Curriculum Vitae
Bruno Martelli

1 Personal data

Born in Arezzo, Italy on April 9, 1973.

Full Professor at the Maths Department, Faculty of Science, University of Pisa, Largo Pontecorvo 5, 56126 Pisa.

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2 Positions and titles

1992. Member of the Italian team in the XXXIII International Maths Olympiads, Moscow.

1992/93 – 1995/96. Math Dept of Pisa, gradued *cum lode*, thesis *Invarianti di Turaev-Viro*, supervised by Carlo Petronio.

1992/93 – 1995/96. Scuola Normale Superiore of Pisa, gradued *cum laude*.

1996/97. Istituto Nazionale di Alta Matematica in Rome.

1997/98 – 2000/01. Math Dept of Florence, PhD thesis *Complexity of three-manifolds*, supervised by Carlo Petronio and Wolfgang Metzler.

2001/02. Math Dept of Pisa, Postdoctoral Fellowship.

2002/03. Applied Math Dept of Pisa, Postdoctoral Fellowship.

2004 – 2014. Math Dept of Pisa, Assistant Professor (Ricercatore) in geometry.

2014 – 2016. Math Dept of Pisa, Associate Professor in geometry.

2016 – now. Math Dept of Pisa. Full Professor in geometry.

3 Visiting periods

December 1994. École Normale of Paris.

October – December 1995. St. John's College, Oxford.

March – June 2000. Frankfurt.

March 2003. Austin (Texas).

March 2010. *Professeur invité*, Institut de Recherche Mathématique Avancée de Strasbourg.

March 2012. Institut Henri Poincaré (Paris).

May – June 2013. *Professeur invité*, Institut de Recherche Mathématique Avancée de Strasbourg.

May 2015. *Professeur invité*, Université Paul Sabatier, Toulouse

4 Teaching

Courses

I have taught various courses (as a main teacher or as an assistant, mostly in geometry/topology but also in analysis and algebra) in Pisa at the following departments: Telecommunications Engeneering, Physics, Maths, Computer Science. Details starting from 2003/04 available from

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http://people.dm.unipi.it/martelli/didattica.html

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Dissertations supervised

Degree dissertations

24 November 2006. Abramo Bertucco, *Curve tropicali.*

23 February 2007. Leone Slavich, *Decomposizione per somma connessa di 3-varietà.*

25 May 2007. Marco Golla, *Varietà tropicali.*

27 September 2007. Claudio Tamburrino, *Coomologia della grassmanniana.*

25 July 2008. Mario Luca Scarascia, *Il polinomio di Alexander.*

27 March 2009. Fabio Lilliu, *Teorema di normalizzazione e Riemann-Roch.*

24 July 2009, Marco Antognozzi, *Introduzione alla teoria di Morse.*

30 October 2009, Francesca Iezzi, *Il polinomio di Jones e i link alternati.*

26 March 2010. Daniele Celoria, *Costruzione di Pontryiagin e gruppi di omotopia delle sfere.*

28 June 2010. Francesco Lin, *K-teoria complessa e invariante di Hopf.*

28 June 2010. Nicolas Matte Bon, *Foliazioni di 3-varietà in codimensione uno: il teorema di Novikov.*

30 September 2011. Omar Quilici, *Omologia singolare e grado topologico.*

15 June 212. Fabio Gironella, *Foliazioni misurate su superfici e teoremi di classificazione.*

19 July 2013. Michele Ancona, *Coomologia di SO(n).*

19 July 2013. Elena Giorgi, *Le classi di Stiefel-Whitney.*

2 December 2013. Irene Barbensi, *Il teorema di Lickorish-Wallace.*

13 May 2016. Alessandro Terni, *Teoria di Morse.*

10 June 2016. Irene Filoscia, *Decomposizione di 3-varietà in fattori primi*

4 May 2018. Laura Salvetti, *Superfici singolari in una 3-varietà: il lemma di Dehn e il teorema del loop*

Master dissertations

27 November 2009. Claudio Tamburrino, *L'omologia di Khovanov.*

29 October 2010. Mario Scarascia, *Superfici quasi-geodetiche in 3-varietà iperboliche.*

17 October 2014. Marco Antognozzi, *La caratterizzazione di Rivin dei poliedri iperbolici di volume finito.*

16 Ottobre 2015. Giulio Belletti, *The generalized Witten asymptotics conjecture.*

14 October 2016. Fabio Lilliu, *Immersioni di superfici in 3-varietà iperboliche chiuse.*

26 October 2018. Ludovico Battista, *Principal Congruence Link Complements*

15 March 2019. Andrea Parma, *Geometric structures on manifolds: transitions from hyperbolic to anti-de Sitter geometry.*

