

Dr. Bruno Benedetti
University of Miami
Ungar 533, 1365 Memorial Drive
Coral Gables, FL 33146
bruno@math.miami.edu
www.math.miami.edu/~bruno

Bruno Benedetti
Curriculum vitae
(September 2018)

PROFESSIONAL POSITIONS

2015 –	Assistant Professor (tenure track)	University of Miami, USA
2014 (fall)	Research Visitor and Part-Time Lecturer	Northeastern U., Boston, USA
2013–2015	Postdoc, within ‘Discretization’ project	FU Berlin, Germany
2011–2013	Postdoc, Göran Gustafsson – Vetenskapsrådet	KTH, Stockholm, Sweden
2010–2011	Postdoc, within Ziegler’s ERC grant ‘SD Models’	TU & FU, Berlin, Germany

EDUCATION

PhD, with Günter M. Ziegler, <i>summa cum laude</i> , 2010 Thesis: On locally constructible manifolds (Combinatorics)	TU Berlin, Germany
MSc, Mathematics, <i>summa cum laude</i> , 2006 Thesis: Il rango aritmetico di una varietà algebrica (Commutative Algebra)	U. Genova, Italy
BSc, Mathematics, <i>summa cum laude</i> , 2004 Thesis: Compositions of bankruptcy rules (Game Theory)	U. Genova, Italy

RESEARCH AREA

My research, currently supported by NSF, is at the intersection of Geometry and Combinatorics; in particular, I exploit algebraic, metric, and probabilistic tools to tackle long-standing problems in PL manifold theory, in convexity, and in algorithmic topology.

PUBLICATIONS AND PREPRINTS

21. K. Adiprasito, B. Benedetti: Linear embeddings of contractible and collapsible complexes.
Preprint (May 2018, 8 pages), at [arXiv:1403.5217v4](https://arxiv.org/abs/1403.5217v4).
20. K. Adiprasito, B. Benedetti: A Cheeger-type exponential bound for the number of triangulated manifolds. Preprint (May 2018, 15 pages), at [arXiv:1710.00130v2](https://arxiv.org/abs/1710.00130v2).
19. K. Adiprasito, B. Benedetti: Barycentric subdivisions of convex complexes are collapsible.
Preprint (September 2017, 21 pages), at [arXiv:1709.07930](https://arxiv.org/abs/1709.07930).
18. K. Adiprasito, B. Benedetti: Collapsibility of CAT(0) spaces.
Preprint (September 2017, 27 pages) at [arXiv:1107.5789v6](https://arxiv.org/abs/1107.5789v6).
17. B. Benedetti, M. Di Marca, M. Varbaro: Regularity of line configurations.
J. Pure Applied Algebra 222 (2018), 2596–2608.

