

Dr. Bruno Benedetti
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Bruno Benedetti
Curriculum vitae
(May 2019)

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: Barycentric subdivisions of convex complexes are collapsible. Preprint (September 2017, 21 pages), at [arXiv:1709.07930](https://arxiv.org/abs/1709.07930).
19. K. Adiprasito, B. Benedetti: Collapsibility of CAT(0) spaces. Preprint (September 2017, 27 pages) at [arXiv:1107.5789v6](https://arxiv.org/abs/1107.5789v6).
18. K. Adiprasito, B. Benedetti: A Cheeger-type exponential bound for the number of triangulated manifolds. *Annales de l’Institut Henri Poincaré D*, to appear.
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 grants 1855165, 1600741 “Geometric combinatorics and Discrete Morse Theory” (as principal investigator), 2016–2022.
MSRI Research Membership, Fall 2017.
- *Miami*: University of Miami Provost Research Award 2017 (as principal investigator).
University of Miami Scholarly & Creative Activities Recognition Award 2017.
Member of the Miami Scientific Italian Community, 2017-current.
- *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

121. U Bologna, Seminario d'Algebra e Geometria Bologna, Italy, May 30
120. U Genova, Seminario d'Algebra e Geometria Genoa, Italy, May 22
119. Carnegie-Mellon ACO Seminar Pittsburgh, Pennsylvania, March 28
118. UW Combinatorics Seminar Seattle, Washington, February 6
117. Hebrew U Combinatorics Seminar Jerusalem, Israel, January 7

2018

116. David Essner Award Ceremony Coral Gables, 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, 2019), *Discrete Mathematics* (Spring 2018), *Topology* (Fall 2016), *Linear Algebra* (Fall 2015, 2019), *ODE* (Fall 2015), *Advanced Calculus* (Spring 2017), *Calculus 2* (Spring 2017).

At Northeastern University: *Calculus 2* (Fall 2014).

CREATIVE COURSES. At University of Miami: Graduate course *Metric Geometry* (Spring 2019). Graduate course *Polytopes* (Fall 2016, 2018). Master course *Optimization in Mathematical Finance* (Fall 2018). Master course *Graph Theory* (Summer 2016). At U Genoa: Intensive course *Triangulations: Between Algebra, Geometry, and Computer Science* (Nov. 2011).

SUMMER SCHOOLS. Lecturer at

- “Discrete Morse Theory”, U Modena, Italy, May 29–June 13, 2019
- “Low-Dimensional Geometry & Topology”, Institut Poincaré, Paris, France, 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); Discrete Mathematics (Elsevier).

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).

Topology: Topology and its Applications (Elsevier).

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.

Press:

Released interviews in German, Italian, and American newspapers (*Tagesspiegel*, Nov. 9, 2011; *Il Fatto Quotidiano*, Aug. 1, 2018; *Buongiorno Miami*, Aug. 10, 2018), radio channels (*Radio DeeJay*, Aug. 5, 2018; *Radio Colonia*, Oct. 26, 2018), and video channels (*bustowebTV*, Aug. 4, 2018).

Mathematics and Arts:

Curator of the art exposition “Serie armonica alternata”, with Barbara Paci Art Gallery, for the Milan Design Week (sculptures by Massimiliano Pelletti, paintings by Alessandro Busci; Milan, via Durini 3, April 13–15, 2018).

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:

- Program committee of FPSAC20, Bar Ilan University, Israel, July 13–17, 2020.
- 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.