Curriculum Vita

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Personal

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Education

BA	1972	University of California, Irvine
MA	1975	University of California, Berkeley
PhD	1978	University of California, Berkeley

Dissertation: Some problems in set theory and model theory, under the supervision of Professor John W. Addison, Jr.

Employment

1977-79	Instructor	U. Wisconsin, Madison
1979-84	Assistant Professor	U. Texas, Austin
1981	Visiting Assistant Professor	U. Wisconsin, Madison
1984-85	Associate Professor	U. Texas, Austin
1985-90	Associate Professor	U. Wisconsin, Madison
1990-	Professor	U. Wisconsin, Madison
1994-95	Sabbatical	York University, Toronto
2002-03	Sabbatical	Toronto, Gainesville, Boise
2007	Visiting Professor	U. Florida, Gainesville
2012-13	Sabbatical	Fields Institute, Toronto
2014	Emeritus	

Teaching Award

1984 President's Associates Centennial Teaching Fellowship in Mathematics, University of Texas, Austin.

Graduate Students

1990	Les Nelson, MA
1991	Tom Linton, PhD
1993	Garry Channing (natus Schumacher), MA
1994	Mark Johnson, PhD
2002	Tim Cookson, PhD
2013	Konstantinos Beros, PhD (co-advisor Joseph S. Miller)
2013	Devon O'Rourke, MA
2014	Ashutosh Kumar, PhD

Research Support

1978-92	NSF	Topology and Foundations
1982-83	UT	University Research Institute
1986-91	UW	Romnes Faculty Fellowship
1993,4,6,7,00	UW	Graduate School

Other Support

1989-91 NSF equipment grant with matching funds from the University of Wisconsin, Mathematics Department Computer Laboratory Improvement. (with Rod Smart)

1991 NSF Special Projects, Summer Conference on general topology and and its applications: Mary Ellen Rudin and her work; held June 26-29, 1991 in Madison, Wisconsin. (with Frank Tall and Ralph Kopperman)

1992-1997 NSF support for the Southern Wisconsin Logic Colloquium. (lead by Steffen Lempp and with Paul Bankston, Donna Carr, Mirna Dzamonja, H.Jerome Keisler, Kenneth Kunen, Terrence S. Millar, Mary Ellen Rudin, Wim Ruitenburg, and John C. Simms)

1997 WEB Page Development Grant, Doit Learning Technology and Distance Education, University of Wisconsin, Madison. (with Joel Robbin)

2009 NSF support for Kunen Fest : Topology and Set Theory Conference held April 2009, Madison, Wisconsin (with Mirna Dzamonja, Erik Andrejko, Dilip Raghaven)

Publications

Lecture notes: On the length of Borel hierarchies, Kurt Godel Research Center, Vienna, Austria TOPOSYM, Prague, Czech Republic, July 2016.

Nyikos's Joke eprint March 2016.

The onto mapping property of Sierpinski eprint July 2014 updated May 2016.

Analytic subspace of the reals without an analytic basis (with Konstantine Beros) eprint June 2014 (written Feb 2009)

Partitions of 2^ω and Completely Ultrametrizable Spaces (with William R. Brian), Topology Appl. 184 (2015), 6171.

A proof by areas of the sin(A+B) formula.

Selective covering properties of product spaces, II: γ-spaces, (with Boaz Tsaban and Lyubomyr Zdomskyy), Trans. Amer. Math. Soc. 368 (2016), no. 4, 28652889.

Irredundant Generators (with Jonathan Cancino, Osvaldo Guzmán) eprint June 2013 revised Apr 2014

Generating Borel measurable mappings with continuous mappings, (with Wojciech Bielas, Michał Morayne, Tomasz Słonka); Topology Appl. 160 (2013), no. 12, 1439-1443.

