

## Letterio Gatto's CV

Web of Science ResearcherID K-1149-2014  
ORCID 0000-0002-3446-2663  
e-mail [letterio.gatto@polito.it](mailto:letterio.gatto@polito.it)  
webpage <https://staff.polito.it/letterio.gatto/index.htm>



- General Data

Born in Torino, 1964, May 23rd;  
married with Sheila Maria Gomes (2003);  
father of Giuseppe (2004) and Giuliano (2006).

- Studies

**1982.** Maturità Scientifica, Liceo Scientifico Sperimentale Blaise Pascal. Final score 60/60;  
**1987.** Laurea in Matematica, Università degli Studi di Torino. Final score 110/110 cum laude;  
**1990, January–June.** Visiting Ph.D. student, Boston University;  
**1993.** Dottorato di Ricerca in Matematica (Consorzio Universitario Torino–Genova);  
**1994–1995.** NATO postdoctoral scholarship at Vakgroep Wiskunde Rijkuniversiteit te Utrecht;

- Employment & Work Experiences

**1992–1998.** *Ricercatore Universitario* at Dipartimento di Matematica del Politecnico di Torino;  
**1998–1999.** *Pesquisador Visitante*, CNPq<sup>1</sup>, at Universidade Federal de Minas Gerais, Belo–Horizonte, Brazil;  
**1999–2002.** Professor Adjunto, Universidade Federal de Pernambuco, Recife, Brazil;  
**2002–present.** Associate Professor at Dipartimento di Scienze Matematiche<sup>2</sup> “G.L. Lagrange”, Politecnico di Torino;

---

<sup>1</sup>Conselho Nacional da Pesquisa e desenvolvimento

<sup>2</sup>former “Dipartimento di Matematica”

- Grant & Awards.

- **2020–2022.** *Mentoring African Research in Mathematics* (MARM) Award, by London Mathematical Society (LMS), International Mathematical Union (IMU) and African Millennium Mathematics Science Initiative (AMMSI). Mentorship of the Department of Mathematics of University of Namibia (UNAM), Windhoek (<https://www.lms.ac.uk/grants/mentoring-african-research-mathematics> and <https://www.marm-lms.unam-namibia.org/>)
- **Cientista Visitante by FAPESP**
  - \* **2016/07–2017/02.** IBILCE–UNESP, Campus São José do Rio Preto (SP), Processo n. 016/03161-3;
  - \* **2012/08–2013/01.** IBILCE–UNESP, Campus São José do Rio Preto (SP), Processo n. 2012/02869-1;
  - \* **2008/09/01 al 2008/10/01.** Campus São José do Rio Preto (SP), Processo n. 453280/2008-0.
- **2008/10–2008/12.** Professor Visitante CNPq, Universidade Federal de Pernambuco;
- **2000–2001.** CNPq’s researcher (produtividade em pesquisa), processo n. 300680/99-6;

- Participation to meetings as invited speaker

- **2021.** *Schubert Calculus on Grassmannians & Vertex Operators*, (contributed talk) INPANGA 2020 (+1) on Schubert Variety, Banach Center, Palac Będlewo, Będlewo, July 12–17, 2021 <https://www.impan.pl/en/activities/banach-center/conferences/20-impanga/lectures>;
- **2019.**
  - \* INPANGA Seminar 2019, In honour of Alain Lascoux, [Symmetric polynomials and the legacy of Alain Lascoux](#), Polish Academy of Science, 25 October;
  - \* *The cohomology of Grassmannians is a  $gl_n$ -module*, Geometria in Bicocca, Milano, September, 16–17;
- **2018.**
  - \* *On the bosonic vertex representation of  $gl_\infty$* , Algebraic Geometry and Foliations (in celebration of Israel Vainsenchers 70th Birthday), November 6–8;
  - \* Short Course (6 hours) on *Quatro Aulas de Teoria dos Polinômios Simétricos*, Mathematics Summer School, *Universidade Federal de Pernambuco*, Recife, January 8–12;
  - \* Short Course (6 hours) on *Quatro Aulas de Teoria dos Polinômios Simétricos*, Mathematics Summer School of *Universidade Federal de Sergipe*, Aracaju, January 15–29;