20 September 2019. Dario Ascari, *Strutture iperboliche su fibrati in piani su superfici.*

20 September 2019. Matteo Migliorini, *Taut foliations on 3-manifolds.*

25 October 2019. Diego Santoro, *Hyperbolic four-manifolds with vanishing Seiberg-Witten invariants.*

25 October 2019. Giovanni Italiano, *Trisections of 4-manifolds.*

13 December 2019. Elia Miranceli, *Link alternati debolmente generalizzati.*

PhD dissertations

October 2011. Fionntan Roukema, *Dehn Surgery on the Minimally Twisted Five-Chain Link.*

April 2014. Leone Slavich, *Hyperbolic 4-manifolds and 24-cells.*

October 2016. Alessio Carrega, *Shadows and Quantum Invariants.*

May 2017. Stefano Riolo, *Cone-manifolds and hyperbolic surgeries.*

Ongoing, started 2015. Giulio Belletti.

Ongoing, started 2017. Leonardo Ferrari.

Ongoing, started 2018. Ludovico Battista.

5 Talks

Conferences

August 1997. "Encoding spines of 3-manifolds via o-graphs,"
  Low-dimensional topology and combinatorial group theory, Luttach (Italy).

August 1999. "Tori and minimal spines of 3-manifolds,"
  Low-dimensional topology and combinatorial group theory, Chelyabinsk (Russia).

30 July – 8 August 2001. "Complexity of 3-manifolds and decompositions along tori,"
  Low-dimensional topology and combinatorial group theory, Luttach (Italy).

15-17 June 2002. "Complexity of 3-manifolds and decompositions along tori,"
AMS-UMI joint meeting, Pisa, session on the topology of 3-manifolds.

1-8 September 2002. "Riconoscere varietà ottenute con chirurgia di link in S^3,"
Proprietà geometriche dell varietà reali e complesse: nuovi contributi italiani III, Palermo.

8-13 September 2003. "Complessità di n-varietà triangolabili,"
Congresso UMI, Milan, session on the topology and geometry of manifolds.

6-9 May 2004. "Complexity of PL n-manifolds,"
INTAS workshop on 3-manifolds, Edernburg (Germany).

23-27 February 2005. "Links, two-handles, and complexity of 4-manifolds,"
Workshop on 3-manifolds and complexity, Cortona (Italy).

16-19 June 2005. "2-polyhedra in 4-manifolds,"
AMS-DMV-ÖMG joint meeting, Mainz, session on geometric topology & group theory.

20-24 June 2005. "Dehn surgery on links in 3-manifolds,"
Summer school and conference on geometry and topology of 3-Manifolds, Trieste.

20-26 May 2007. "Complexity ad decompositions of PL-manifolds," *Braids and their ramifications*, Cortona.

6-11 Dicembre 2010. "Turaev-Viro representations of the mapping class groups,"
De Brun workshop, Galway (Ireland).

29 Avril - 4 Mai 2012. "Stable complexity and simplicial volume of manifolds,"
Triangulations, Oberwolfach (Germany).

25 June 2013. "From cubulations to cusped hyperbolic 4-manifolds,"
Low-dimensional topology and geometry in Toulouse, Toulouse (France).

30 June – 2 July 2014. "Hyperbolic 4-manifolds constructed via right-angled polytopes,"
RSME-SCM-SEMA-SIMAI-UMI joint meeting, Bilbao, session on geometric topology.

5 March – 7 March 2015. "Varietà iperboliche di dimensione 4,"
Varietà reali e complesse: geometria, topologia e analisi armonica, SNS Pisa.

24-30 May 2015. "Quantum representations of the mapping class group",
Chromatic and colored structures in geometry and statistical physics, Cortona.

22-27 June 2015. "Constructing hyperbolic four-manifolds",
New Perspectives on the Interplay between Discrete Groups in Low-Dimensional Topology and Arithmetic Lattices, Oberwolfach.

27-31 July 2015. "An analytic family of representations for the mapping class group of punctured surfaces",
New developments in TQFT, QGM Aarhus.

29 August - 2 July 2016. "Hyperbolic Dehn filling in dimension four",
1st joint meeting Brazil–Italy in mathematics, IMPA Rio de Janeiro

18-22 September 2017. "Hyperbolic Dehn filling in dimension four",
Geometric topology in low dimensions, Warwick.

11-15 December 2017. "Shadow complexity of smooth closed four-manifolds",
Computation in geometric topology, Warwick.

12-16 February 2018. "Shadow complexity of smooth closed four-manifolds",
Knotted embeddings in dimensions 3 and 4, Luminy.

9-13 July 2018. "Hyperbolic Dehn filling in dimension four",
Growth in Topology and Number Theory: Volumes, Entropy, and L2-torsion, Bonn.

