Professor Fabrizio Zanello **Curriculum Vitæ**

CURRENT CONTACT INFORMATION

Department of Mathematical Sciences zanello@math.mit.edu
Michigan Tech www.mtu.edu/math/department/faculty/zanello
1400 Townsend Drive
Houghton, MI 49931-1295

PERSONAL INFORMATION

- Born on September 22, 1978 in Genova, Italy
- Permanent resident ("Green card" holder) of the United States of America. Currently an Italian citizen

EDUCATION

- M.S. in Mathematics (Analytic Number Theory), University of Genova, Italy, July 2001. Thesis advisor: Alberto Perelli
- Ph.D. in Mathematics (Combinatorial Commutative Algebra), Queen's University at Kingston, Canada, October 2004. Thesis advisor: Anthony V. Geramita

CURRENT RESEARCH INTERESTS

- Combinatorial Commutative Algebra
- Enumerative Combinatorics
- Partition Theory

EMPLOYMENT

- Postdoctoral Fellow, University of Genova, Italy, Spring 2005
- Göran Gustafsson Postdoc, Royal Institute of Technology (KTH), Sweden, 2005-06 (I was the only mathematician selected for that academic year)
- Visiting Assistant Professor, University of Notre Dame, 2006-07
- Assistant Professor, Michigan Technological University, 2007-2011
- Associate Professor (with tenure), Michigan Technological University, 2011 - present
- Visiting Professor, MIT, January to December 2011 (hosted by Richard P. Stanley)

UNPAID VISITING POSITIONS (15 DAYS OR LONGER)

- Visiting Scholar, University of Notre Dame, March 2006 (hosted by Juan Migliore)

EDITORIAL ACTIVITIES

- Editorial Board member of Journal for Algebra and Number Theory Academia (JANTA), 2010 - present

SELECTED HONORS AND AWARDS

- National finalist, Italian Mathematics Olympics, 1995, 1996 and 1997. Ranking first for the Liguria Region in 1996
- Winner of an INdAM (Italian National Institute of Higher Mathematics) Postdoc, 2005-06 (I was one of only six Italian mathematicians selected for that academic year; declined)
- Outstanding Faculty Research Award (Junior level), Department of Mathematical Sciences, Michigan Tech, 2008
- Outstanding Faculty Research Award (Junior level), Department of Mathematical Sciences, Michigan Tech, 2010

SELECTED GRANTS AND FELLOWSHIPS

- Three Duncan and Urlla Carmichael Graduate Fellowships, Queen's University (2001-02, 2002-03 and 2003-04)
- Two Dean's Travel Grants for Doctoral Field Research, Queen's University (Spring 2003 and Spring 2004)
- Vetenskåpsradet (Swedish Research Council) Travel Grant (March 2006)
- CIRM (International Center of Mathematical Research, Trento, Italy) Grant for Research in Pairs (with M. Boij, J. Migliore, R. Mirò-Roig and U. Nagel; two weeks, July 2009)
- CRM (Center of Mathematical Research, Barcelona, Spain) Grant for Research in Pairs (with M. Boij, J. Migliore, R. Mirò-Roig and U. Nagel; ten days, July 2010)

Teaching Experience

- Teaching Assistant, Queen's University, 2001-2004
- Primary instructor, University of Notre Dame, 2006-07. Courses taught:
  - Calculus II for Business
  - Calculus I for Business
  - Calculus I for Life Sciences
- Primary instructor, Michigan Tech, 2007-2010 and 2012 - present. Courses taught:
  - Graduate Topics in Combinatorial Commutative Algebra
  - Graduate Topics in Commutative Algebra
  - Graduate Algebra II
  - Graduate Algebra I
  - Senior Abstract Algebra
  - Introduction to Abstract Algebra
  - Calculus I
- Primary instructor, MIT, 2011. Courses taught:
  - 18.304, the Undergraduate Seminar in Discrete Mathematics (in both Spring and Fall 2011)

International Schools Taught

- First Combinatorial South School: Modern methods in Combinatorics (ECOS 2013), funded by CIMPA (San Luis, Argentina, July 22 to August 2, 2013). Course in Algebraic Combinatorics (tentative). Title: *TBA*

Selected Talks and Presentations (other than at home institutions)