- **2017.**
  - \* *Multiplying polynomials by matrices*, plenary talk, International Meeting in Commutative Algebra and Related Topics (IMCARA), Universidade de São Paulo at São Carlos;
  - \* *The cohomology of Grassmannians represents Lie algebras of endomorphisms*, plenary talk, 8th Workshop on Algebraic Singularities Theory and 11th Workshop on Singularities and Geometry, Niteroi, RJ, Brazil, January 16–20 Gennaio;
  - \* *Polynomial Rings are  $gl$ -modules*, plenary talk, Alga Meeting, IMPA, Rio de Janeiro, Brazil, February 6–10;
- **2016.**
  - \* *a) Embedding the Grassmann Cone in a polynomial ring & b) Integrals in the Grassmannian of lines*, invited talks in thematic sessions, 1st Joint Meeting Brazil–Italy in Mathematics, IMPA, Rio de Janeiro, August 29–September 2,
- **2015.**
  - \* *Generic Linear Recurrent Sequences and Related Topics*, 30°, Colóquio Brasileiro de Matemática, IMPA, Rio de Janeiro, Five hours long short course, July 26th–31st.
- Webinars
  - **2021.**
    - \* [\*On the Vertex Operators Representation of Lie Algebras of Matrices\*](#), Brazilian Algebraic Geometry (BRAG) Seminar, July 30, 2021;
    - \* [\*Hasse-Schmidt derivations on Grassmann semi-algebras\*](#), joint Algebra Seminar Bar-Ilan and Jeruslame University, February 24, 2021;
    - \* [\*HIDEAs to work with\*](#), LAGOON (Longitudinal Algebra and Geometry Open Online) Seminar, February 18, 2021.
  - **2020.**
    - \* *Bosonic and Fermionic Representations of Endomorphisms of Exterior Algebras* ([video](#)), [Representation Theory & Mathematical Physics Seminar](#) (Kansas State University & University of Texas, Arlington), November 10, 2020;
- Journal peer reviewer for
  - Asian European Journal of Mathematics;
  - Atti dell’Accademia Peloritana dei Pericolanti;
  - Boletim da Sociedade Brasileira de Matemática;
  - Far East Mathematical Journal;

- Fundamenta Mathematicae;
- Geometria Dedicata
- Indiana University Mathematical Journal
- International Mathematics Research Notices (IMRN);
- Journal of the London Mathematical Society;
- Journal of Algebra;
- Journal of Algebra and its Applications;
- Journal of Geometry;
- Journal of Pure and Applied Algebra;
- Journal of Singularities;
- Le Matematiche;
- Linear and Multilinear Algebra;
- Memoires of the American Mathematical Society;
- Michigan Mathematical Journal;
- Rendiconti del Seminario Matematico e Fisico dell'Università e del Politecnico di Torino;
- Transformation Groups;
- Turkish Mathematical Journal;

- External peer reviewer

- CNPq
- Conicyt
- Fonds Voor Wetenschappelijk Onderzoek (FWO, Belgium)
- INPAN
- CINECA (Marie-Curie Fellowships)
- CONSOLIDATE THE FOUNDATIONS 2015 (Universit di Tor Vergata)
- IMPA (for selections of candidates for the Summer School, 2014)

- Membership of judging boards for Ph.D. Candidates

- Universidade Fedearal de Minas Gerais, Belo Horizonte, Brazil, Candidate: Sarah Faria Monteiro Mazzini, October 10th, 2021)
- Universidade Fedearal de Minas Gerais, Belo Horizonte, Brazil, Candidate: Vanderlei Lopes de Jesus, August 13th, 2021)
- Universidade Fedearal de Minas Gerais, Belo Horizonte, Brazil, Candidate: Vinicius Lara Lima, July 20th, 2020)

- IMPA (Member of judging Committee for a Doctoral Thesis, 2018. Candidate: Rick Richster)
- UFPe (member of judging Committee for a Doctoral Thesis, 2001, Candidate; Joachim Kock)

- **Ph.D. students**

- *Ommolbanin Behzad*, Institute of Advanced Studies in Basic Sciences, Zanjan, IRAN. Thesis title: *Hasse–Schmidt Derivations and Vertex Operators on Exterior Algebras*. Defended February 7th, 2021;
- *Antonio Nigro*, Politecnico di Torino, Italy. Thesis title *Sections of Grassmann Bundles.*, defended March 17t, 2010;
- *Táise Santiago Costa Oliveira*, Politecnico di Torino, Italy. Thesis title: *Schubert Calculus on a Grassmann Algebra*, defended March 27th, 2006.

- **Research.**

- **1987.** Construction of a locally free substitute of sheaves of principal parts for complex algebraic curve with Gorenstein Singularities [41, 40, 39, 38, 37, 36, 24];
- **1995.** Construction of the first jet extension of the relative Wronskian on a family of stable curves with application to the study of divisors defined by special Weierstrass points [33, 34] and used in [29, 28, 31];
- **2005.** Formulation of the new notion of Hasse–Schmidt derivation on an exterior algebra (or: HiDEA=**H**igher **D**erivations on **E**xterior **A**lgebras) with applications to Schubert Calculus [30, 26, 25, 18];
- **2008.** Statement and proof of the following Theorem: *let  $C$  be a uninodal reducible stable curve  $X \cup Y$  of genus  $g = g_X + g_Y$  such that  $X \cap Y = \{Q\}$ . A point  $P \in X \setminus \{Q\}$  is limit of a special Weierstrass point on nearby smooth curve of genus  $g$  if and only if either  $P$  is a special ramification point of the linear system  $K_X((g + Y + 1)Q)$  or it is a ramification point of the linear system  $K_X((g_Y = 2)Q)$  and  $Q$  is a Weierstrass point of the component  $Y$ , where  $K_X$  denotes the canonical bundle of a smooth curve  $X$  [29, 28];*
- **2012.** Generic linear ODEs, application to Schubert calculus and generalized Wronskians [23, 21, 22, 27];
- **2018.** Substantial; generalization of the Cayley’s and Hamilton theorem (each endomorphism of a finite dimensional vector space is root of its characteristic polynomial), via the use of HiDEA (together with I. Scherbak)[17];
- **2020.** HiDEA and representation Theory of Lie (semi)algebra of Endomorphisms [11, 12, 13, 16, 20, 19].