24-28 June 2019. Minicourse on "The geometry of 3-manifolds",
Géométrie, topologie et arithmétique de façon hyperbolique, Les Diablerets (Svizzera).

Seminar talks

March 2000 – June 2000 and February 2001. Various seminars on the complexity of 3-manifolds at the Math Dept in Frankfurt.

19 May 2009. "Complessità di varietà triangolabili," Bologna Math Dept.

8 June 2009. "Ombres de Turaev sans sommets," Strasbourg IRMA.

22 March 2010. "Epines 3-dimensionnelles de 4-variétés," Strasbourg IRMA.

24 January 2011. "Turaev-Viro representations of the mapping class groups," Strasbourg IRMA.

23 April 2013. "Une famille analytique de représentations pour le groupe modulaire," Paris Jussieu.

6 May 2013. "Une famille analytique de représentations pour le groupe modulaire," Strasbourg IRMA.

27 May 2013. "Quantum representations of mapping class groups," Paris Orsay.

26 February 2014. "Combinatorial constructions of hyperbolic and Einstein four-manifolds," MIT Boston.

27 February 2014. "Combinatorial constructions of hyperbolic and Einstein four-manifolds," Brown University.

20 May 2014. "Constructions of hyperbolic manifolds from regular polytopes," Fribourg (Switzerland)

5 May 2015. "Quelques constructions de variétés hyperboliques en dimension 4," Toulouse.

16 November 2016, "Hyperbolic Dehn filling in dimension four," Regensburg.

17 November 2016, "The geometrisation of three-manifolds," Regensburg.

30 November 2016, "Hyperbolic cone-manifolds in dimension four," Uppsala.

22 June 2017, "Geometrisation of three-manifolds," Heidelberg.

27 November 2017, "Hyperbolic Dehn filling in dimension four," Luxembourg.

21 February 2019, "Variétés hyperboliques compactes sans structure spin", Paris Jussieu.

6 Organizational activities

1994 – 1996. Member of the evaluation team of the italian mathematical olympiad.

2002 – today. Reviewer for MathSciNet and referee for various journals.

June 2004 – June 2005. Coordinator of a GNSAGA/GNAMPA italian project entitled *Flusso di Ricci su 3-varietà* (Ricci flow on 3-manifolds).

March 2011 – 2015. National coordinator of a FIRB italian project entitled *Geometry and topology of low-dimensional manifolds*, with a budget of 610.000 euros.

June 2013. Main organizer of the INdAM workshop *Geometric topology in Cortona*, Cortona, 3-7 June 2013 and of the mini-workshop *Hyperbolic geometry and mapping class groups*, Pisa 12-13 June 2013.

May 2014. Member of the scientific committee for the intensive month *Teichmüller theory and surfaces in 3-manifolds*, Centro De Giorgi (Pisa), 26 May 2014 - 20 June 2014.

June 2016. Member of the organization commitee for the two-weeks *School on Geometric Group Theory and Low-Dimensional Topology: Recent Connections and Advances*, ICTP Trieste, 23 may 2016 - 2 june 2016.

June 2016. Coordinator of a PRA Pisa project, with a budget of 40.000 euros.

June 2017. Main organizer of the INdAM workshop *Geometric topology in Cortona*, Cortona, 4-10 June 2017.

June 2018. Coordinator of a PRA Pisa project, with a budget of 33.000 euros.

References

Books

[1] B. MARTELLI, "An Introduction to Geometric Topology," 480 pages, CreateSpace Independent Publishing Platform, 2016.

[2] B. MARTELLI, "Geometria e algebra lineare," 444 pagine, 109 figure, Independently published, 2018.

Papers

[3] B. MARTELLI, *Minimal spines and geometric decompositions of closed 3-manifolds*, in "Low-dimensional topology and combinatorial group theory (Chelyabinsk 1999)", Inst. of Math. of Nat. Acad. Sci. of Ukraine, Kiev.

[4] B. MARTELLI – C. PETRONIO, *Three-manifolds having complexity at most* 9, Experimental Math. **10** (2001), 207-237.

[5] B. MARTELLI – C. PETRONIO, *A new decomposition theorem for* 3-*manifolds*, Illinois J. Math. **46** (2002), 755-780.

[6] R. Frigerio – B. Martelli – C. Petronio, *Complexity and Heegaard genus of an infinite class of compact 3-manifolds*, Pacific J. Math. **210** (2003), 283-298.

[7] R. Frigerio – B. Martelli – C. Petronio, *Dehn filling of cusped hyperbolic 3-manifolds with geodesic boundary*, J. Diff. Geom. **64** (2003), 425-456.