16. B. Benedetti, Mogami manifolds, nuclei, and 3D simplicial gravity.
Nuclear Physics B 919 (2017), 541–559.
15. B. Benedetti, B. Bolognese, M. Varbaro: Regulating Hartshorne’s connectedness theorem.
J. Algebraic Combinatorics 46 (2017), 33–50.
14. K. Adiprasito, B. Benedetti, F. H. Lutz: Extremal examples of collapsible complexes and random discrete Morse theory.
Discrete Comput. Geometry 57, Issue 4 (2017), 824–853.
13. B. Benedetti: Smoothing discrete Morse theory.
Annali Sc. Norm. Sup. Pisa Cl. Sci., Serie V, Vol. XVI, Fasc. 2 (2016), 335–368.
12. B. Benedetti, M. Varbaro: On the dual graphs of Cohen–Macaulay algebras.
Int. Math. Res. Notices (2015), 8085–8115.
11. K. Adiprasito, B. Benedetti: Subdivisions, shellability, and collapsibility of products.
Combinatorica (2016).
10. K. Adiprasito, B. Benedetti: Tight complexes in 3-space admit perfect discrete Morse functions.
Eur. J. Comb. 45 (2015), 71–84.
9. K. Adiprasito, B. Benedetti: The Hirsch conjecture holds for flag normal complexes.
Math. Oper. Research 39, Issue 4 (2014), 1340–1348.
8. B. Benedetti, F. H. Lutz: Random discrete Morse theory and a new library of triangulations.
Exp. Math. 23, Issue 1 (2014), 66–94. Available at [arXiv:1303.6422](https://arxiv.org/abs/1303.6422).
7. B. Benedetti, F. H. Lutz: Knots in collapsible and non-collapsible balls.
Elec. J. Comb. 20, No. 3, Research Paper P31 (2013), 29 pages.
6. B. Benedetti: Discrete Morse theory for manifolds with boundary.
Trans. Amer. Math. Soc. 364 (2012), 6631–6670.
5. B. Benedetti, G. M. Ziegler: On locally constructible spheres and balls.
Acta Mathematica 206 (2011), 205–243.
4. B. Benedetti: Collapses, products and LC manifolds.
Journal of Comb. Theory, Series A 118 (2011), 586–590.
3. B. Benedetti, F. H. Lutz: The dunce hat and a minimal non-extendably collapsible 3-ball.
Electronic Geometry Models No. 2013.10.001 (2013), www.eg-models.de/2013.10.001.
2. B. Benedetti, M. Varbaro: Unmixed graphs that are domains.
Comm. in Algebra 39 (2011), 2260–2267.
1. B. Benedetti, A. Constantinescu, M. Varbaro: Dimension, depth and 0-divisors of the algebra of basic k -covers of a graph. *Le Matematiche*, Vol. 63, No. 2 (2008), 117–156.

AWARDS

- *United States*: NSF grant 1600741, “Geometric combinatorics and Discrete Morse Theory” (as principal investigator), 2016–2019. Provost Research Award 2017, University of Miami (as principal investigator). Scholarly & Creative Activities Recognition Award 2017, University of Miami. MSRI Research Membership, Fall 2017.
- *Germany*: Co-PI within SFB/TRR 109 grant “Discretization in Geometry and Dynamics”. (My contribution within this initiative was to develop the research proposal for the project “Discrete Morse Theory”, successfully funded by the DFG. See <http://www.discretization.de/en/projects/period/1/>.)
- *Sweden*: Swedish Science Council (Vetenskapsrådet) research grant, Stockholm, 2011–2013. Göran Gustafsson postdoctoral scholarship, Stockholm, 2011.
- *Italy*: “Messaggero della Conoscenza” award (with L. Orecchia), 2013. Two national grants of INDAM, 2001–2004 and 2004–2006. Prize of the University of Genoa, 2005.

INVITED TALKS

2019

- | | |
|-------------------------------------|---------------------------------|
| 118. UW Combinatorics Seminar | Seattle, Washington, February 6 |
| 117. Hebrew U Combinatorics Seminar | Jerusalem, Israel, January 7 |

2018

- 116. David Essner Award Ceremony Miami, Florida, November 15
- 115. MIT Combinatorics Seminar Cambridge, Massachusetts, October 19
- 114. Northeastern U 'Pick My Brain' Seminar Boston, Massachusetts, October 17
- 112. and 113. Joint Meeting Italy–Poland Wroclaw, Poland, September 18 and 19
- 111. U. Genova, Seminario d'Algebra e Geometria Genoa, Italy, July 9
- 110. U. Firenze, Seminario di Geometria Florence, Italy, July 6
- 109. Institut Henri Poincaré, School on low-dim. geometry and topology Paris, France, June 21
- 108. Miami Palmetto math honors society Pinecrest, Florida, March 22
- 107. Kansas U. Combinatorics Seminar Lawrence, Kansas, March 14
- 106. Joint Math Meeting of the AMS San Diego, California, January 12