Countable subgroups of Euclidean Space, eprint May 2013

Selective covering properties of product spaces, Annals of Pure and Applied Logic 165 (2014), 1034-1057. (with Boaz Tsaban, Lyubomyr Zdomskyy)

Compact subsets of the Baire space, eprint Nov 2012

A hierarchy of clopen graphs on the Baire space, eprint Oct 2012

Carlson collapse is minimal under MA, eprint Sept 2012

Cohen forcing preserves being a gamma-set but not Hurewicz property, eprint Sept 2012

Products of Luzin, Sierpinski, and γ-sets, three eprints July 2012

Recurse - question of Charlie McCoy, eprint July 2012

Hechler and Laver Trees, eprint Apr 2012.

Universal Functions, Fund. Math. 227 (2014), no. 3, 197–246. (with P.Larson, J.Steprans, W.Weiss)

Absoluteness of convexly orderable, eprint Feb 2012.

The hierarchy of ω_1-Borel sets, eprint July 2011.

Uniquely Universal Sets, Topology and its Applications 159 (2012), 3033-3041.

The maximum principle in forcing and the axiom of choice, eprint May 2011.

Universal sets for pointsets properly on the n^{th} level of the projective hierarchy, Journal of Symbolic Logic,78(2013), pp. 237-244. (with Greg Hjorth and Leigh Humphries)

Point-cofinite covers in the Laver model, Proceedings of American Mathematical Society, 138(2010), 3313-3321. (with Boaz Tsaban)

Biography of Kenneth Kunen, Topology Appl. 158 (2011), no. 18, 2445.

The axiom of choice and two-point sets in the plane, eprint Sept 2008.

Lecture notes on interest rate calculations for business students, eprint Dec 2008,

A Dedekind Finite Borel Set, Archive for Mathematical Logic, 50 (2011), no. 1-2, 1–17.

The recursion theorem and infinite sequences, eprint Nov 2007.

Lecture notes in Computability Theory, 137 pages, eprint Dec 2008.

Long Borel hierarchies, Math Logic Quarterly, 54(2008), 301-316.

A hodgepodge of sets of reals, Note di Matematica, 27(2007), Supplemento 1, 25-39.

Steinhaus Sets and Jackson Sets, Advances in logic, 127–145, Contemp. Math., 425, Amer. Math. Soc., Providence, RI, 2007. (with Su Gao and William A. R. Weiss)

The number of translates of a closed nowhere dense set required to cover a Polish group, Annals of Pure and Applied Logic, 140(2006), 52-59. (with Juris Steprans)

Half of an inseparable pair, Real Analysis Exchange, 32 (2006/07), no. 1, 179–193.

The cardinal characteristic for relative γ-sets, Topology and its Applications, 156(2009), 872-878.

On squares of spaces and F_σ-sets, Topology Proceedings, 20(2005), 237-241.

The γ-Borel conjecture, Archive for Mathematical Logic, 44(2005), 425-434.

Models in which every nonmeager set is nonmeager in a nowhere dense Cantor set, Canadian Journal of Mathematics, 57(2005), 1139-1154. (with Maxim R. Burke)

Ultrafilters with property (s), Proceedings of the American Mathematical Society, 137(2009), 3115-3121.

On λ'-sets, Topology Proceedings, 28(2004), 179-187.

On relatively analytic and Borel subsets, Journal of Symbolic Logic 70(2005), 346-352.

Descriptive set theory in Encyclopedia of general topology. Edited by Klaas Pieter Hart, Jun-iti Nagata and Jerry E. Vaughan. Elsevier Science Publishers, B.V., Amsterdam, 2004. x+526 pp. ISBN: 0-444-50355-2

A MAD Q-set, Fundamenta Mathematicae, 178(2003), 271-281.

A nonhereditary Borel-cover γ-set, Real Analysis Exchange, 29(2003-2004), 601-606.

Categoricity Without Equality, in Łos Memorial Volume, Fundamenta Mathematicae, 170(2001), 87-106. (with H. Jerome Keisler)

Baire measures on uncountable product spaces, eprint Oct 1998.

