

Curriculum Vitae

Francesco Bonsante

Personal:

date of birth : 27.01.1978
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Education and experience:

24 ott. 2000: *Laurea* (four year degree) in Mathematics at University of Pisa (cum Laude).
2001: *Diploma* in Mathematics of Scuola Normale Superiore (cum Laude).
2001-2003: Ph.D. student in Mathematics at Scuola Normale Superiore di Pisa.
2004: Research assistant (borsista) at Department of Mathematics of University of Pisa .
2005: Research assistant (borsista) at Department of Applied Mathematics of University of Pisa.
apr. 2005: defense of my Ph.D. (cum Laude). Dissertation with title “Deforming the Minkowskian cone of a closed hyperbolic manifold”. Supervisor prof. R. Benedetti, referees prof. A. Zeghib, J.M. Montesinos.
sept. 2005-may 2006: I won a Marie Curie Intra European Fellowship at Laboratoire Picard of Toulouse.
may 2006- sept.2007: Research fellow (Ricercatore a tempo determinato) in geometry at Scuola Normale Superiore di Pisa.
oct.2007-march 2015 Lecturer (Ricercatore) at University of Pavia.
dec 2013 National habilitation as Associate and Full Professor (Settore concorsuale 01/A2 Geometria e Algebra).
apr. 2015-present Associate professor at University of Pavia

Areas of reserach

Teichmüller theory, hyperbolic geometry, Lorentzian geometry, geometric structures, cone singularities, global differential geometry.

Teaching

2001: Tutorials in "Differential geometry" (mathematics, 3rd year)
2002: Tutorials in "Matematica 3" (engineer students, 3rd year)
2004-05: Tutorials in Linear Algebra (computer science students, 1st year).
2005-06: Tutorials in Linear Algebra (engineer students, 1st year)
2006-07: Tutorials in "Matematica 1" (Calculus) at Scuola Normale Superiore (mathematics, 1st year)
2007-08: Linear Algebra (engineer students 1st year).
2008-09: - Linear Algebra (engineer students, 1st year)
- Geometria Superiore (master course, mathematics).
- Mean curvature flow (PhD course).
2009-10: Linear Algebra (engineer students, 1st year)
2010-11: Linear Algebra (engineer students, 1st year)

- 2011-12:** - Linear Algebra (engineer students, 1st year).
- Riemann surfaces and algebraic curves (master course in mathematics)
- 2012-13:** - Linear Algebra (engineer students, 1st year).
- Algebra (mathematics students, 2nd year)
- 2013-14:** - Linear Algebra (engineer students, 1st year).
- 2014-15:** - Linear Algebra (engineer students, 1st year).
- Algebra (mathematics students, 2nd year)
- Harmonic maps between surfaces (Ph.D. course)
- 2015-16:** - Linear Algebra (engineer students, 1st year).
- Geometria 2 (mathematics students, 2nd year)
- Harmonic maps between surfaces (Ph.D. course)
- 2016-17:** - Linear Algebra (engineer students, 1st year).
- Geometria 2 (mathematics students, 2nd year)
- 2017-18:** - Linear Algebra (engineer students, 1st year).
- Istituzioni di Geometria Superiore (master course in mathematics)

