

## Nathanael Ackerman

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### Education

- Doctorate in Philosophy in Mathematics from the Massachusetts Institute of Technology, June 2006

Thesis: “On Quantifier Rank Spectrum of Sentences of  $\mathcal{L}_{\infty, \omega}$ ”

- Bachelor of Arts in Mathematics from Harvard University graduating Magna Cum Laude, June 2000

### Research Interests

- Infinitary Logic: Specifically the study of infinitary logic on countable structures as well as the connection between infinitary logic and descriptive set theory.
- Descriptive Sheaf Theory: Specifically the study of how the properties of Baire space and trees can be generalized to arbitrary sheaves.
- Higher Order Topology: Specifically properties of the category of higher order topological spaces (i.e. those space obtained by lifting Stone duality higher dimensional categories).
- Domain Theory: Specifically generalizing the techniques of domain theory as a unified way of looking at  $\alpha$ -recursion theory.

For more details see my research statement.

### Writings

- *Quantifier Rank Spectra of  $L_{\omega_1, \omega}$*  (Submitted to the “Notre Dame Journal of Formal Logic”).
- *Relativized Grothendieck Topoi* (Submitted to “Annals of Pure and Applied Logic”).
- *$\Gamma$ -Ultrametric Spaces and Presheaves* (Submitted to “Journal of Pure and Applied Algebra”).

For more details (including a list of papers in preparation) see my publication list.

## Academic Employment

University of Pennsylvania (2006-Present): Lecturer

### *Teaching*

Fall 2008:

- Math 104- Calculus I
- Math 170- Ideas in Mathematics
- Independent Study:  $\alpha$ -Recursion Theory
- Independent Study: Topos Theory

Spring 2008:

- Math 104- Calculus I
- Independent Study: Set Theory
- Independent Study: Topos Theory

Fall 2007:

- Math 371- Algebra
- Math 170- Ideas in Mathematics
- Independent Study: Set Theory

Spring 2007:

- Math 170- Ideas in Mathematics
- Math 104- Calculus I
- Independent Study: Set Theory and Determinacy

Fall 2006:

- Math 371- Algebra
- Independent Study: Set Theory and Determinacy

Massachusetts Institute of Technology (2000-2006): Graduate Student

### *Teaching*

Fall 2002:

- Math 18.01: Calculus (at Experimental Study Group (ESG)).

Spring 2002:

- Informal Graduate Student Seminar on Model Theory with the goal of covering Morley's Theorem

Summer 2002:

- Informal Graduate Student Seminar on Set Theory with the goal of covering Forcing

### *Mentoring:*

Summer 2005:

- I mentored two high school students at the Research Science Institute (RSI) at MIT, one of whom won top 5 honors in both her written and oral presentation.

## Work Experience (outside of teaching)

- Spring-Summer 2001: Provided background research for Professor Gerald Sacks' book "Mathematical Logic in the 20th Century"
- Summer 2000: Worked at Numeric Investors creating a program to graph features of various stocks.

## Talks

### Conferences:

- "Possible Scott Ranks of Formulas of Small Quantifier Rank" at Classification of Countable Models: Work growing out of Vaught's Conjecture Workshop May 18-24, 2005 at the University of Notre Dame

### Logic and Computation Seminar at University of Pennsylvania:

- "Lindstrom's Theorem (Part I, II)" (Fall 2006)
- "Independence CH and AC using Forcing (Part I - IV)" (Fall 2006-Spring 2007)
- "Vaught's Conjecture (Part I - III)" (Spring 2007)
- "Antifoundation Axiom (Part I - III)" (Fall 2007)
- "Admissible Sets" (Fall 2007)
- "Quantifier Rank Spectra of  $\mathcal{L}_{\omega_1, \omega}$  (Part I - V)" (Spring 2008)
- "Relativized Grothendieck Topoi (Part I, II)" (Fall 2008)

### Graduate Student Seminar at the University of Pennsylvania:

- "Ultraproducts" (Spring 2008)

### Logic Seminar at George Washington University:

- "Vaught's Conjecture (Part I, II)" (Spring 2008)

### Boston Logic Seminar at MIT:

- " $\kappa$ -Polish Spaces" (Spring 2006)
- "Regular Categories and Coherent Logics" (Spring 2005)
- "Topos Theory and Zermelo Set Theory" (Fall 2004)
- "Iterated ultrapowers and mice" (Fall 2003)
- "Maximality Conditions for  $L_{\omega, \omega}, L_{\infty, \omega}$ " (Fall 2002)
- " $ZFC_0 \neq ZFC_{\alpha_0} \neq ZFC_{\aleph_1} \neq ZFC_{st}$ " (Spring 2002)
- "Jensen's Covering Theorem" (Spring 2001)