Vitali sets and Hamel bases that are Marczewski measurable, Fundamenta Mathematicae, 166(2000), 269-279. (with Strashimir G. Popvassilev)

Everywhere of second category sets, Real Analysis Exchange, 24(1999), 607-614. (with Kandasamy Muthuvel)

Orthogonal families of real sequences, Journal of Symbolic Logic, 63(1998), 29-49. (with Juris Steprans)

Introduction to Mathematical Logic - Moore Style, This is a set of 288 questions written for a Moore-style course in Mathematical Logic, 75 pages, eprint 1996.

Mathematical Logic and Computability, McGraw-Hill (1996),
Jerry Keisler, Joel Robbin,
contributors: Arnold Miller, Ken Kunen, Terry Millar, Paul Corazza.

The combinatorics of open covers (II), Topology and its applications, 73(1996), 241-266. (with Winfried Just, Marion Scheepers, and Paul Szeptycki)

Souslin's hypothesis and convergence in category, Proceedings of American Mathematical Society, 124(1996), 1529-1532.

Cardinal invariants concerning functions whose sum is almost continuous, Real Analysis Exchange, 20(1994-5), 657-672. (with Krzysztof Ciesielski)

Measurability of functions with approximately continuous vertical sections and measurable horizontal sections, Colloquium Mathematicae, 69(1995), 299-308. (with Miklós Laczkovich)

Descriptive Set Theory and Forcing: How to prove theorems about Borel sets the hard way, Lecture Notes in Logic 4(1995), Springer-Verlag. New edition 4-2001 now published by Association for Symbolic Logic.

Measurable rectangles, Real Analysis Exchange, 19(1994), 194-202.

Some interesting problems, in **Set Theory of the Reals**, ed Haim Judah, Israel Mathematical Conference Proceedings, vol 6 (1993), 645-654, American Math Society, continuously updated on my home page.

Special sets of reals, in **Set Theory of the Reals**, ed Haim Judah, Israel Mathematical Conference Proceedings, 6(1993), 415-432, American Math Society.

Sacks forcing, Laver forcing, and Martin's axiom, Archive for Mathematical Logic, 31(1992), 145-161. (with Haim Judah and Saharon Shelah)

Review: Countable Ultraproducts Without CH by Michael Canjar; Small Filter Forcing by R. Michael Canjar, The Journal of Symbolic Logic Vol. 56, No. 1, Mar., 1991

Projective subsets of separable metric spaces, Annals of Pure and Applied Logic, 50(1990), 53-69.

Set theoretic properties of Loeb measure, Journal of Symbolic Logic, 55(1990), 1022-1036.

Review: R. Fraisse, Theory of relations, Bulletin of the American Mathematical Society Volume 23, Number 1 July 1990

Two remarks about analytic sets, in **Lecture Notes in Mathematics**, Springer-Verlag, 1401(1989), 68-72. (with Fons van Engelen and Ken Kunen)

Descriptive set theory on a hyperfinite set, Journal of Symbolic Logic, 54(1989), 1167-1180. (with Steve Leth, Jerry Keisler, and Ken Kunen)

Infinite combinatorics and definability, Annals of Pure and Applied Mathematical Logic, 41(1989), 179-203.

Review: Can You Take Solovay's Inaccessible Away? by Saharon Shelah; A Mathematical Proof of S. Shelah's Theorem on the Measure Problem and Related Results by Jean Raisonnier, The Journal of Symbolic Logic Vol. 54, No. 2, Jun., 1989

Rigid Borel sets and better quasiorder theory, Contemporary Mathematics (American Mathematical Society), 65(1987), 199-222. (with Fons van Engelen and John Steel)

On some properties of Hurewicz, Menger, and Rothberger, Fundamenta Mathematicae, 129(1988), 17-33. (with David Fremlin)

Solution to Funar problem in 1986 Math Monthly

Rational perfect set forcing, Contemporary Mathematics (American Mathematical Society), 31(1984), 143-159.

When the continuum has cofinality ω_1, Pacific Journal of Mathematics, 115(1984), 399-407. (with Karel Prikry)

Additivity of measure implies dominating reals, Proceedings of the American Mathematical Society, 91(1984), 111-117.

