

CV and Publications

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Home Address: 19 Murdock Street, Cambridge, MA 02139  
Birth: 5/16/43 Marblehead, Massachusetts Citizenship: USA

**Education:** B.S. Massachusetts Institute of Technology, 1964  
Ph.D. Mathematics, MIT, 1970  
M.A. Counseling Psychology, Lesley College, 1990

**Teaching, Research:** Professor of Mathematics, Northeastern Univ. 1987-  
Associate Professor of Mathematics, Northeastern Univ., 1981-1987  
Assistant Professor of Mathematics, Northeastern Univ. 1978-1981  
Assistant Professor of Mathematics, U. of Texas. 1970-1978

**Honors and Awards:**

Invited participant: Mittag-Leffler Moduli Year, 2007 (one month)  
Senior Research Scientist Sponsor of two NSF Postdoctoral Fellows at Northeastern,  
1998-2001  
Provost Research Award, 1996-1997.  
One of PI's of NSF Bulgaria-US Exchange Program in Algebra, 1989-1993  
Senior Fulbright Research Scholar, U. of Nice 1980  
NSF-CNRS Exchange Fellowship, France, 1975-1976

**Contributions to Mathematics Community (other than publications)**

Coorganizer of Conference: "Syzygies" at NU, edited book of Abstracts, c. 1996,  
Coorganizer of AMS Special Session "Hilbert Scheme" at AMS Sectional meeting at  
NU, October, 2002.  
Organized editing of Ruth Michler's papers after her tragic accident at NU, in 2000.  
Referee for about 5-10 submitted articles a year, wide range of journals as Journal of Al-  
gebra, Proceedings AMS, Journal of Algebraic Geometry, Math Research Letters, Advances  
in Mathematics, Transformation Groups, Compositio, Pacific Journal of Mathematics, J.  
of Algebra and Number Theory.  
Coorganizer and cofounder of NU GASC seminar (Geometry, Algebra, Singularities  
and Combinatorics).  
Reviewer for MathSciNet (65 reviews appeared)

## A. Iarrobino: Publications as of September, 2009

### Ph.D thesis:

Families of ideals in a power series ring in two variables, (A. Mattuck, advisor), M.I.T., 1970.

### Articles and Books:

1. Punctual Hilbert Schemes, BAMS 78 (1972), 810-823 (MR 46 #7235).
2. Reducibility of the family of 0-dimensional schemes on a variety, Inventiones Math. 15 (1972), 72-77 (MR 46 #170).
3. Number of generic singularities, Rice University Studies 59, Part 1 (1972), 49-52 (MR 49 #10693).
4. An algebraic fibre bundle over  $P^1$  that is not a vector bundle, Topology 12 (1973), 229-232. (MR 49 # 5009)
5. **Memoir**, AMS:  
Punctual Hilbert Schemes, 111 p., A.M.S. Memoir #188, A.M.S., Providence, 1977. (MR 58 #5667)
6. Some zero-dimensional generic singularities: finite algebras having small tangent spaces (with J. Emsalem), Compositio Math. 36 (1978), 145-188 (MR 81c # 14004).
7. Irreducibility of the compactified Jacobian (with A. Altman and S. Kleiman), pp. 1-12 in Real and Complex Singularities, Oslo 1976, P. Holm, editor, Sijthoff & Noordhoff, Alphen aan den Rijn, Netherlands, 1978 (MR 58 #16650).
8. (with J. Briançon) Dimension of the punctual Hilbert scheme, Journal of Algebra 55 (1978), 536-544 (MR 80 g #14013).
9. Deformations of zero-dimensional complete intersections, after M. Granger, T. Gaffney, with appendix: Global Hilbert Scheme  $Hilb^Q(\mathbf{P}^r)$  after Gotzmann, pp. 92-105 in Proceedings of the Week of Algebraic Geometry, Bucharest, 1980, L. Badescu and H. Kurke, editors, Teubnertexte #40, B.G. Teubner, Leipzig, 1981 (MR 84j:#14012).
10. Deforming complete intersection Artin algebras., pp. 593-608 in Singularities, PSPM #40, part 1, American Math Society, Providence, RI, 1983.
11. Compressed algebras: Artin algebras having given socle degrees and maximal length, Trans. AMS 285 (1984), 337-378.
12. Compressed algebras and components of the punctual Hilbert scheme, pp.146-185 in Algebraic Geometry, Sitges 1983, Lecture Notes in Math. vol 1124, Springer-Verlag 1985.
13. Tangent cone of a Gorenstein singularity, in Proceedings of the conference on Algebraic Geometry, Berlin 1985, H.Kurke and M. Roczen, eds., Teubnertexte zur math. vol. 92, Teubner, Leipzig, 1986, pp. 163-176.
14. (with J. Elias) The Hilbert function of a Cohen-Macaulay local algebra: extremal Gorenstein algebras, J. Algebra 110 (1987), 344-356.
15. Hilbert scheme of points: Overview of last ten years, in Algebraic Geometry, Bowdoin 1985, S. Bloch, editor, PSPM #46 Part 2, Amer. Math. Soc., Providence, 1987, pp. 297-320