- Conference on Zero-dimensional Schemes and Related Topics (in honor of Tony Geramita, on the occasion of his sixtieth birthday), Acireale, Italy, June 2002. Paper presented at the Poster session
- Route 81 Conference on Commutative Algebra and Algebraic Geometry, Kingston, Canada, October 2002. Talk: *Extending the idea of compressed algebra to arbitrary socle-vectors*
- Algebraic Geometry seminar, KTH, Sweden, June 2003. Talk: *Extending the idea of compressed algebra to arbitrary socle-vectors*
- Algebraic Geometry seminar, University of Genova, Italy, July 2003. Talk: *Extending the idea of compressed algebra to arbitrary socle-vectors*
- Route 81 Conference on Commutative Algebra and Algebraic Geometry, Syracuse, NY, October 2003. Talk: *Extending the idea of compressed algebra to arbitrary socle-vectors, II: cases of non-existence*
- Algebraic Geometry seminar, University of Genova, Italy, March 2004. Talk: *Level algebras of type 2*
- Algebraic Geometry seminar, University of Genova, Italy, July 2004. Talk: *Stanley's theorem on codimension 3 Gorenstein h-vectors*
- Algebra and Geometry mini-Conference, Politecnico of Torino, Italy, November 2004.

Talk: *Extending the idea of compressed algebra to arbitrary socle-vectors*

- Algebraic Geometry seminar, University of Notre Dame, March 2006. Talk: *Stanley's theorem on codimension 3 Gorenstein h-vectors*
- Algebraic Geometry seminar, University of Notre Dame, April 2006. Talk: *Generic quotients of level algebras of arbitrary type*
- A.M.S. Meeting of Notre Dame, IN (Special Session on Combinatorial Algebraic Geometry), April 2006. Talk: *My viewpoint on a particular case of the Multiplicity Conjecture*
- Algebraic Geometry seminar, KTH, Sweden, May 2007. Talk: *A conjecture of Stanley on socle degree 4 Gorenstein h-vectors*
- Algebra seminar, Tulane University, October 2007. Talk: *Interval Conjectures for level Hilbert functions*
- Algebra seminar, Lakehead University, Canada, February 2008. Talk: *How many partial derivatives does a polynomial have?*
- Algebraic Geometry seminar, University of Notre Dame, March 2008. Talk: *Interval Conjectures for level Hilbert functions*
- A.M.S. Meeting of Bloomington, IN (Special Session on Combinatorial and Geometric Aspects of Commutative Algebra), April 2008. Talk: *Interval Conjectures for level Hilbert functions*
- Algebraic Geometry seminar, KTH, Sweden, June 2008. Talk: *Interval Conjectures for level Hilbert functions*
- C.M.S. Meeting of Ottawa, Canada (Special Session on Commutative Algebra and Algebraic Geometry), December 2008. Talk: *Interval Conjectures for Gorenstein and Level Hilbert Functions*
- Commutative Algebra and Algebraic Geometry seminar, CUNY, March 2009. Talk: *On the structure of pure O-sequences*
- A.M.S. Meeting of Lexington, KY (Special Session on Combinatorial Algebra), March 2010. Talk: *On the structure of pure O-sequences: unimodality, non-unimodality, and an interval conjecture*
- Algebra seminar, Tulane University, April 2010. Talk: *On the structure of a pure O-sequence. An overview*
- Algebraic Geometry seminar, University of Notre Dame, November 2010. Talk: *Some recent developments in the theory of pure O-sequences*
- Combinatorics seminar, MIT, February 2011. Talk: *Some recent developments in the theory of pure O-sequences*
- Combinatorics/Partitions seminar, Pennsylvania State University, March 2011. Talk: *The KOH terms and classes of N-modular diagrams of integer partitions*
- A.M.S. Meeting of Winston-Salem, NC (Special Session on Algebraic and Geometric Aspects of Matroids), September 2011. Talk: *Stanley's matroid h-vector conjecture in low rank*
- A.M.S. Meeting of Lincoln, NE (Special Session on Algebraic Geometry and Graded Commutative Algebra), October 2011. Talk: *On the Interval Property in algebra and combinatorics*
- Geometry-Algebra-Singularities-Combinatorics (GASC) seminar, Northeastern University, October 2011. Talk: *Zeilberger's KOH theorem and unimodal N-modular diagrams of integer partitions*
- C.M.S. Meeting of Toronto, Canada (Special Session on Algebraic Geometry and Commutative Algebra), December 2011. Talk: *On Stanley's matroid h-vector conjecture*
- Algebra seminar, Tulane University, March 2012. Talk: *Zeilberger's KOH theorem and unimodal N-modular diagrams of integer partitions*
- A.M.S. Meeting of Lawrence, KS (Special Session on Combinatorial Commutative Algebra), March 2012. Talk: *On Stanley's matroid h-vector conjecture*
- Route 81 special Conference (Tonyfest), in honor of Tony Geramita on the occasion

of his seventieth birthday, Kingston, Canada, October 2012. Talk: *TBA*

Publications

Books and monographs

1. (with M. Boij, J. Migliore, R. Mirò-Roig and U. Nagel) "On the shape of a pure O-sequence", Mem. Amer. Math. Soc., vii + 78 pages, to appear. Available on the arXiv

