Steven C. Leth

Position: Professor, School of Mathematical Sciences, University of Northern Colorado, Greeley, CO, 80639

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Education:

Year	Degree	Institution	Area of Study
1985	Ph. D.	University of Colorado	Mathematics
1978	M.S.	Stanford University	Mathematics
1976	B.A.	University of Colorado	Mathematics/Physics

Work Experience Professional Academic:

Year	Institution/Organization	Position	Responsibilities
1996-pres	UNC	Professor	Teaching, advising,
1991-1996		Assoc. Prof.	research, service
1988-1991		Assist. Prof.	
1985-88	Univ. of Wisconsin	Assist. Prof.	Teaching, research
1978-85	Metropolitan State College	Part-time Instr.	Teaching

Area of Specialization: Nonstandard Analysis and its application to continuum theory and combinatorial number theory. Teaching of Mathematics.

Research Areas/ Interests: Applications of nonstandard methods to continuum theory and combinatorial number theory. Another area of interest is the teaching and learning of mathematics.

Publications:

Juried Book Chapters:

Nonstandard methods and the Erdos-Turan conjecture, in <u>The Strength of Nonstandard Analysis</u>, van den Berg and Neves (eds.), Springer-Wein, 2007, pp. 133-142

Some nonstandard methods in geometric topology, in <u>Developments in Nonstandard Mathematics</u>, Pitman Research Notes in Mathematics No.336, Cutland, Neves, Oliveira and Pinto (eds.), Longman; Wiley and Sons, 1995,
pp. 50-60

Juried Articles (accepted for publication)

A monad measure space for logarithmic density (with Mauro Di Nasso, Isaac Goldbring, Renling Jin, Martino Lupini and Karl Mahlburg), accepted for publication in *Monatshefte für Mathematic*, arXiv:1503.03810

Approximate polynomial structure in additively large sets (with Mauro Di Nasso, Isaac Goldbring, Renling Jin, Martino Lupini and Karl Mahlburg), accepted for publication in *Integers* , arXiv:1508.02350

High density piecewise syndeticity of product sets in amenable groups (with Mauro Di Nasso, Isaac Goldbring, Renling Jin, Martino Lupini and Karl Mahlburg), accepted for publication in the *Journal of Symbolic Logic,* November, 2015, arXiv:1505.04701

Juried Articles (published)

High density piecewise syndeticity of sumsets (with Mauro Di Nasso, Isaac Goldbring, Renling Jin, Martino Lupini and Karl Mahlburg), *Advances in Mathematics 278 (2015) 1-33*

On a sumset conjecture of Erdős (with Mauro Di Nasso, Isaac Goldbring, Renling Jin, Martino Lupini and Karl Mahlburg), *Canadian Journal of Mathematics*, volume 67 (2015), 795-809.

Regions in the nonstandard plane that contain no standard points, *Journal of Logic and Analysis* 4:16, November, 2012, pp. 1-17

Near arithmetic progressions in sparse sets, *Proceedings of the American Mathematical Society* (134) no. 6, June 2006, pp. 1579-1589

An asymptotic formula for powers of binomial coefficients (with Jeff Farmer), *The Mathematical Gazette*, v. 89 no. 516, 2005, pp. 385-391

The Use of Writing in mathematics classes: the new imperative *The Project Calc Newsletter*, December 1994

Meager Sets on the hyperfinite time line, (with H. J. Keisler), *Journal of Symbolic Logic*,56 Number 1 (March 1991) pp. 71-102.

Descriptive set theory over hyperfinite sets, (with H.J. Keisler, K. Kunen and A. Miller), *Journal of Symbolic Logic*. 54, Number 4 (Dec. 1989) pp. 1167-1180.

Some nonstandard methods in combinatorial number theory, *Studia Logica* XLVII 3 (Sept. 1988) pp. 85-98.

Sequences in countable nonstandard models of the natural numbers, *Studia Logica* XLVII 3 (Sept. 1988) pp. 63-83.