Lindelöf models of the reals: solution to a problem of Sikorski, Israel Journal of Mathematics, 45(1983), 209-218. (with Larry Manevitz)

Borel and projective sets from the point of view of compact sets, Mathematical Proceedings of the Cambridge Philosophical Society, 94(1983), 399-409. (with Ken Kunen)

A minimal degree which collapses ω_1, Journal of Symbolic Logic, 49(1984), 298-300. (with Tim Carlson and Ken Kunen)

γ*-sets and other singular sets of real numbers*, Topology and Its Applications, 17(1984), 145-155. (with Fred Galvin)

Special subsets of the real line, in **Handbook of Set Theoretic Topology**, North Holland, (1984), 201-233.

Review: The Number of Countable Models by Michael Morley, The Journal of Symbolic Logic Vol. 49, No. 1, Mar., 1984

The Borel classification of the isomorphism class of a countable model, Notre Dame Journal of Formal Logic, 24(1983), 22-34.

Pellings problem, American Mathematical Monthly, Vol. 90, No. 6, Jun. - Jul., 1983, 408-9.

On box products, Topology and Its Applications, 14(1982), 313-317.

A characterization of the least cardinal for which the Baire category theorem fails, Proceedings of the American Mathematical Society, 86(1982), 498-502.

Review: On the Consistency of Borel's Conjecture by Richard Laver; Iterated Perfect-Set Forcing by James E. Baumgartner; Richard Laver, The Journal of Symbolic Logic Vol. 48, No. 3, Sep., 1983

Mapping a set of reals onto the reals, Journal of Symbolic Logic, 48(1983), 575-584.

Generic Souslin sets, Pacific Journal of Mathematics, 97(1981), 171-181.

Some properties of measure and category, Transactions of the American Mathematical Society, 266(1981), 93-114. *Corrections and additions to some properties of measure and category*, Transactions of the American Mathematical Society, 271(1982), 347-348.

The Baire category theorem and cardinals of countable cofinality, Journal of Symbolic Logic, 47(1982), 275-288.

On generating the category algebra and the Baire order problem, Bulletin de L'Academie Polonaise des Science, 27(1979), 751-755.

Covering 2^ω *with* ω_1 *disjoint closed sets*, in **The Kleene Symposium**, North Holland (1980), 415-421.

On Q-sets, Proceedings of the American Mathematical Society, 78(1980), 280-284. (with Bill Fleissner)

Vaught's conjecture for theories of one unary operation, Fundamenta Mathematicae, 111(1981), 135-141.

There are no Q-points in Laver's model for the Borel conjecture, Proceedings of the American Mathematical Society, 78(1980), 103-106.

On the length of Borel hierarchies, Annals of Math Logic, 16(1979), 233-267.

Some problems in set theory and model theory Thesis (Ph.D. in Mathematics)–University of California, Berkeley, Nov. 1978.

Lectures

The Borel hierarchy cut-off problems of Kolmogorov, Banach, and Mazurkiewicz, talk at the February 1977 meeting of the Association for Symbolic Logic in St. Louis, Missouri.

On Borel hierarchies, 50 minute talk at the Logic Colloquium, University of California, Berkeley, March 1977; and University of California, Los Angeles, April 1977.

Covering 2^ω with ω_1 disjoint closed sets, talk at the June 1978 Kleene Symposium at the University of Wisconsin, Madison.

The Borel hierarchy of a separable metric space, talk at the July 1978 London Conference on Analytic Sets, University College of London, England.

On generating the category algebra and the Baire order problem, 20 minute talk at the October 1978 meeting of the American Mathematical Society at Syracuse, New York.

The Baire category theorem and cardinals of countable cofinality, 50 minute colloquia talks at the University of Maryland, College Park, January 1979, University of Illinois, Urbana-Champaign, February 1979, and Pennsylvania State University, University Park, February 1979.

Some properties of measure and category, 20 minute talk at the August 1979 meeting of the American Mathematical Society at Duluth, Minnesota.

Generic Souslin sets, talk at the January 1980 meeting of the American Mathematical Society at San Antonio, Texas.