Publications in refereed journals

1. *I numeri di Fermat*, Periodico di Matematiche, VII, **5** (1998), no. 2-3, 63-68
2. *Some observations on the statistical independence and the distribution of zeros in the Selberg Class*, Rend. Circ. Mat. Palermo (2), **52** (2003), no. 2, 211-223
3. *Extending the idea of compressed algebra to arbitrary socle-vectors*, J. Algebra **270** (2003), no. 1, 181-198
4. *When are There Infinitely Many Irreducible Elements in a Principal Ideal Domain?*, Amer. Math. Monthly **111** (2004), no. 2, 150-152
5. *Extending the idea of compressed algebra to arbitrary socle-vectors, II: cases of non-existence*, J. Algebra **275** (2004), no. 2, 730-748
6. *Stanley's theorem on codimension 3 Gorenstein h-vectors*, Proc. Amer. Math. Soc. **134** (2006), no. 1, 5-8
7. *Level algebras of type 2*, Comm. Algebra **34** (2006), no. 2, 691-714
8. *When is there a unique socle-vector associated to a given h-vector?*, Comm. Algebra **34** (2006), no. 5, 1847-1860
9. *A non-unimodal codimension 3 level h-vector*, J. Algebra **305** (2006), no. 2, 949-956
10. *Improving the bounds of the Multiplicity Conjecture: the codimension 3 level case*, J. Pure Appl. Algebra **209** (2007), no. 1, 79-89
11. *Partial derivatives of a generic subspace of a vector space of forms: quotients of level algebras of arbitrary type*, Trans. Amer. Math. Soc. **359** (2007), no. 6, 2675-2686
12. (with J. Migliore) *The Hilbert functions which force the Weak Lefschetz Property*, J. Pure Appl. Algebra **210** (2007), no. 2, 465-471
13. *The h-vector of a relatively compressed level algebra*, Comm. Algebra **35** (2007), no. 4, 1087-1091
14. (with M. Boij) *Level Algebras with Bad Properties*, Proc. Amer. Math. Soc. **135** (2007), no. 9, 2713-2722
15. (with J. Migliore and U. Nagel) *An improved Multiplicity Conjecture for codimension three Gorenstein algebras*, Comm. Algebra **36** (2008), no. 1, 112-119
16. (with J. Migliore and U. Nagel) *A characterization of Gorenstein Hilbert functions in codimension four with small initial degree*, Math. Res. Lett. **15** (2008), no. 2, 331-349
17. (with J. Migliore and U. Nagel) *On the degree two entry of a Gorenstein h-vector and a conjecture of Stanley*, Proc. Amer. Math. Soc. **136** (2008), no. 8, 2755-2762
18. (with J. Migliore) *The strength of the Weak Lefschetz Property*, Illinois J. Math. **52** (2008), no. 4, 1417-1433
19. (with J. Migliore and U. Nagel) *Bounds and asymptotic minimal growth for Gorenstein Hilbert functions*, J. Algebra **321** (2009), no. 5, 1510-1521
20. (with J. Zylinski) *Forcing the Strong Lefschetz and the Maximal Rank Properties*, J. Pure Appl. Algebra **213** (2009), no. 6, 1026-1030
21. *Interval Conjectures for level Hilbert functions*, J. Algebra **321** (2009), no. 10, 2705-2715

22. (with M. Boij) *Some algebraic consequences of Green's hyperplane restriction theorems*, J. Pure Appl. Algebra **214** (2010), no. 7, 1263-1270
23. (with A. Van Tuyl) *Simplicial complexes and Macaulay's inverse systems*, Math. Z. **265** (2010), no. 1, 151-160
24. (with J. Li) *Monomial Complete Intersections, The Weak Lefschetz Property and Plane Partitions*, Discrete Math. **310** (2010), no. 24, 3558-3570
25. *The KOH terms and classes of unimodal N-modular diagrams*, J. Combin. Theory Ser. A **118** (2011), no. 8, 2498-2510

Preprints

1. (with T. Hà and E. Stokes) *Pure O-sequences and matroid h-vectors*, preprint. Available on the arXiv
2. (with R.P. Stanley) *On the rank function of a differential poset*, preprint. Available on the arXiv
3. (with C. Sandon) *Warnaar's bijection and colored partition identities, I*, preprint. Available on the arXiv
4. (with C. Sandon) *Warnaar's bijection and colored partition identities, II*, preprint. Available on the arXiv