[8] G. Amendola – B. Martelli, *Non-orientable 3-manifolds of small complexity*, Topol. Appl. **133** (2003), 157-178.

[9] R. Frigerio – B. Martelli – C. Petronio, *Small hyperbolic 3-manifolds with geodesic boundary*, Experimental Math. **13** (2004), 177-190.

[10] B. Martelli – C. Petronio, *Complexity of geometric three-manifolds*, Geom. Dedicata **108** (2004), 15-69.

[11] G. Amendola – B. Martelli, *Non-orientable 3-manifolds of complexity up to* 7, Topol. Appl. **150** (2005), 179-195.

[12] B. Martelli *Links, two-handles, and four-manifolds*, Int. Math. Res. Not. **58** (2005), 3595-3624.

[13] B. Martelli – C. Petronio, *Dehn filling of the "magic" 3-manifold*, Comm. Anal. Geom. **14** (2006), 967-1024.

[14] B. Martelli *Complexity of 3-manifolds*, "Spaces of Kleinian Groups", London Math. Soc. Lec. Notes Ser. **329** (2006), 91-120.

[15] R. Frigerio – B. Martelli, *Countable groups are mapping class groups of hyperbolic 3-manifolds* Math. Res. Lett. **13** (2006), 897-910.

[16] F. Costantino – R. Frigerio – B. Martelli – C. Petronio, *Triangulations of 3-manifolds, hyperbolic relative handlebodies, and Dehn filling*, Comm. Math. Helv. **82** (2007), 903-934.

[17] E. Fominykh – B. Martelli, *k-Normal surfaces*, J. Diff. Geom. **82** (2009), 101-114.

[18] D. Heard – C. Hodgson – B. Martelli – C. Petronio, *Hyperbolic graphs of small complexity*, Experimental Math. **19** (2010), 211-236.

[19] B. Martelli, *Complexity of PL manifolds*, Algebraic & Geometric Topology 10 (2010), 1107-1164.

[20] B. Martelli, *Four-manifolds with shadow-complexity zero*, Int. Math. Res. Not. **2011** (2011), 1268-1351.

[21] B. Martelli, *A finite set of local moves for Kirby calculus*, J. Knot Theory Ramif. **21** (2012), 1250126.

[22] S. Francaviglia – R. Frigerio – B. Martelli, *Stable complexity and simplicial volume of manifolds*, Journal of Topology **5** (2012), 977-1010.

[23] A. KOLPAKOV – B. MARTELLI, *Hyperbolic four-manifolds with one cusp*, Geom. & Funct. Anal. **23** (2013), 1903-1933.

[24] F. COSTANTINO – B. MARTELLI, *An analytic family of representations for the mapping class group of punctured surfaces*, Geometry & Topology **18** (2014) 1485-1538.

[25] B. MARTELLI – C. PETRONIO – F. ROUKEMA, *Exceptional Dehn surgery on the minimally twisted five-chain link*, Comm. Anal. Geom. **22** (2014), 689-735.

[26] A. KOLPAKOV – B. MARTELLI – S. TSCHANTZ, *Some hyperbolic three-manifolds that bound geometrically*, Proc. Amer. Math. Soc. **143** (2015), 4103-4111.

[27] A. CARREGA – B. MARTELLI, *Shadows, ribbon surfaces, and quantum invariants*, Quantum Topology **8** (2017), 249-294.

[28] B. MARTELLI – M. NOVAGA – A. PLUDA – S. RIOLO, *Spines of minimal length*, Ann. Sc. Norm. Sup. Pisa Cl. Sci **XVII** (2017), 1067-1090.

[29] M. GOLLA – B. MARTELLI, *Pair of pants decomposition of 4-manifolds*, Algebraic & Geometric Topology, **17** (2017), 1407-1444.

[30] B. MARTELLI, *Hyperbolic three-manifolds that embed geodesically*, `arXiv:1510.06325`.

[31] B. MARTELLI, *Hyperbolic four-manifolds*, `arXiv:1512.03661`, submitted

[32] B. MARTELLI – S. RIOLO, *Hyperbolic Dehn filling in dimension four*, Geometry & Topology **22** (2018), 1647-1716.

[33] Y. KODA – B. MARTELLI – H. NAOE, *Four-manifolds with shadow-complexity one*, `arXiv:1803.06713`, submitted

[34] B. MARTELLI, *Dehn surgery on the minimally twisted seven-chain link*, `arXiv:1808.08430`, accepted for publication in Comm. Anal. Geom.

[35] B. MARTELLI – S. RIOLO – L. SLAVICH, *Compact hyperbolic manifolds without spin structures*, `arXiv:1904.12720`

Pisa, September 19, 2019