Some set theoretic problems in dimension theory, 50 minute talk at the January 1980 biannual meeting of the Cabal in Set Theory at the University of California, Los Angeles.

Projective sets and compact subsets of ω^ω, talk at the January 1981 meeting of the American Mathematical Society at San Francisco, California.

Rational perfect set forcing, 20 minute talk at the April 1981 meeting of the American Mathematical Society at Milwaukee, Wisconsin.

Additivity of measure implies dominating reals, talk at the January 1982 meeting of the American Mathematical Society at Cincinnati, Ohio.

End extensions of second order models of arithmetic, talk at the Logic colloquium, University of Wisconsin, Madison.

Some independence results, talk at the January 1983 meeting of the Association for Symbolic Logic at Boulder, Colorado.

Some peculiar sets of reals, 50 minute talk at the March 1983 Spring Topology meeting at Houston, Texas.

Some methods of forcing which add reals, 30 minute talk at the June 1983 American Mathematical Society Summer Research Conference in Set Theory, Boulder, Colorado.

Some remarks on the negation of the continuum hypothesis, 50 minute colloquium talk at Pennsylvania State University, University Park, February 1984.

Rothberger's property, 50 minute talk at the July 1984 meeting on undecidable problems in measure theory, University of Toronto, Canada.

Rigid Borel sets, 20 minute talk at the March 1985 meeting of the American Mathematical Society at Chicago, Illinois.

Definability and combinatorics, talk at the March 1987 Spring Topology meeting at Birmingham, Alabama.

Two remarks about analytic sets, 45 minute talk at the August 1987 meeting on set theory (STACY) at York University, Toronto.

Descriptive set theory over hyperfinite sets, 20 minute talk at the January 1988 meeting of the American Mathematical Society in Atlanta, Georgia.

Projective subsets of singular separable metric spaces, 30 minute talk at the April 1988 Spring Topology meeting in Gainsville, Florida.

Goodstein sequences and ordinal numbers, 50 minute talk May 1988 for the talent search honors day U.W. Math Department.

Set theoretic properties of Loeb measure, 40 minute talk at the August 1988 meeting on nonstandard analysis, at Smith College, Northampton, Massachusetts.

On Loeb-Sierpiński sets and other properties of Loeb measure, 20 minute talk at the October 1988 meeting of the American Mathematical Society in Lawrence, Kansas.

Some interesting problems, 50 minute talk at meeting on the real line in December 1988 at the University of California, Berkeley.

Perfect sets of generic reals, 50 minute talk at February 1989 meeting of the New England Set Theory seminar (NESTS) at Smith College, Northampton, Massachusetts.

Bizarre axioms of set theory, 50 minute colloquium talk in March 1989 at York University, Toronto, Canada.

Laver trees, 50 minute seminar talk in March 1989 at University of Toronto, Canada.

Add, cov, and all of that, 60 minute talk at Mary Ellen Rudin's meeting in November 1989 at Madison, Wisconsin.

Set theory of the real line, 50 minute colloquium talk in April 1990 at George Mason University, Fairfax, Virginia.

Sierpiński sets, 20 minute talk at the Summer Symposium in Real Analysis in June 1990 at San Bernardino State University, San Bernardino, California.

Additivity and Cofinality, 10 minute talk in August 1990 at the International Congress of Mathematics, Kyoto, Japan.

Martin's axiom and forcing, 50 minute talk in December 1990 at the Logic Colloquium, University of Wisconsin, Madison.

Peculiar sets of reals, four 90 minute talks in January 1991 at the Winter Institute on the Set Theory of the Reals, Bar Ilan University, Israel.

Strong first category sets, 90 minute talk in July 1991 at the Summer School in Set Theory, Institute for Studies in Theoretical Physics and Mathematics, Tehran, Iran.

The σ-algebra generated by the measurable rectangles, 20 minute talk in January 1992 at the American Mathematical Society meeting, Baltimore, Maryland.

Remarks on measurable rectangles, 50 minute talk at the Boise meeting in set theory (BEST) in March 1992, University of Idaho, Boise.