Invited talks and mini courses in International workshop

- *Wick Rotation in 3D gravity* (workshop *Towards the quantum geometry of hyperbolic 3-manifolds* Max Plank Institute, Golm, Potsdam, 2004).
- *(2+1)-spacetimes of constant curvature and projective structures* (workshop *Global geometric aspects of gravitation* École Normale Supérieure di Lyon, 2005).
- *Canonical Wick Rotation in 3D-gravity* (workshop *Classical and quantum gravity in dimension 3* Centro De Giorgi di Pisa, 2005).
- *Wick Rotation in 3D-gravity* (workshop *Teichmüller theory (classical and quantum)* Oberwolfach, 2006).
- *Earthquakes on surfaces with geodesic boundary* (Dipartimento di Matematica Università di Milano).
- *Earthquakes on hyperbolic surfaces with geodesic boundary and multi black holes* (Joint Meeting AMS-MAA, San Diego, 2008).
- *Canonical Time in 3d-gravity* (workshop *Geodicauserie I*, IHP, Paris, 2008).
- *Mean curvature flow in Anti de Sitter spacetime* (workshop *Geometric Flows and Geometric Operators* Centro de Giorgi, Pisa, 2009).
- *Earthquake theorem for surfaces with small cone angles* (workshop *Geodicauserie II*, Avignon, 2009).
- *Quasi-conformal minimal Lagrangian maps of the hyperbolic plane* (workshop *Geometric structures in 2 and 3 dimensions*, Autrans, 2010)
- *Minimal Lagrangian maps of the hyperbolic disc* (final workshop of the ANR program GeomEinstein, Montpellier, 2010).
- *Maximal graphs in Anti de Sitter space* (workshop *Geometry and Analysis in Lorentzian manifolds*, École Normale Lyon, 2010).
- *Fixed points of the composition of earthquakes* (workshop *Geometry, topology and Dynamics of Character Varieties*, NUS Singapore, 2010).
- *Maximal surfaces in Anti de Sitter space* (workshop *Geometric evolutions and minimal surfaces in Lorentzian manifolds*, Centro De Giorgi Pisa 2010).
- *AdS geometry in dimension 3* 6h Minicourse (trimester “Geometry and analysis of surface group representations” Institut Henri Poincare, Paris, 2012).
- *A cyclic flow on Teichmüller space* (Conference “Rigidity and flexibility in dimensions 2,3 and 4” for the 60th birthday of Steven Kerckhoff, Luminy, 2012).
- *An L^1 -energy for maps between manifolds* (“A geometry day in Como”, Como, 2014)

- 3h mini course on AdS geometry at the meeting “Regards croisés sur les structures géométriques et la géométrie lorentzienne” Avignon, September 2014.
- *Convex surfaces with constant curvature in Minkowski space*, UMI meeting, special session “Topologia e geometria differenziale”, Siena 2015.
- *Isometric immersions of the hyperbolic plane into the Minkowski space* (international workshop “3 dimensional geometric structures, representations of surface groups and related topics”, Luxemborg, 2016)
- *Teichmüller theory in 3d gravity* (international workshop “Current problems in Theoretical Physics”, parallel session “Quantum fields and gravity”, Vietri sul Mare 7-11 Aprile 2017)
- *The volume of the convex core of globally hyperbolic AdS space-times* (international workshop “99e rencontre entre mathématiciens et physiciens théoriciens”, IRMA, Strasbourg, 2017)
- *3d gravity and Teichmüller theory* (international workshop “Geometry of Moduli Space for Low Dimensional Manifolds”, RIMS, Kyoto, 2017)

Scientific visit

I visited and gave a talk (under invitation) the following Departments:

- in Italy: Genova, Milano Bicocca, Pisa, Roma “La Sapienza”, Trento, Bologna, Napoli, Torino.
- out of Italy: Lyon (Ecole Normale), Grenoble, Toulouse, Hamburg, Paris (Institut Poincaré), Luxembourg, Osaka University.

I had a one-month invitation in Toulouse in 2007-2008-2009-2010-2011-2012.

Events

- I was in the organization committee of the following workshops, schools or intensive periods
- “Giornata di Geometria 3”, Pavia 2012.
 - INdAM meeting “Geometric topology in Cortona”, Cortona 2013.
 - Intensive research period ‘Teichmüller theory and surfaces in 3-manifolds’, 26 May-20 June 2014 Centro di Ricerca Matematica “Ennio De Giorgi”, Pisa.
 - INdAM Workshop ‘Chromatic and colored structures in geometry and statistical physics’ which will be held in Cortona (Italy) from 24 to 30 May 2015
 - INdAM meeting “Geometric topology in Cortona”, 4-6 June 2017
 - International workshop “Teichmüller theory and geometric structures on 3-dimensional manifolds”, Luxembourg 12-14 June 2017

Journals

Referee for:

Geometriae Dedicata, Transaction of AMS, Commentarii Mathematici Helvetici, Annales de l’Institut Fourier, Journal of Topology, Invent. Math, Annals of Math., Duke Math. J., Math. Annalen.

