors Society (2002–present).
- National Merit Finalist (1999).
- Cum Laude Society (1999).

Activities.

- Trinity Hall Graduate Society Computing Officer (2006–present).
- Independent projects in computational music (1994–present).
- Studied with West Clare fiddle master Kevin Crehan (2002–3).
- Taught Irish fiddle at the Riley School of Irish Music (1998–2003).
- Member of the CCM Concert and Repertory Orchestras (conducted by Xian Zhang and Mark Gibson; more than six hours of rehearsal a week) (2000–1, 2002–4).

Skills.

- Fluent in German (1988–present); Knowledge of Irish (1999–present); Four years of Latin in Junior/High School (1993–6).
- Operating Systems: FreeBSD, GNU/Linux, MacOS X, Openstep, and Solaris.
- Programming Languages: Awk, *Axiom*, C, C++, *Haskell*, Java, $\text{T}_{\text{E}}\text{X}$, $\text{L}_{\text{A}}\text{T}_{\text{E}}\text{X}$, *Mathematica*, Maxima, Objective-C, *Perl*, PostgreSQL, Postscript, and Scheme LISP.

Publications.

- CS McTague and JP Crutchfield, Automated Pattern Detection—An Algorithm for Constructing Optimally Synchronizing Multi-Regular Language Filters, *Theoretical Computer Science* 359 (2006), 306–328. arxiv.org/cs.CV/0410017.
- JP Crutchfield and CS McTague, Unveiling an Enigma: Patterns in Elementary Cellular Automaton 22 and How to Discover Them (in preparation).
- DP Feldman, CS McTague and JP Crutchfield, Organization of Intrinsic Computation: Complexity-Entropy Diagrams (in preparation).

Research Talks.

- *Elliptic Cohomology Equals Bordism Modulo Flops*, Graduate Homotopy Theory Conference, Cambridge (December 2007).
- *When Does a Singular Space Have a Signature?*, Work in Progress Seminar, DP-MMS, Cambridge University (October 2006).
- *Automated Pattern Analysis of Cellular Automata*, Max Planck Institute for Mathematics in the Sciences, Leipzig (November 2005).
- *The Multi-Regular Language Filtering Problem*, Dynamics of Learning Research Group, Santa Fe Institute (August 2004).
- *The Transducer Fixed Point Nightmare and My Elusive ϵ -Space Fantasy*, Dynamics of Learning Research Group, Santa Fe Institute (March 2004).
- *Music through Computation*, Invited Keynote Speech, *International Mathematica Symposium*, Imperial College London (July 2003).

Earlier versions of the talk were given both at the Complex Systems Summer School's special session on music and complexity at St. John's College, Santa Fe, and as a UC Mathematics Department Colloquium Lecture (both in June 2003).

- *Finite-state Domains in Cellular Automata, \mathbb{Z} -Filters, and a General Patch Theory*, Dynamics of Learning Research Group, Santa Fe Institute (September 2002).
- *Cellular Automata as Operators on Regular Language Space*, special lecture in the UC Mathematics Department Colloquium Series (October 2001).
- *Tools for Computing Music (with examples)*, special seminar at the Santa Fe Institute (September 2001).
- *Pattern Formation in Computer Programs: Cellular Automata as Operators on Regular Language Space*, REU presentation, Santa Fe Institute (August 2001).

Seminar Talks.

- *Al-Khwārizmī, The Father of Algebra*, Millenium Mathematics Project (December 2007).
- *Thom's Construction of L-classes via Maps to Spheres and its Generalization to Singular Spaces*, Topology Seminar, Mathematics Institute, Universität Heidelberg (June 2006).
- *The Piecewise Linear DeRham Theorem*, Oberseminar Topologie, Mathematics Institute, Universität Heidelberg (June 2006).

- *The Todd Genus and its Role in the Riemann-Roch-Hirzebruch Theorem*, Topology Seminar, Mathematics Institute, Universität Heidelberg (November 2005).
- *Stratified Morse Theory*, Part III Seminar, DPMMS, Cambridge University (March 2005).
- *An Introduction to Intersection Homology*, Part III Seminar, DPMMS, Cambridge University (December 2004).
- *The Generalized Atiyah-Hirzebruch Spectral Sequence and the Uniqueness of Cohomology Theories Satisfying the Dimension Axiom*, UC Topology Seminar (May 2004).
- *Whitney Stratifications*, UC Topology Seminar (February 2004).
- *Pontrijagin Classes and Numbers*, UC Topology Seminar (December 2003).

Selected general-audience articles about my work.

- *Undergrad's Work Mixes Math and Music* by Professor Joanna Mitro, *The Right Angle* (UC Math Department's Newsletter) (2003).
- *Math-Music Whiz Invited to International Symposium* by Marianne Kunnen-Jones, UC Public Relations, <http://www.uc.edu/news/NR.asp?id=622> (2003).
- *6 Integers: Making Music with Mathematica* by Maryka Baraka, Wolfram Research, <http://www.wolfram.com/news/mctague.html> (1999).