16. The Hilbert function of a Gorenstein Artin algebra, p.348- 364 in Commutative Algebra, Proceedings of a Microprogram held June 15-July 2,1987 at MSRI, M. Hochster, C. Hunecke, J.D. Sally, Editors, Springer-Verlag, New York, 1989.
17. (with D. Bernstein) A nonunimodal graded Gorenstein Artin algebra in codimension five, *Comm. in Algebra* 20(8), (1992), 2323-2336.
18. **Memoir**, AMS:  
Associated graded algebra of a Gorenstein Artin algebra, 117 p.,AMS Memoir Vol. 107 #524 (1994).
19. (with J. Emsalem), Inverse system of a symbolic power I. *J. Algebra*, 174, (1995), 1080-1090
20. Inverse system of a symbolic power, II: the Waring problem for forms, *J of Algebra*, 174, (1995), 1091-1110.
21. Inverse system of a symbolic power III: thin algebras and fat points, *Compositio Math.* 108, (1997), 319-356.
22. Gorenstein Artin algebras, Additive decompositions of forms, and the Punctual Hilbert Scheme, p. 53–96 in *Commutative Algebra, Algebraic Geometry, and Computational Methods*, D. Eisenbud, editor, Springer, Singapore (1999).
23. **Book**, Springer Lecture Notes:  
(With V. Kanev) *Power Sums, Gorenstein Algebras, and Determinantal Varieties*, (1999), 345+xxvii p., Springer Lecture Notes in Mathematics #1721.
24. Appendix C: The Gotzmann Theorems and the Hilbert scheme (with S. L. Kleiman), 23p. (This Appendix is separately listed on the title page of SLN #1721).
25. (With C. D’Cruz), High order vanishing ideals at  $n + 3$  points of  $P^n$ , in *Commutative algebra, homological algebra and representation theory (Catania/Genoa/Rome, 1998)*. *J. Pure Appl. Algebra* 152 (2000), no. 1-3, 75–82.
26. (With Young Hyun Cho), Hilbert functions of level algebras, *J. Algebra* 241 (2001), 745-758.

#### Recent articles:

27. Dr. Ruth I. Michler’s Research, p. 1–7 in “Topics in Algebraic and Noncommutative Geometry: Proceedings in memory of Ruth Michler”, C. Melles, J. Brasselet, and G. Kennedy, editors, AMS Contemporary Mathematics series, # 324, 2003.
28. (with J. Yaméogo) The family  $G_T$  of graded Artinian quotients  $G_T$  of  $k[x, y]$  of given Hilbert function, *Communications in Algebra*, Vol. 31 # 8, 3863–3916 (2003).  
(ArXiv alg-geom/9709021)
29. Ancestor ideals of vector spaces of forms and level algebras, *J. Algebra* **272** (2004), 530–580. (ArXiv math.AC/030728).
30. Betti strata of height two ideals, *J. Algebra* **285** (2005) no. 2, 835–855.  
(ArXiv : math.AC/0407364)
31. (with Hema Srinivasan) Some Gorenstein Artin algebras of embedding dimension four: components of  $PGOR(H)$  for  $H = (1, 4, 7, \dots, 1)$ , *J. of Pure and Applied Algebra* **201** (2005) # 1-3. 62–96. (ArXiv : math.AC/0412466)

32. Hilbert functions of Gorenstein algebras associated to a pencil of forms, pp. 273–286, in Proceedings of the Conference on Projective Varieties with Unexpected Properties, C. Ciliberto, A. Geramita, B. Harbourne, R. Miró-Roig, K. Ranestad, editors (de Gruyter) (2005) ISBN-10:3-11-018160-6. (ArXiv: math.AC/0412361)
- 33 (with R. Basili) Pairs of commuting nilpotent matrices, and Hilbert function. J. Algebra **320** # 3 (2008), 1235–1254. ArXiv math.AC: 0709.2304.
- 34 (with M. Boij) Reducible family of height three level algebras, Journal of Algebra **321** (2009), 86–104 (published online 18 Nov. 2008). ArXiv: math.AC/0707.2148.