Papers in preparation

1. (with M. Boij, J. Migliore, R. Mirò-Roig and U. Nagel) *Sharp bounds for level h-vectors*, in preparation
2. (with M. Boij, J. Migliore, R. Mirò-Roig and U. Nagel) *Flawlessness and the Lefschetz properties for level algebras*, in preparation
3. (with J. Migliore and U. Nagel) *Pure O-sequences: known results, applications, and open problems*, in preparation

Other publications

1. "La Classe di Selberg: distribuzione statistica e zeri delle combinazioni lineari", M.S. Thesis, University of Genova, Italy (2001)
2. "H-vectors and socle-vectors of graded artinian algebras", Ph.D. Thesis, Queen's University at Kingston, Canada (2004)

Collaborators

- Mats Boij (KTH, Sweden)
- Tai Hà (Tulane University)
- Jizhou Li (Rice University; when he was my undergraduate student)
- Juan Migliore (University of Notre Dame)
- Rosa M. Mirò-Roig (University of Barcelona, Spain)
- Uwe Nagel (University of Kentucky)
- Colin Sandon (MIT; when he was my undergraduate student)
- Richard P. Stanley (MIT)
- Erik Stokes (NSA)
- Adam Van Tuyl (Lakehead University, Canada)
- Jeffery Zylinski (Purdue University; when he was my undergraduate student)

Mentoring and Supervision

Postdocs/Visiting Assistant Professors

- Erik Stokes (Visiting Assistant Professor, Michigan Tech, 2008-2010)

Ph.D. students

- Kaixian Yu (Ph.D., Michigan Tech, in progress)
- Adrián Pastine (Ph.D., Michigan Tech, in progress). Adrián is sponsored by a Fulbright Scholarship

Master's students

- Alex Schaefer (M.S., Michigan Tech, 2008). Alex's following position: Ph.D. student at the University of Kansas
- Amer Tahat (M.S., Michigan Tech, in progress)

Undergraduate students

- Jeffery Zylinski (two Senior research projects, 2008 and 2009; Summer research Fellowship project, 2008; Michigan Tech). Jeffery's following position: Ph.D. student at Purdue University
- Jizhou Li (Senior research project, Michigan Tech, 2009). Jizhou won an Honorable Mention at the 2009 Putnam Competition as a Michigan Tech student. His following position: Ph.D. student at Rice University
- Ping Ngai (Brian) Chung (UROP research project funded by the Institute, MIT, 2011). Brian was a Medalist at three different editions of the International Mathematics Olympics
- Benjamin Lerner (UROP research project funded by the Institute, MIT, 2011)
- Colin Sandon (two UROP research projects funded by the Institute, MIT, 2011). Colin is, among his many achievements, a 2010 Putnam Fellow
- TaoRan Chen (UROP research project funded by the Institute, MIT, 2011)

Service at Michigan Tech

- Member of the Recruitment Committee for faculty positions, Department of Mathematical Sciences, 2008-09
- University Senator, 2009-2012
- Chair of the Senate Research Policy Committee and member of the University Research Advisory Council, 2009-10
- Member of the Graduate Committee, Department of Mathematical Sciences, 2009-10
- Member of the Recruitment Committee for faculty positions, Department of Mathematical Sciences, 2010-11

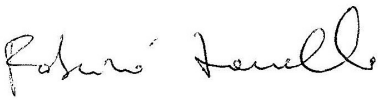
Other Professional Activities

- Referee for the following journals (with multiplicity ≥ 1):
  - Canad. J. Math.
  - Comm. Algebra
  - Discrete Math.
  - European J. Combin.
  - Expo. Math.
  - Forum Math.
  - J. Algebra
  - J. Algebraic Combin.
  - J. Combin. Theory Ser. A
  - J. Commut. Algebra
  - J. Pure Appl. Algebra
  - Proc. Amer. Math. Soc.
  - Turkish J. Math.
- Reviewer for MathSciNet (2003-2011)

- Organizer (with J. Migliore and U. Nagel) of a Special Session on Hilbert Functions in Commutative Algebra and Algebraic Combinatorics, A.M.S. Meeting of Notre Dame, IN, November 2010

NEWSPAPER INTERVIEWS, GIFTED CHILDREN OUTREACH

I have been giving a large number of interviews to Italian newspapers during the last several years, both about myself and my professional activities and, more important, the education of gifted children/young adults. Some interviews are also available online, including those published by Corriere della Sera and La Repubblica (the two main Italian newspapers) and Alice & Bob (a journal of Bocconi University, one of the leading European Business Schools). Since 2011, I am a member of the Scientific Committee of AISTAP (Italian Association for the Development of Talent and High Ability). I have been a member of Mensa Italia (where I served for two terms as Secretary of the Liguria Region) since 1997



Fabrizio Zanello
February 7, 2012