2017

- 105. MSRI Farewell Seminar Berkeley, California, December 12
- 104. UC Davis, Geometry & Topology Seminar Davis, California, November 14
- 103. Bay Area Differential Geometry Seminar Berkeley, California, October 28
- 102. MSRI Seminar Berkeley, California, October 25
- 101. MSRI, "Modern techniques and methods" Berkeley, California, October 10
- 100. Berkeley Math Circle Berkeley, California, September 26
- 99. SFSU, Geometry & Topology Seminar San Francisco, California, September 25
- 98. U North Texas, AMS meeting Denton, Texas, September 9
- 97. UC Berkeley, Topology Seminar Berkeley, California, September 6
- 96. SIAM Conference on Applied Alg. Geometry Atlanta, Georgia, August 1–4
- 95. Encounter in Topology and Algebra Catania, Italy, June 1–4

2016

- 94. ICERM, "Topology & geometry in a discrete setting" Providence, Rhode Island, November 29
- 93. NCSU, Triangle Lectures in Combinatorics Raleigh, North Carolina, November 19
- 92. U. Washington, Combinatorics Seminar Seattle, Washington, October 19
- 91. Bowdoin College, AMS Sectional Meeting Brunswick, Maine, September 25
- 90. Northeastern U, Workshop on combinatorics Boston, Massachusetts, September 23
- 89. Applied Algebraic Topology Research Network videoconference from Miami, September 21
- 88. U. Genova, Algebra & Geometry seminar Genoa, Italy, June 9
- 87. Texas A&M, CombinaTexas College Station, Texas, May 7
- 86. Cornell, Discrete Geometry & Combinatorics Seminar Ithaca, New York, March 7
- 85. Joint Math Meeting of the AMS Seattle, Washington, January 8

2015

- 84. U. Erlangen, Institute of Theoretical Physics Erlangen, Germany, December 21
- 83. U. Boston, Theoretical Computer Science seminar Boston, Massachusetts, November 23
- 82. U. Memphis, AMS meeting Memphis, Tennessee, October 17
- 81. Seminaire Lotharingien de Combinatoire Bertinoro, Italy, September 6–9
- 80. U. Genève, Mathematical Physics Seminar Geneva, Switzerland, March 2
- 79. Centro De Giorgi, Scuola Normale Superiore Pisa, Italy, February 17
- 78. MFO, Geometric and Algebraic Combinatorics Oberwolfach, Germany, February 2
- 77. CSU, Colloquium Fort Collins, Colorado, January 23
- 76. TU Graz, Colloquium on Computational Topology Graz, Austria, January 21
- 75. Aalto U., Colloquium Helsinki, Finland, January 17
- 74. U. Miami, Colloquium Miami, Florida, January 13

2014

- 73. TU Chemnitz (in videoconference from Boston) Chemnitz, Germany, December 16
- 72. Boston College, Geometry-Topology Seminar Boston, Massachusetts, October 30
- 71. AMS Western Sectional Meeting San Francisco, California, October 25
- 70. Northeastern U., GASC Seminar Boston, Massachusetts, September 8
- 69. Elbe Sandstones Combinatorics Conference Rynartice, Czech Republic, August 7

- 68. Institute of Science and Technology Austria Klosterneuburg, Austria, July 22
- 67. Erwin Schrödinger Inst., Combinatorics, Geometry & Physics Vienna, Austria, July 15
- 65. and 66. Joint Meeting Italy–Spain Bilbao, Spain, July 1-3
- 64. Cuarto Encuentro Colombiano de Combinatoria Bogotá, Colombia, June 10
- 63. U. Bari, Colloquio Matematico Bari, Italy, April 9
- 62. U. Genova, Seminario d’Algebra e Geometria Genoa, Italy, March 7
- 61. Københavns U., Experimental math. colloquium Copenhagen, Denmark, January 10