**Accepted conditionally.**

- 35 (with Y. Cho) Inverse systems of punctual subschemes of  $P^n$ , 42p. (accepted conditionally, but some time ago J. Algebra).

**Most recent preprints/ in preparation, 2009.**

- a (with R. Basili and L. Khatami) Note on commuting nilpotent matrices (70p.) [This replaces “An involution on  $N_B$ , the nilpotent commutator of a nilpotent Jordan matrix  $B$ . (49 p.)”, joint with R. Basili.] This will be a source for (b) and an article in preparation on the  $P$  to  $Q(P)$  problem of (33).
- b (with R. Basili and L. Khatami) “Commuting nilpotent matrices and Artinian algebras” in preparation.
- c (with M. Boij) Duality for central simple modules of Artinian Gorenstein algebras.

**Reports (not refereed)**

- Réseaux de coniques et algèbres de longueur 7 associées (Nets of conics and length 7 algebras associated to them), with J. Emsalem, 49p., U. of Paris VII, (1977).
- Vanishing ideals at multiple points of  $P^r$ , p. 109-113, in Commutative Algebra, Extended abstracts of an International Conference at Vechta, 1994, W. Bruns, editor (1994).(BD 13).
- (With V. Kanev), The length of a homogeneous form, determinantal loci of catalecticants and Gorenstein algebras, preprint, 150 p.. 1996.

(An early version of the book [23], this was circulated, and led to work by several other groups. It was more specialized than the actual book [23]. Since this preprint was circulated and referenced in some articles by others, we listed in Appendix E of [23] which sections of the book replace which sections of this preprint.)

- Graded ideals in  $k[x,y]$  and Partitions II: Ramifications and a Generalization of Schubert Calculus.

(ArXiv alg-geom/9709021 has this, the early version of # 28, as well as revised 2003 version)

**Other preprints or in preparation**

Typed manuscripts or teX files needing some revision, pre 2007.

- c (with J. Yameogo) Graded ideals in  $k[x,y]$ , and Partitions,I: Partitions of diagonal lengths  $T$  and the hook code, preprint, 49 p.
- d (With Young Cho), Gorenstein Artin algebras arising from punctual schemes in Projective Space.

- e (with Hema Srinivasan) Some Gorenstein Artin algebras of embedding dimension four, II.
- f Pencils of forms and Artinian level algebras.
- g (with Ghione, Sacchiero), Restricted Tangent Bundles of Rational Curves in  $P^r$
- h The Degree and Genus of Arithmetically Cohen-Macaulay Space Curves.

## A. Iarrobino Talks from 1999

### 1999

- Univ. of Oslo, (October, 1999), "Local and Global Macaulay inverse system of a punctual scheme in  $P^n$ "
- Univ. of Stockholm (October, 1999), "Inverse systems and Gorenstein Artin algebras".
- KTH, Stockholm (Oct., 1999): "The Gotzmann Theorems and the Hilbert Scheme".
- Humboldt Univ., Berlin (Nov. 1999), "The Gotzmann Theorems and the Hilbert scheme".

### 2000

- A.M.S. Annual Meeting, Jan. 2000 (Washington, D.C.), Special Session on Singularities: "Inverse systems for singular subschemes of  $P^n$ "
- A.M.S. Annual Meeting, Jan. 2000 (Washington, D.C.), Special Session on Computation in Commutative Algebra and Algebraic Geometry, "Computation using Macaulay's inverse systems".
- Joint AMS,CMS meeting in Toronto, Canada, Special Session on Algebraic Geometry and Commutative Algebra (September, 2000), "Level Artin algebras: components of  $LEV-ALG(T)$ "
- Cornell University Colloquium (Oliver Talk), Oct, 2000: "What is a Hilbert scheme"

