

Bruno Benedetti
Curriculum vitae
(November 2012)

PROFESSIONAL POSITIONS

2011–2013	Postdoc, Göran Gustafsson – Vetenskapsrådet	KTH, Stockholm, Sweden
2010–2011	Postdoc, within Ziegler’s ERC grant ‘SD Models’	TU & FU, Berlin, Germany
2010	Research member, ‘Homology theories of knots & links’	MSRI, Berkeley, California

EDUCATION

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

RESEARCH

My research interests lie in Discrete Geometry and Topology, with a special focus on triangulations of manifolds and discrete Morse theory. Recently I became interested in endowing simplicial complexes with metric structures; this line of work includes the study of CAT(0) cube complexes and convex triangulations.

I also enjoy applying combinatorial approaches to commutative algebra, physics and optimization. In my PhD thesis (2010), I solved a problem in discrete quantum gravity, using some elementary knot theory. More recently, with K. Adiprasito, I proved the Hirsch conjecture for flag polytopes and for flag homology manifolds.

PUBLICATIONS AND PREPRINTS

11. K. Adiprasito, B. Benedetti: Combinatorial stratifications and minimality of 2-arrangements. Preprint (November 2012) in preparation.
10. K. Adiprasito, B. Benedetti: Subdivisions, shellability, and the Zeeman conjecture. Preprint (April 2012, 18 pages) at [arXiv:1202.6606](https://arxiv.org/abs/1202.6606).
9. K. Adiprasito, B. Benedetti: Tight complexes in 3-space admit perfect discrete Morse functions. Preprint (April 2012, 13 pages) at [arXiv:1202.3390](https://arxiv.org/abs/1202.3390).
8. K. Adiprasito, B. Benedetti: Metric geometry and collapsibility. Preprint (January 2012, 35 pages) at [arXiv:1107.5789](https://arxiv.org/abs/1107.5789).
7. B. Benedetti: Discrete Morse theory is at least as perfect as Morse theory. Preprint (January 2011, 17 pages) at [arXiv:1010.0548](https://arxiv.org/abs/1010.0548).
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.
To appear in *Electronic Geometry Models*. Preprint (7 pages) at [arXiv:0912.3723](https://arxiv.org/abs/0912.3723).
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.

TEACHING

2012

Organizer (with Alex Engström) of the summer school “Discrete Morse Theory and Commutative Algebra”, at Institut Mittag-Leffler, Sweden. Teaching load: about two lectures every day for 2 weeks, plus exercises, software sessions, and research sessions. The course started from basic definitions, progressively leading the students into open problems in research.

2011

Intensive graduate course “Triangulations: Between Algebra, Geometry, and Computer Science” at the Univ. Genoa, Italy. Teaching load: 10 lectures.

2007 – 2010

In these years I could not teach, due to the restrictions of my doctoral and postdoctoral scholarships, in Berlin. In this period I co-organized the Berlin Discrete Geometry Seminar, first at TU Berlin and later at FU Berlin.

2005, 2006

Tutor at the University of Genoa; Teaching load: about four hours a week during term, mostly with 1st year students in Mathematics. (Exercise sessions in calculus, linear algebra, group theory, logic.)

INVITED TALKS

2012

- | | |
|---|-----------------------------------|
| 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 Algebrica e Argomenti Correlati | Genoa, Italy, June 8 |
| 38. Centro De Giorgi, Giornate di Geometria Algebrica | 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. Univ. 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. 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. Univ. Ljubljana, Topology and geometry seminar | Ljubljana, Slovenia, June 6 |
| 25. Univ. Augsburg, Oberseminar Differentialgeometrie | Augsburg, Germany, May 9 |
| 24. Univ. Sevilla, Seminario de Topologia | Sevilla, Spain, Apr. 11 |
| 23. MFO, Topological and geometric combinatorics | Oberwolfach, Germany, Feb. 10 |