Applications of nonstandard models and Lebesgue measure to sequences of natural numbers, *Trans. Am. Math. Soc.* 307, No. 2 (June 1988) pp. 457-468.

A uniqueness condition for sequences, *Proc. Am. Math. Soc.* 93 (1985) pp. 287-290.

Professional Presentations:

Weekly colloquium at the University of Pisa, February, 2016, "Nonstandard methods, asymptotic density and sumsets."

Weekly colloquium at the University of Illinois, Chicago, April, 2015, "Some examples of the use of nonstandard methods in continuum theory."

Weekly colloquium at the College of Charleston, January, 2015, "Sumsets, Banach density and nonstandard methods."

University of Denver sesquicentennial Ramsey Theory conference, May 2014, "Sumsets contained in sets of positive density."

Logic Colloquium at the University of Pisa, April 2014. "A Lebesgue density theorem for nonstandard cuts and an application to additive number theory."

Tenth annual Pike's Peak Regional Undergraduate Mathematics Conference, Pueblo, CO, February 2013 (Keynote speaker) "Fixed Points of Continuous Functions in the Plane."

AMTE Rocky Mountain section meeting panel discussion, Denver, CO, September 2012, "Some thoughts on teaching upper division courses with a high population of future teachers" (by invitation).

Chico Topology Conference, Chico, CA, May 2012, "A nonstandard approach to fixed point problems in the plane."

AMS special session on applications of nonstandard analysis, Honolulu, Hawaii, March, 2012, "Some questions and answers about "fixed point traps" in the plane.

Informal presentation to the topology group at California State University, Sacramento, July 2011

Spring Topology Conference, Tyler Texas, March 2011, "Nonstandard Methods in Continuum Theory."

Chico Topology Conference, Chico, California, June 2010, "An example of the use of nonstandard methods in continuum theory."

Two seminars in nonstandard continuum theory, California State University, Sacramento, June 2010.

International Meeting on applications of logic to mathematics ("Logic and Mathematics"), University of York, York, England, August 2009 "A "flatness" property for certain regions that contain no standard points."

College of Charleston weekly colloquium, Charleston, South Carolina, January 2008, "Nonstandard methods applied to geometric topology in the

plane."

International Colloquium on Nonstandard Mathematics (NSM 2006), University of Pisa, Pisa, Italy, May 2006 "Some nonstandard notes on the fixed point property in the plane." (one of the advertised invited speakers)

Presentation at University of Pisa, Pisa, Italy, March 2005 "Examples of the use of nonstandard methods in geometric topology and in combinatorial number theory" (by invitation)

International Colloquium on Nonstandard Mathematics, University of Aveiro, Aveiro, Portugal, July 2004 "Near arithmetic progressions in sparse sets" (by invitation)

Littleton Elementary School Teachers Meeting, Littleton, CO , September 2003, "Improving Math Instruction; Hands On Activities" (by invitation).

MAA annual regional meeting, Colorado Springs, CO, April 2003, "An illustration of rational vs. irrational numbers".

CCTM annual meeting, Denver, Colorado, September 2002, "Enhancing understanding of the irrationals".

MAA annual regional meeting, Laramie, Wyoming, April 2002, "A look at a false proof of the Four Color Theorem".

CCTM annual meeting, Denver, Colorado, September 2001, "Some class lessons based on important theorems"

WyTEC conference, University of Wyoming, January 2000 "Calculus Projects using Mathematica" (by invitation)

Logic Colloquium, University of Colorado, April 1999 "Nonstandard Analysis and Combinatorics" (by invitation)

AMS Special Session on Nonstandard Analysis, Urbana Illinois, March 1999, "Nonstandard applications to problems from combinatorial number theory: a survey and update" (by invitation)

Logic Colloquium, University of Wisconsin, March 1999 "Nonstandard analysis and Szemeredi's theorem".