Measurable rectangles, 20 minute talk at the American Mathematical Society meeting in Dayton, Ohio, October 1992.

Compact sets and forcing extensions, 30 minute talk at Real Analysis meeting and workshop in Łodz, Poland, July 1994.

Descriptive set theory and forcing, 60 minute talk at Topology meeting in Amsterdam, The Netherlands, August 1994.

Approximately continuous functions and the random real model, 90 minute talk at Set Theoretic Topology seminar at University of Toronto, September 1994.

Almost continuous functions, not to be confused with approximately continuous functions, 60 minute talk at Set Theoretic Topology seminar at York University, Toronto, November 1994.

The Hurewicz conjecture, 45 minute talk, at the meeting on Combinatorial set theory and its consequences, Curaçao, Netherlands Antilles, June 1995.

Covering properties of sets of reals, properties of Rothberger, Gerlitz-Nagy, Menger, and Hurewicz, 50 minute talk in the Logic Seminar, University of Wisconsin, Madison, October 1995.

Orthogonal real sequences or taking a 90 degree turn for the worse, 60 minute talk, at the Midwest Model Theory Meeting, Notre Dame University, Indiana, November 1995.

Orthogonal sequences, 30 minute talk, at the Oberwolfach meeting in Set Theory, Oberwolfach Germany, January 1996.

Covering properties of sets of reals, 60 minute talk at the Spring Topology and Southeast Dynamical Systems conference, Ball State University, Muncie, Indiana, March 1996.

The Menger and Hurewicz properties and topological games, 50 minute talk at the Miniconference in Real Analysis, Auburn University, Auburn, Alabama, March 1996.

Covering properties of sets of reals - the Hurewicz conjecture, three 45 minute talks at the Conference in honor of Borsuk and Kuratowski, Banach International Mathematical Center and the Institute of Mathematics of Warsaw University, Warsaw, Poland, May 1996.

A survey of infinite combinatorics, 50 minute talk in the Logic Colloquium, University of Wisconsin, Madison, December 1996.

Infinite Ramsey theory, math colloquium, Indiana University, Bloomington, Indiana, December 1996.

The method of forcing in set theory, math colloquium, University of Wisconsin, Milwaukee, Wisconsin, October 1997.

Sequences and sets of positive measure, two 60 minute talks at the Workshop in Set Theoretic Topology, Budapest, Hungary, July 1999.

Generic extensions of models of set theory, math colloquium, Marquette University, Milwaukee, Wisconsin, November 2001.

On MAD Q-sets, 60 minute lecture, Fields Institute of the University of Toronto, December 2002.

Laver forcing and strong measure zero sets, 60 minute expository talk, University of North Carolina, Charlotte, January 2003.

On λ'-sets, math colloquium, Auburn University, Auburn Alabama, January 2003.

On MAD Q-sets, 50 minute lecture, logic seminar, University of Florida, Gainesville, February 2003.

Hechler trees, Laver trees, and analytic sets, 20 minute talk, Southeastern Logic Symposium, University of Florida, Gainesville, March 2003.

Ultrafilters with property (s), 20 minute talk, Spring Topology meeting, Texas Tech University, Lubbock Tx, March 2003.

On relatively analytic subsets, 60 minute talk at BEST 12, Boise State University, Boise, Idaho, March 2003.

Borel γ-sets and the γ-Borel conjecture, 50 min seminar talk at Boise State University, April 2003.

On γ-sets, 50 min talk, logic colloquium, University of Wisconsin, Madison, January 2004.

On γ-sets, 50 min talk, Southeastern Logic Symposium, University of Florida, Gainesville, March 2004.

The cardinal characterics of relative γ-sets, 15 min talk, Spring Topology and Dynamics conference, Birmingham, Alabama, March 2004.

Half of an inseparable pair, 20 min talk, Summer Symposium in Real Analysis, Slippery Rock, Pennsylvania, June 2004.

On γ-sets, 50 min talk, Workshop on Coverings, Selections and Games in Topology 2005 December 2005, Lecce University , Italy.