2010

- | | |
|--|------------------------------------|
| 22. Univ. 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 University, GASC Seminar | Boston, Massachusetts, August 9 |
| 11. Washington University 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 Univ., 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 University, AGC Seminar | San Francisco, California, Feb. 3 |

2009

- | | |
|--|-----------------------------|
| 4. Univ. di Genova, Seminario di Algebra e Geometria | Genoa, Italy, Dec. 15 |
| 3. KolKom 2009: Colloquium on Combinatorics | Magdeburg, Germany, Nov. 13 |
| 2. U. Belgrade & SANU Math Institute, CGTA Seminar | Belgrade, Serbia, Sep. 15 |

2008

- | | |
|--|-----------------------|
| 1. Univ. di Genova, Seminario di Algebra e Geometria | Genoa, Italy, Dec. 23 |
|--|-----------------------|

AWARDS

- Research grant from the DFG, via the Computer Science Department at FU Berlin, for the period 2012–2016. (Postponed until 2013).
- Swedish science council (Vetenskapsrådet), 2-year personal research grant, Stockholm, 2011. (Started position in November 2011.)
- Göran Gustafsson postdoctoral scholarship, Stockholm, 2011. (Resigned in October 2011 for incompatibility with Vetenskapsrådet grant.)
- Full Scholarship of the BMS (Berlin, 2006–2009) and BMS Certificate of Excellence, 2010.
- Prize of the University of Genoa among all faculties and years, 2005.
- Two national grants of the Italian institute for Advanced Mathematics (INDAM), 2001–2004 and 2004–2006.

POPULAR SCIENCE OR NON-REFEREED PUBLICATIONS

5. B. Benedetti, Metric geometry and random discrete Morse theory. Oberwolfach Reports 24 (2012), to appear.
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.)

FURTHER EXPERIENCE

Travels: Six invitations to Oberwolfach. One MSRI program (Berkeley), on knot theory. One IPAM workshop (Los Angeles), on the simplex method in integer programming. About 20 international

conferences attended, among which include the “Crafoord Days” in Lund (2012), “The mathematics of Klee and Grünbaum” in Seattle (2010), FPSAC in San Francisco (2010), “Unstructured meshes in dynamical spacetime” in Jena (2010), and “Hilbert functions & syzygies, in honor of Jürgen Herzog” in Cortona (2007). Summer schools attended in Trieste, Barcelona, Catania, Berlin, Perugia.

Editorial activities: Referee for several journals, among which: Journal of Algebraic Combinatorics (Springer); Journal of Combinatorial Theory Series A (Elsevier); Pacific Journal of Mathematics (Mathematical Science Publisher); Rendiconti del Circolo Matematico di Palermo (Springer); Electronic Journal of Combinatorics (free). Reporter/editor for Oberwolfach Report No. 8, 2011 (“Topological and geometric combinatorics”, 349–423). Reporter/editor for Oberwolfach Report No. 24, 2012 (“Triangulations”).

Theses refereed: External referee for Daniele Boccacini’s master thesis, U. Genoa, 2012.

Organizations of conferences, seminars, etc.: Organizer (with A. Engström) of the first summer school held at Institut Mittag-Leffler, Sweden (July 2012). Organizer (with E. Delucchi and L. Moci) of the INDAM International Conference “CoMeTA - Combinatorial Methods in Topology and Algebra”, Cortona, Sept. 2013.

Organizer (with G. Ziegler and B. Schulze) of the Berlin Discrete Geometry Seminar, at TU Berlin or FU Berlin, 2010–2011. Organizer of the Brown Bag Seminar, KTH, Stockholm, 2011. Organizer (with A. Björner, P. Bränden, and S. Linusson) of the KTH Combinatorics Seminar, Stockholm, 2012–2013.

Participant as principal investigator (when in Berlin) and as external researcher (when in Stockholm) to the DFG grant application “Discretization in Geometry and Dynamics”, project “Discrete Morse theory”. The project was successfully approved in May 2012.

Language skills: Italian as mother tongue. Fluent in English and German. Good knowledge of Spanish. Good reading comprehension of Latin and French.