2013

- 60. U. Pisa, Algebra Geometria & Combinatoria Pisa, Italy, December 19
- 59. U. Miami, Combinatorics seminar Miami, Florida, December 2
- 58. Courant Institute, Geometry seminar New York, New York, November 26
- 57. ICERM, Postdoc seminar Providence, Rhode Island, November 25
- 56. Cornell, Discrete Geometry & Combinatorics Seminar Ithaca, New York, November 11
- 55. U. Washington, Combinatorics Seminar Seattle, Washington, November 6
- 54. Ohio State, Combinatorics Seminar Columbus, Ohio, October 16
- 53. Caltech, Geometry and Topology Seminar Pasadena, California, October 4
- 52. Geometry workshop Strobl, Austria, August 29
- 51. NORCOM (Nordic Combinatorics) Stockholm, Sweden, June 18
- 50. U. Genova, Seminario d’Algebra e Geometria Genoa, Italy, April 4
- 49. Etna Triangulations and Algebra Meeting Catania, Italy, February 21

2012

- 48. First Workshop SFB/TR109 Obergurgl, Austria, December 19
- 47. Aurora Borealis Combinatorics Conference Abisko, Sweden, December 7
- 46. U. Bologna, Seminario di Algebra Bologna, Italy, November 27
- 45. Boston College, Geometry-Topology Seminar Boston, Massachusetts, October 25
- 44. AMS Sectional Meeting, Alg. Topological Combinatorics New Orleans, Louisiana, October 13
- 43. U. Washington, Combinatorics Seminar Seattle, Washington, October 10
- 42. NAU, Colloquium of Mathematics and Statistics Flagstaff, Arizona, October 8
- 41. UC Davis, Geometry & Topology Seminar Davis, California, October 2
- 40. UCLA, Combinatorics seminar Los Angeles, California, September 27
- 39. U. Genova, Geometria Algebraica e Argomenti Correlati Genoa, Italy, June 8
- 38. Centro De Giorgi, Giornate di Geometria Algebraica Pisa, Italy, May 24
- 37. U. Pisa, Seminario di topologia Pisa, Italy, May 23
- 36. MFO, Triangulations Oberwolfach, Germany, May 3
- 35. U. Wien, Geometry & Analysis on Groups Seminar Wien, Austria, March 29

2011

- 34. U. Genoa, doctoral course ‘Triangulations’ Genoa, Italy, November 21–28
- 33. Meeting of the Swedish Math. Society Linköping, Sweden, November 19
- 32. UBA, Algebraic Topology and Combinatorics Buenos Aires, Argentina, November 10
- 31. Aalto Univ., Algebra and Combinatorics Seminar Helsinki, Finland, September 28
- 30. KTH Matematisk Cirkel, Guest Lecture Stockholm, Sweden, September 15
- 29. Royal Inst. of Technology (KTH), Combinatorics Seminar Stockholm, Sweden, September 14
- 28. Scientific Computing & Imaging Institute Salt Lake City, Utah, August 4
- 27. IMPAN, Geometric group theory Bedlewo, Poland, June 30
- 26. U. Ljubljana, Topology and geometry seminar Ljubljana, Slovenia, June 6
- 25. U. Augsburg, Oberseminar Differentialgeometrie Augsburg, Germany, May 9
- 24. U. Sevilla, Seminario de Topologia Sevilla, Spain, Apr. 11
- 23. MFO, Topological and geometric combinatorics Oberwolfach, Germany, February 10

2010

- 22. U. Basel, Seminar Algebra und Geometrie Basel, Switzerland, December 7
- 21. Nordic Institute for Theoretical Physics (NORDITA) Stockholm, Sweden, December 8
- 20. Aurora Borealis Combinatorics Workshop Abisko, Sweden, December 2
- 19. UC Santa Barbara, Topology Seminar Santa Barbara, California, November 16