Founded Projects

- Member of the PRIN 2005 project “Proprietà geometriche delle varietà reali e complesse”.
- Member of the PRIN 2007 project “Moduli, strutture geometriche e loro applicazioni”.
- Member of the PRIN 2009 project “Moduli strutture geometriche e loro applicazioni”
- Member of A.N.R. program GEODYCOS 2007-10 “geometrical and dynamical cosmology”
- Local coordinator of the del project **FIRB2010** “Geometria e topologia delle varietà in dimensione bassa”.
- PI of the Pavia University peer reviewed project **Blue Sky research 2017** “Analytic and geometric properties of low-dimensional manifolds”.

Papers

- *Flat Spacetimes with Compact Hyperbolic Cauchy Surface*. Journ. Diff. Geom. **69**(2005), 441–521.
- *Canonical Wick Rotation in 3-dimensional gravity* in collaborazione con R. Benedetti Mem. Amer. Math. Soc **198**(2009) 1–164. .
- *Constant curvature (2+1)-spacetimes and projective surfaces* survey per *Actes du Seminaire de Theorie Spectrale et Geometrie* dell’Institut Fourier di Grenoble.
- *Notes on a Paper of Mess*, with A.Andersson, T.Barbot,R. Benedetti, W. Goldam, F. Labourie, K.Scannell, J.M. Schlenker, Geom. Ded.**126**(2007)47–70.
- *AdS Manifolds with particles and earthquakes on singular surfaces* with J.M. Schlenker, Geom. Func. Anal. **19**(2009), 41–82.
- *Multi Black Holes and earthquakes on Riemann surfaces with boundaries* in collaborazione con K. Krassnov e J.M. Schlenker, Int. Math. Res. Not IMRN **2011**, 487–552.
- *(2+1)-Einstein spacetimes of finite type* with R. Benedetti *Handbook in Teichmuller theory* (Papadopoulos ed.), vol II, EMS Publishing House, Zurich 2009.
- *Maximal surfaces and the universal Teichmüller space* with J.-M. Schlenker, Invent. Math. **182**(2010), page 279-333.
- *Collisions of particles in locally AdS spacetimes I. Local description and local examples* with T. Barbot e J.-M. Schlenker, Comm Math. Phys. **308**(2011), 147–200.
- *Fixed points of composition of earthquakes* with J.-M. Schlenker, Duke Math. J. **161**(2012) 1011–1054.
- *A cyclic extension of the earthquake flow* with G. Mondello e J.-M. Schlenker, Geometry&Topology **17**(2013) 157-234.
- *Collisions of particles in locally AdS spacetimes II. Moduli of globally hyperbolic spaces* with T. Barbot e J.-M. Schlenker, Comm. Math. Phys. **327**(2014) 691735.
- *Recovering the geometry of flat space-time from background radiation* joint with Meusburger and Schlenker, Ann. Henri Poincare, 2013, DOI:10.1007/s00023?013?0300?6.
- *A cyclic extension of the earthquake flow II*, with G. Mondello e J.-M. Schlenker, Ann. Sci. Éc. Norm. Supér. **48**(2015), 811–859.
- *On Codazzi tensors on a hyperbolic surface and flat Lorentzian geometry*, IMRN 2016, 343–417.
- *Spacelike convex surfaces with prescribed curvature in (2 + 1)-Minkowski space*, with A. Seppi, Adv. Math. **304**(2017), 434–493.
- *The equivariant Minkowski problem in Minkowski space*, with F. Fillastre, Ann. Ist. Fourier (Grenoble), **67**(2017), 1035–1113.
- *On the volume of anti-de Sitter maximal globally hyperbolic three manifolds*, with A. Seppi and A. Tamburelli, Geom. Funct. Anal. **27**(2017), 1106–1160.

Preprints

- *Area-preserving diffeomorphisms of the hyperbolic plane and K-surfaces in Anti-de Sitter space*, with A. Seppi, arXiv:1610.05701
- *Equivariant maps into Anti-de Sitter space and the symplectic geometry of $\mathbb{H}^2 \times \mathbb{H}^2$* , with A. Seppi, arXiv:1706.00846, to appear in Trans. Amer. Math. Soc.