

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
(January 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 (October 2017, 9 pages), at [arXiv:1403.5217v3](https://arxiv.org/abs/1403.5217v3).
20. K. Adiprasito, B. Benedetti: A Cheeger-type exponential bound for the number of triangulated manifolds. Preprint (September 2017, 13 pages), at [arXiv:1710.00130](https://arxiv.org/abs/1710.00130).
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, in press: DOI 10.1016/j.jpaa.2017.10.009.

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

2018

106. Joint Math Meeting of the AMS

San Diego, California, January 12

2017

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| 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

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| 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

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| 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

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| 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, Algebra seminar | Genoa, Italy, March 7 |
| 61. Københavns U., Experimental math. colloquium | Copenhagen, Denmark, January 10 |

2013

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| 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 |

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| 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, Apr. 4 |
| 49. Etna Triangulations and Algebra Meeting | Catania, Italy, Feb. 21 |

2012

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| 48. First Workshop SFB/TR109 | Obergurgl, Austria, Dec. 19 |
| 47. Aurora Borealis Combinatorics Conference | Abisko, Sweden, Dec. 7 |
| 46. U. Bologna, Seminario di Algebra | Bologna, Italy, Nov. 27 |
| 45. Boston College, Geometry-Topology Seminar | Boston, Massachusetts, Oct. 25 |
| 44. AMS Sectional Meeting, Alg. Topological Combinatorics | New Orleans, Louisiana, Oct. 13 |
| 43. U. Washington, Combinatorics Seminar | Seattle, Washington, Oct. 10 |
| 42. NAU, Colloquium of Mathematics and Statistics | Flagstaff, Arizona, Oct. 8 |
| 41. UC Davis, Geometry & Topology Seminar | Davis, California, Oct. 2 |
| 40. UCLA, Combinatorics seminar | Los Angeles, California, Sept. 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

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| 34. U. Genoa, doctoral course 'Triangulations' | Genoa, Italy, Nov. 21–28 |
| 33. Meeting of the Swedish Math. Society | Linköping, Sweden, Nov. 19 |
| 32. UBA, Algebraic Topology and Combinatorics | Buenos Aires, Argentina, Nov. 10 |
| 31. Aalto Univ., Algebra and Combinatorics Seminar | Helsinki, Finland, Sept. 28 |
| 30. KTH Matematisk Cirkel, Guest Lecture | Stockholm, Sweden, Sept. 15 |
| 29. Royal Inst. of Technology (KTH), Combinatorics Seminar | Stockholm, Sweden, Sept. 14 |
| 28. Scientific Computing & Imaging Institute | Salt Lake City, Utah, Aug. 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, Feb. 10 |

2010

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| 22. U. Basel, Seminar Algebra und Geometrie | Basel, Switzerland, Dec. 17 |
| 21. Nordic Institute for Theoretical Physics (NORDITA) | Stockholm, Sweden, Dec. 8 |
| 20. Aurora Borealis Combinatorics Workshop | Abisko, Sweden, Dec. 2 |
| 19. UC Santa Barbara, Topology Seminar | Santa Barbara, California, Nov. 16 |
| 18. UC Davis, Geometry & Topology Seminar | Davis, California, Nov. 10 |
| 17. UC Berkeley, RTG seminar | Berkeley, California, Nov. 9 |
| 16. U. La Sapienza, Seminario di Algebra e Geometria | Rome, Italy, Oct. 26 |
| 15. MFO, Arbeitsgemeinschaft 'Topological Robotics' | Oberwolfach, Germany, Oct. 15 |
| 14. Royal Inst. of Technology (KTH), Combinatorics Seminar | Stockholm, Sweden, Sept. 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 |

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| 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), *Optimization* (Fall 2018), *Discrete Mathematics* (Spring 2018), *Topology* (Fall 2016), *Linear Algebra* (Fall 2015), *Introduction to ODE* (Fall 2015), *Calculus 2* (Spring 2017). At Northeastern University: *Calculus 2* (Fall 2014).

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

SUMMER SCHOOLS. Lecture *Combinatorial homotopy theory* at summer school “Low-Dimensional Geometry and Topology: Discrete & Algorithmic Aspects”, Institut Henri Poincaré, Paris, June 18–22, 2018. Lecture series *Some recent results on Polytopes* at Seminaire Lotharingien de Combinatoire, Bertinoro, September 6–9, 2015. Lecture series *Discrete Morse theory* at winter school “Homology: Theoretical and Computational Aspects”, Genoa, Italy (February 9–13, 2015), and at school “Computational topology & topological data analysis”, Ljubljana, Slovenia (July 1–5, 2013). Summer school *Geometry, graph theory and optimization*, organized with Lorenzo Orecchia and funded by the Italian Ministry of Education, in Bari, Italy (July 14–26, 2013). Summer program *Discrete Morse theory & Commutative Algebra*, organized with Alex Engström at *Institut Mittag-Leffler*, near Stockholm, Sweden (July 18 to August 1, 2012).

CONFERENCES AND PROGRAMS ORGANIZED

2018

- With R. Stanley and M. Wachs (U Miami): Scientific Committee of ICM Satellite Conference *A Pan-Hemispheric Celebration of Mathematics in Miami*, July 26–29.

2017

- With J. Barmak (U Buenos Aires) and F. Frick (Cornell U): session *Geometry and combinatorics of cell complexes* at the Mathematical Congress of the Americas, Montreal, Canada, July 24–28.

2013

- With E. Delucchi (U Freiburg), L. Moci (Paris 7): INDAM conference “*CoMeTA - Combinatorial Methods in Topology and Algebra*”, Cortona, Palazzone, Sept. 2013. Funded by INDAM.

- With L. Orecchia (Boston U): Summer school “*Teoria dei Grafi, Geometria Convessa e Ottimizzazione*”. Bari, Italy, July 2013. Funded by the Italian Ministry of Education, after we won an Italian competition called “Messaggeri della Conoscenza”.

- By myself: “*Etna Triangulations and Algebra Meeting, 2013*”. Catania, Italy, Grand Hotel Excelsior, Febr. 2013. Funded by KTH Stockholm.

2012

- With A. Engström (Aalto): Summer program by Institut Mittag-Leffler, on “*Discrete Morse Theory and Commutative Algebra*”. July 18–31, 2012. Funded by Institut Mittag-Leffler.

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 at NSF. 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, among others:

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).

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.

Mentor/advisor: Advisor for Marco Macchia’s diploma thesis, U Bari (defended in July 2014). External referee for master theses: Daniele Boccalini, U. Genoa, Italy, 2012; Nachiketa Adhikari, Chennai Mathematical Institute, India, 2017. Examiner for Kaje Kubjas’ doctoral thesis, FU Berlin, 2013.

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.