CCTM annual meeting, Denver Colorado, October 1998, "Adding excitement and depth to proof by mathematical induction"

MAA regional meeting, Denver, Colorado, April 1998, "What I learned about the Prime Number Theorem from my students"

International Symposium on Nonstandard Analysis and its Applications, Edinburgh, Scotland, August, 1996, "Some conditions which imply that a non-separating plane continuum has the fixed point property"

MAA regional meeting, Grand Junction, Colorado, April 1996, "An asymptotic formula for powers of binomial coefficients and a lesson about inductive reasoning" (with Jeff Farmer)

One day workshop on Calculus Reform, by invitation of Western State College, Gunnison, Colorado, January, 1996

MAA regional meeting, Pueblo, Colorado, April 1995, "A Simplified Sperner's Lemma"

CCTM annual meeting, Denver Colorado, October 1994, "A report on calculus reform at the university level" (by invitation)

CCTM annual meeting, Denver Colorado, October 1994, "Preparing for algebra and geometry in an exploring and exciting way"

International Colloquium on Nonstandard Mathematics, University of Aveiro, Aveiro, Portugal, July 1994, "Some applications to geometric topology"

CCTM annual meeting, Denver Colorado, October 1993, 90 minute workshop: "Challenging topics and problems for elementary school students"

MAA sectional meeting, April 1993, Golden Colorado,"The use of writing in the teaching of mathematics"

Presided over session on calculus curriculum at NSF Calculus PI meeting, Washington DC, October 1992 (by invitation)

Poster Session at NSF Calculus PI meeting, Washington DC, October 1991

University of Wyoming weekly colloquium, Laramie Wyoming, January 1991 "A Look at Some Nonstandard Methods in the Plane" (by invitation)

AMS winter meeting, Jan. 1991, San Francisco, "Every Sequence of Positive Upper Density Contains an SIM set--a Nonstandard Tool in Combinatorial Number Theory" (chair of session)

University of Iowa Nonstandard Analysis Conference, Iowa City, March 1990 "The Fixed Point Property" (by invitation)

Kempner Colloquium, University of Colorado, April 24, 1989. "Some Nonstandard Methods in Combinatorial Number Theory." (by invitation)

Nonstandard Analysis Conference, Amherst, MA, August 1988, "Meager Sets over the Hyperfinite Time Line", (invited speaker, chair of session)

AMS winter meeting, Jan. 1988, Atlanta, "Nonstandard Methods in Combinatorial Number Theory".

Colloquium at the University of Iowa, Iowa City, April 1987, "Nonstandard Analysis and Combinatorics".

Abraham Robinson Memorial Conference, Oct. 1984, "Nonstandard Density Functions on the Natural Numbers".

Additional Professional Presentations

I have given a number of talks at UNC, to math club or in other settings. I have given a number of presentations to visiting junior high school students at various times.

| **Funded Projects:** | $30,000 (approximate) from the American Institute of Mathematics, awarded December 2011 in the AIM SQuaRE program to fund meetings for a |

research team of myself and five other mathematicians in three consecutive summers.

$54553 NSF "Instrumentation and Laboratory Improvement" Grant (with Chris Cotter, Cynthia Galovich, Igor Szczyrba and Ann Thomas), 1993

$65000 NSF to be a test-site for a calculus project using computers to enhance instruction, Fall 1991 (with C. Cotter, J Deutsch, I. Szczyrba)

Refereeing for Journals

Journal of Symbolic Logic	5 papers
Proceedings of the American Mathematical Society 4 papers	
Glasgow Mathematics Journal	1 paper
Archive for Mathematical Logic	1 paper
Real Analysis Exchange	1 paper
Advances in Mathematics	2 papers
Logic and Analysis	2 papers

Professional Development

Worked with high school teachers from Adams 14 district 2012-2014 as part of MSP grant from 2012-2014.

Worked with K-8 teachers from Eagle County and other districts as part of MSP grant from 2014-2016.

Professional Consultation

External evaluator for the mathematics department at Western State College in Gunnison, 1998