- | | |
|--|---------------------------------------|
| 18. UC Davis, Geometry & Topology Seminar | Davis, California, November 10 |
| 17. UC Berkeley, RTG seminar | Berkeley, California, November 9 |
| 16. U. La Sapienza, Seminario di Algebra e Geometria | Rome, Italy, October 26 |
| 15. MFO, Arbeitsgemeinschaft ‘Topological Robotics’ | Oberwolfach, Germany, October 15 |
| 14. Royal Inst. of Technology (KTH), Combinatorics Seminar | Stockholm, Sweden, September 8 |
| 13. Unstructured meshes in dynamical spacetimes | Jena, Germany, August 27 |
| 12. Northeastern U., GASC Seminar | Boston, Massachusetts, August 9 |
| 11. Washington U. in St. Louis | St. Louis, Missouri, July 27 |
| 10. Centro De Giorgi, Scuola Normale Superiore | Pisa, Italy, June 17 |
| 9. National Research Council (CNR), sez. IMATI | Genoa, Italy, May 21 |
| 8. Freie U., Topology seminar | Berlin, Germany, April 7 |
| 7. Annual Convention of the German Math. Society | Munich, Germany, March 11 |
| 6. UC Berkeley, Combinatorics Seminar | Berkeley, California, March 1 |
| 5. San Francisco State U., AGC Seminar | San Francisco, California, February 3 |
- 2009**
- | | |
|--|---------------------------------|
| 4. U. Genova, Seminario di Algebra e Geometria | Genoa, Italy, December 15 |
| 3. KolKom 2009: Colloquium on Combinatorics | Magdeburg, Germany, November 13 |
| 2. U. Belgrade & SANU Math Institute, CGTA Seminar | Belgrade, Serbia, September 15 |
- 2008**
- | | |
|--|---------------------------|
| 1. U. Genova, Seminario di Algebra e Geometria | Genoa, Italy, December 23 |
|--|---------------------------|

TEACHING

STANDARD PORTFOLIO. At University of Miami: *Survey of Modern Algebra* (Spring 2016, 2017, 2018), *Discrete Mathematics* (Spring 2018), *Topology* (Fall 2016), *Linear Algebra* (Fall 2015), *ODE* (Fall 2015), *Calculus 2* (Spring 2017). At Northeastern: *Calculus 2* (Fall 2014).

GRADUATE COURSES. Graduate course *Polytopes* (Fall 2016, 2018), at U Miami. Master course *Optimization in Mathematical Finance* (Fall 2018), at U Miami. Intensive course *Triangulations: Between Algebra, Geometry, and Computer Science*, at U. Genoa (Nov. 2011).

SUMMER SCHOOLS. Lecturer at

- “Low-Dimensional Geometry and Topology”, Institut Henri Poincaré, Paris, June 18–22, 2018
- “Seminare Lotharingien de Combinatoire”, Bertinoro, September 6–9, 2015.
- “Homology: Theoretical and Computational Aspects”, Genoa, Italy (February 9–13, 2015)
- “Computational topology & topological data analysis”, Ljubljana, Slovenia (July 1–5, 2013).

Lecturer and organizer at

- “Geometry, graph theory and optimization”, organized with Lorenzo Orecchia and funded by the Italian Ministry of Education, in Bari, Italy (July 14–26, 2013).
- “Discrete Morse theory & Commutative Algebra”, organized with Alex Engström at *Institut Mittag-Leffler*, near Stockholm, Sweden (July 18 to August 1, 2012).

RESEARCH REPORTS AND POPULAR SCIENCE PUBLICATIONS

6. B. Benedetti, Balinski’s theorem for arrangements of curves. Oberwolfach Reports 12, Issue 1 (2015), 293–296.
5. B. Benedetti, Metric geometry and random discrete Morse theory. Oberwolfach Reports 9, Issue 2 (2012), 1456–1459.
4. B. Benedetti, Non-evasiveness, collapsibility, and explicit knotted triangulations. Oberwolfach Reports 8, Issue 1 (2011), 403–405.
3. B. Benedetti, Knot theory and robot arms. Oberwolfach Reports 7, Issue 4 (2010), 2732–2735. (Survey talk.)

2. B. Benedetti, L'accademia delle scienze di Berlino e la sua biblioteca. *Biblioteche Oggi* 26 (2008), 41–47. (Historical essay on the Prussian Academy of Science, in Italian.)
1. A. Benedetti and B. Benedetti: *Gli Archivi della Scienza*. Genoa, Erga (2001), 576 pages. (A book on all Italian scientific museums and archives, in Italian.)

SERVICE

Panelist: Panelist and external reviewer for NSF (multiple times). External collaborator for two analogous European institutions.