The axiom of choice and the real line, mathematics colloquium, University of Florida, Gainesville, March 2007.

Long Borel hierarchies, logic colloquium, University of Florida, Gainesville, March 2007.

How long can the Borel hierarchy be?, 50 min talk, Set Theory of the Reals conference, Gainesville, Florida, May 2007.

The axiom of choice and the Borel hierarchy, logic colloquium, University of Wisconsin, Madison, September 2007.

The axiom of choice and the Borel hierarchy, 45 min talk, Conference in honour of the 60th birthday of Professor Andreas R. Blass, Fields Institute, Toronto, Canada, November 2007.

A Dedekind finite Borel set, 50 min talk, Steel VIG at the UCLA Logic Center, Los Angeles, California, January 2009.

The hierarchy of ω_1-Borel sets, 50 min talk, logic colloquium, University of Wisconsin, Madison, February 2009.

On ω_1-Borel sets, 90 min talk, Set Theory Seminar at the Fields Institute, University of Toronto, Toronto, Canada March 2009.

Uniquely Universal sets, 50 min talk, The 11th Topological Symposium, International Conference on General Topology and its Relations to Modern Analysis and Algebra, Prague, Czech Republic, August 2011.

Universal functions, 25 min talk, Special Session on Set Theory, AMS Sectional Meeting, Cornell University, Ithaca, New York, September 2011.

Universal functions, 35 min talk, Logic, Dynamics and Their Interactions, with a Celebration of the Work of Dan Mauldin, University of North Texas,

Denton TX, June 2012

Countable subgroups of Euclidean space, 90 min talk, set theory seminar Fields Institute, University of Toronto, May 2013.

Clopen graphs on the Baire space, 60 min talk, logic colloquium, University of Wisconsin, Madison, September 2013.

The onto mapping property of Sierpinski, 50 min talk, 60 years of Dow: celebrating the mathematics of Alan Dow, A special meeting of the Mid-Atlantic Mathematical Logic Seminar (MAMLS), Cornell University, Ithaca NY, December 2015.

On the length of Borel hierarchies, July 2016, Kurt Godel Research Center, Vienna, Austria and TOPOSYM, Prague, Czech Republic.

Research Interests

My area of research is mathematical logic or as it is sometimes called, foundations. This field is commonly divided into four subjects: set theory, model theory, recursion theory, and proof theory. My own interests are primarily in set theory and especially independence and consistency results in axiomatic set theory using the method of forcing.

Set theory started with Georg Cantor in the 1870's. While investigating a problem in Fourier analysis which involved the set of real numbers for which a trigonometric series converged, Cantor showed that the real line is uncountable, i.e., it cannot be put into a one-to-one correspondence with the set of natural numbers. Cantor's continuum hypothesis says that the real line is as small as possible, given Cantor's theorem. Since the work of Ernst Zermelo (1908) and Abraham Fraenkel (1922) it has been known that there is an explicit set of axioms (ZFC) which can be given for the theory of sets. All of mathematics could be formalized in the language of set theory and all mathematical proofs can be translated into strictly formal proofs from ZFC.

In 1938, Kurt Gödel showed the continuum hypothesis is relatively consistent with the usual axioms of set theory (ZFC). This means that it is impossible to prove that the continuum hypothesis is false, using accepted ordinary mathematical reasoning. In 1963 Paul Cohen invented the method of forcing to show that it is impossible to prove that the continuum hypothesis is true. These two results show that the continuum hypothesis is independent of the usual axioms of set theory.

Since then the method of forcing has been used to obtain many independence results, not only in set theory, but also in analysis, measure theory, general topology, and algebra. Problems which most interest me, concern the real numbers and their classical properties, such as: Lebesgue measure, Baire category, the Borel and projective hierarchies, infinite combinatorics on countable sets, combinatorial cardinals beneath the continuum, and elementary set theoretic topology. Almost all these problems are intimately related to Cantor's continuum hypothesis and are solved by using the technique of forcing.