### 2001

- U. Missouri Colloquium, April, 2001, "What is a Hilbert scheme"
- U. Missouri Algebra Weekend, April, 2001 "Some Gorenstein algebras of height four"
- CIRM, Lumini, France: July, 2001,RENCONTRE, Résolution des singularités et géométrie non commutative, à la mémoire de Ruth Michler: "Families of Gorenstein Artin algebras of codimension 4 (with H. Srinivasan). "

Participant, Ruth commemoration: "La vie academique de Ruth Michler"

### 2002

- Northeastern Univ. Geometry Algebra Singularities Combinatorics (GASC) Seminar Jan. 14,2002, "Some families of Gorenstein algebras of height four and the Hilbert schemes of curves on  $\mathbf{P}^3$ ."
- Univ. de Paris VII, (March, 2002) Séminaire de Singularités, "Des algèbres Gorensteins Artiniens de hauteur 4"
- Conference on Hilbert schemes, Vector bundles, and their interplay with Representation Theory, U. of Missouri (April, 2002), The varieties  $G_T$  parametrizing graded ideals in  $k[x, y]$ , and partitions. (Contributed talk).
- Norwegian Academy of Sciences: Algebraic Geometry (May, 2002) Conference in honor of Steven Kleiman's 60th birthday: "Some families of Artinian Gorenstein algebras, and the Hilbert schemes of curves on  $\mathbf{P}^3$ ."
- Conference on Zero Dimensional Schemes: Acireale, June, 2002 (60th birthday conference for A. Geramita): lead talk: "Some Gorenstein Artinian algebras of height four" (included historical background on the study of Gorenstein Artinian algebras).

### 2003

- Conference in Commutative Algebra, Banff Research Center, Canada, (April, 2003) Families of level Artinian algebras.

## 2004

- Lawrenceville AMS sectional meeting, special session on Commutative Algebra and Algebraic Geometry, "Pencils of forms and Gorenstein algebras"
- Brandeis University Fellowship of the Ring Seminar: "Hilbert functions of Artinian Gorenstein algebras"
- Northeastern U. Tapas seminar: "Artinian Gorenstein algebras", and "Introduction to Artinian algebras"
- Univ. of Versailles Colloquium, "Level algebras"
- Univ. of Barcelona, "Gorenstein Artinian algebras and punctual schemes"
- Univ of Perugia Colloquium, "The Hilbert function of an Artinian Gorenstein algebra"
- Siena conference on Projective Varieties with Unexpected Properties, "Pencils of forms and level algebras"
- Nashville AMS sectional meeting, Special session on Algebraic Geometry and Commutative Algebra, "Consecutive genera for irreducible ACM space curves"

## 2005

- Fields Institute Conference on Resolutions, Inverse Systems, and Coinvariants held at the University of Ottawa, "Artinian Gorenstein algebras and inverse systems" (January)
- KTH and University of Stockholm joint algebra and geometry seminar: "Betti strata" (April)
- Northeastern University Tapas seminar: "Higher derivatives of forms and level Artinian algebras" (June)
- Midwest Algebra, Geometry and their Interactions Conference (MAGIC) at U. Notre Dame: "Reducible families of level algebras" (October)

## 2006

- Fields Institute Workshop on 'Computational and Combinatorial Commutative Algebra', Toronto, "Irreducible components of families of level algebras" (August). (The Overheads are posted at "<http://www.math.neu.edu/~iarrobino/Toronto-FieldsOvhd>".)

## 2007

- Fields Institute Miniconference, Algebraic Combinatorics Meets Inverse Systems, Centre de Recherches Mathématiques, Montreal: "Pairs of commuting nilpotent matrices and Hilbert functions", (January). Northeastern GASC seminar: Commuting nilpotent matrices and Hilbert function.
- Univ. of Texas, Austin, "Pairs of commuting nilpotent matrices and Hilbert functions" (February)
- Mittag-Leffler Institute, Moduli Year "Commuting nilpotent matrices and the punctual Hilbert scheme" (May)

## 2008

- Conference: Algebraic combinatorics and combinatorial algebra: Dalhousie University. "Involution on the nilpotent commutator of a nilpotent matrix". (January)
- Kranskja Gora, Slovenia -5th Linaar Algebra Workshop, June 2, 2008, "Nilpotent subalgebra of the centralizer"
- Bucharest, Romania: IMAR, Conference in Algebraic Geometry, July 3, 2008, "An algebra of commuting nilpotent matrices." (The overheads are posted <http://www.math.neu.edu/~iarrobino/Bucharestb.pdf>).