Editor: Editor (with E. Delucchi, L. Moci) of the book *Combinatorial methods in Topology and Algebra*, Springer, 2016. Reporter/editor for Oberwolfach Report No. 8, 2011 (“Topological and geometric combinatorics”, 349–423). Reporter/editor for Oberwolfach Report No. 24, 2012 (“Triangulations”, 1405–1486).

Reviewer: Referee for conferences in computer science and mathematics (e.g. SoCG, FPSAC, Mega) and for the Wiley publishing house. Referee for the following journals (selection):

Combinatorics: Journal of Algebraic Combinatorics (Springer); Journal of Combinatorial Theory Series A (Elsevier); Discrete & Computational Geometry (Springer); Electronic Journal of Combinatorics (self-published); Combinatorica (Springer).

Computational Geometry: Computational Geometry, Theory & Applications (Elsevier); Foundation of Computational Mathematics (Springer); Journal of Computer and System Sciences (Elsevier).

Differential Geometry and Mathematical Physics: Journal of Differential Geometry (International Press); Communication in Mathematical Physics (Springer); Annales de l'Institut Henri Poincaré (EMS).

Algebra: Journal of Pure and Applied Algebra (Elsevier).

General Mathematics: Pacific Journal of Mathematics (Mathematical Science Publisher); Carpathian Journal of Mathematics (independent); Bulletin of the Iranian Mathematical Society; Rendiconti del Circolo Matematico di Palermo (Springer); Note di Matematica.

Service to students: Advisor for Marco Macchia's diploma thesis, U Bari (defended in July 2014). External referee/committee member for PhD theses (Kaje Kubjas, FU Berlin, Germany, 2013; Brittney Ellzey, U Miami, 2018; James McKeown, U Miami, 2018; Thiago Novello de Brito, U Sao Paulo, Brazil, 2018) and master theses (Daniele Boccalini, U Genoa, Italy, 2012; Nachiketa Adhikari, Chennai Mathematical Institute, India, 2017.)

Seminar organizer:

- Organizer (with R. Sanyal) of the weekly “Visions Seminar” at MSRI, Fall 2017.
- Organizer (with M. Wachs) of the U Miami Combinatorics Seminar, August 2015 - current.
- Organizer (with A. Björner, P. Brändén, and S. Linusson) of the KTH Combinatorics Seminar, Stockholm, 2012–2013.
- Organizer of the Brown Bag Seminar, KTH, Stockholm, 2011.
- Organizer (with G. Ziegler and B. Schulze) of the Berlin Discrete Geometry Seminar, at TU Berlin and later at FU Berlin, 2010–2011.

Conference organizer:

- Organizer (with I. Novik, S. Klee) of the session *Geometric and topological combinatorics* at AMS meeting, Gainesville, November 2–3, 2019.
- Scientific committee (with R. Stanley and M. Wachs) of ICM Satellite Conference *A Pan-Hemispheric Celebration of Mathematics in Miami*, July 26–29, 2018.
- Organizer (with J. Barmak and F. Frick) of the session *Geometry and combinatorics of cell complexes* at the Mathematical Congress of the Americas, Montreal, Canada, July 24–28, 2017.
- Organizer (with E. Delucchi and L. Moci) of the INDAM conference “*CoMeTA - Combinatorial Methods in Topology and Algebra*”, Cortona, Palazzone, Sept. 2013.

- Organizer (with L. Orecchia) of the summer school “*Teoria dei Grafi, Geometria Convessa e Ottimizzazione*”, Bari, Italy, July 2013, funded by the Italian Ministry of Education as award for winning the competition “Messaggeri della Conoscenza 2013”.
- Organizer (by myself) of the conference “*Etna: Triangulations and Algebra Meeting, 2013*”. Catania, Italy, Grand Hotel Excelsior, Febr. 2013.
- Organizer (with A. Engström) of the summer program by Institut Mittag-Leffler, on “*Discrete Morse Theory and Commutative Algebra*”. July 18–31, 2012.