### Other Graduate Lectures at MIT

- "Godel's Incompleteness Theorem" (Spring 2001)
- Talk on "On The Number of Countable Models of a Countable Supersimple Theory" by Byunghan Kim (Spring 2001)
- Talk "Iterated perfect Set Forcing" by Baumgartner and Laver (Fall 2001)
- Talk on " $\omega_1$  Suslin-Trees and  $\diamond$ " (Fall 2001)

## Conferences Attended

- “MAMLS Meeting in honor of Gregory Cherlin’s 60th Birthday” at the University of Rutgers, New Brunswick, New Jersey. (October 24–26, 2008)
- “2008 International Category Theory Conference” in Calais, France (June 22–28, 2008)
- “Mathematical Foundations of Programming Semantics” at the University of Pennsylvania, Philadelphia, Pennsylvania. (May 22–25, 2008)
- “Conference in honour of the 60th birthday of Professor Andreas R. Blass” at the Field’s Institute, Toronto, Canada (November 9–10, 2007)
- “2007 International Category Theory Conference” in Carvoeiro, Portugal (June 17–23, 2007)
- “Recent Advances in Category Theory and Logic: Applications of Traces to Algebra, Analysis and Categorical Logic, A Fields Institute Sponsored Workshop” at University of Ottawa, Ottawa, Canada (April 28-30)
- “2006 Category Theory OctoberFest” at University of Ottawa, Ottawa, Canada (October 21–22, 2006)
- “2006 Greater Boston Logic Meeting” at MIT (May 12th –May 14th, 2003)
- “2005 Category Theory OctoberFest” at University of Ottawa, Ottawa, Canada (October 22–23, 2005)
- “Classification of Countable Models: Work growing out of Vaught’s Conjecture Workshop” May 18–24, 2005 at the University of Notre Dame
- “2004 Category Theory OctoberFest” at McGill University, Montreal, Canada (October 16–17, 2004)
- “Association for Symbolic Logic 2003 Annual Meeting” at University of Illinois at Chicago (June 1–4, 2003)
- “2003 Greater Boston Logic Meeting” at MIT (May 16 –May 18, 2003)
- 2002 Seminar at Notre Dame to discuss Robin Knight’s Counter Example to Vaught’s Conjecture.
- “2001 Greater Boston Logic Meeting” at MIT (May, 2001)
- “Workshop on Simple Theories” (October 19-22, 2000) at The Fields Institute for Research in Mathematical Science

## University Service

- Committee for Masters Degree of University of Pennsylvania student.
- Qualifying Exam Committee for University of Pennsylvania students
- University of Pennsylvania: Preliminary Examination for Graduate Students at (Fall 2008–Spring 2009)
- University of Pennsylvania: Mathematics Colloquium Committee (Fall 2007–Spring 2008)
- University of Pennsylvania: Committee for the Makeup/Advanced Placement Exams (Fall 2006–Spring 2007)
- University of Pennsylvania: Preliminary Examination for Graduate Students at (Fall 2006–Spring 2007)
- University of Pennsylvania: Committee for the Makeup/Advanced Placement Exams at (Fall 2006–Spring 2007)
- Secretary of the weekly logic seminar (Spring 2001–Fall 2001)

## Additional Information

### Public Service:

- 2005-2006: Recruitment Director of CASPARTners (volunteer organization which works with the CASPAR homeless shelter.)
- 1999-2006: Volunteer at the Harvard Square Homeless Shelter
- 1999-2002: Director of the Harvard/MIT Committee on the Blind
- 1999-2000: Director of the Harvard Committee on Deaf Awareness
- 1998-1999: Volunteered at the Horace Mann School for the Deaf

### Wrestling\*:

- Volunteer Assistant Coach at the University of Pennsylvania (2008-2009 season)
  - 1 x British Freestyle Wrestling Olympic Team Member, Athens Games, 2004
  - 5 x British Freestyle Wrestling World Championships Team Member, 1999, 2001-2003, 2005
  - 6 x British Freestyle Wrestling European Championships Team Member, 1999, 2001-2005
  - 2 x British National Freestyle Wrestling Champion, 2002, 2004
- (\*I hold dual US and British citizenship, born in New York City, NY USA)

## References

- Professor Gerald E. Sacks of Harvard University
- Professor Andre Scedrov of the University of Pennsylvania
- Professor Peter Freyd of the University of Pennsylvania
- Professor Antonella Grassi of the University of Pennsylvania (Teaching Recommendation)