## Publication List

### – Books (Scientific Monographs) –



1. *Hasse-Schmidt derivations on Grassmann algebras* (With applications to vertex operators), IMPA Monographs, vol. 4, Springer, [Cham], 2016, ISBN 978-3-319-31841-7 [MR3524604](#).
2. *From classical to modern algebraic geometry*, Trends in the History of Science, Birkhäuser/Springer, Cham, 2016, Corrado Segre’s mastership and legacy, (con G. Casnati, A. Conte, L. Giacardi, M. Marchisio e A. Verra), ISBN 978-3-319-32992-5, [MR3776651](#).
3. *Generic linear recurrent sequences and related topics*<sup>3</sup>, Publicações Matemáticas do IMPA. [IMPA Mathematical Publications], Instituto Nacional de Matemática Pura e Aplicada (IMPA), Rio de Janeiro, 2015, 30° Colóquio Brasileiro de Matemática, [30th Brazilian Mathematics Colloquium], ISBN 978-85-244-0405-4, [MR3363563](#).
4. *Linear ODEs: an algebraic perspective*, Publicações Matemáticas do IMPA, [IMPA Mathematical Publications], Instituto Nacional de Matemática Pura e Aplicada (IMPA), Rio de Janeiro, 2012, XXII Escola de Álgebra, 40 anos. [XXII Brazilian Algebra Meeting, 40th anniversary], Lecture notes from a minicourse held in Salvador de Bahia, July 15–20, 2012, ISBN 978-85-244-0347-7, [MR 3370122](#).
5. *Schubert calculus: an algebraic introduction*<sup>4</sup>, Publicações Matemáticas do IMPA, [IMPA Mathematical Publications], Instituto Nacional de Matemática Pura e Aplicada (IMPA), Rio de Janeiro, 2005, 25° Colóquio Brasileiro de Matemática, [25th Brazilian Mathematics Colloquium], ISBN 85-244-0227-X, [MR2168587](#).
6. *Intersection theory on moduli spaces of curves*, Monografias de Matemática [Mathematical Monographs], vol. **61**, Instituto de Matemática Pura e Aplicada (IMPA), Rio de Janeiro, 2000, ISBN 85-244-0166-4, [MR 1806540](#).

---

<sup>3</sup>Testo delle lezioni del corso di cinque ore tenuto, su invito, al Congresso Nazionale dei Matematici Brasiliani del 2015 (30° Colóquio Brasileiro de Matemática).

<sup>4</sup>Testo delle lezioni del corso di cinque ore tenuto, su invito, al Congresso Nazionale dei Matematici Brasiliani del 2005

– Books (Didactic Monographs) –



7. *Lezioni di Algebra Lineare e Geometria per l'Ingegneria*, con esercizi e elementi di MATLAB<sup>®</sup>, III Edizione , CLUT, Torino, 2019, ISBN 978-88-7992-441-2.
8. *Lezioni di Algebra Lineare e Geometria per l'Ingegneria* (I veri appunti del corso), II Edizione riveduta e corretta, CLUT, Torino, 2013, ISBN 978-88-7992-343-9.
9. *Lezioni di Algebra Lineare e Geometria per l'Ingegneria* (I veri appunti del corso), I Edizione, CLUT, Torino, 2012, ISBN 978-88-7992-245-6.
10. *Un'introduzione Amichevole alla forma canonica di Jordan*, CLUT, 1998, ISBN 88-7992-139-8.

– Accepted Papers for Publication –

– Papers published on peer Reviewed Journals –

11. *Clifford Semialgebras*, Rendiconti del Circolo Matematico di Palermo (2022), Rend. Circ. Mat. Palermo, II. Ser (2022). <https://doi.org/10.1007/s12215-022-00719-w> Rend. Circ. Mat. Palermo, II. Ser (2022). , <https://arxiv.org/abs/2108.03617> (with A. Chapman, L. Rowen);
12. *Polynomial ring representations of endomorphisms of exterior powers*, Collect. Math. **73** (2022), no. 1, 107–133, MR4358249 (with O. Behzad, A. Contiero, R. Vidal Martins);
13. *Bosonic and fermionic representations of endomorphisms of exterior algebras*, Fund. Math. **256** (2022), no. 3, 307–331. MR4358457 (with O. Behzad);
14. *Grassmann semialgebras and the Cayley-Hamilton theorem*, Proc. Amer. Math. Soc. Ser. B **7** (2020), 183–201 (with L. Rowen)
15. *Schubert Derivations on the Infinite Wedge Power*, Bulletin of the Brazilian Math. Society, [ArXiv:1901.06853](https://arxiv.org/abs/1901.06853), 2020 (con P. Salehyan).

16. *The Cohomology of the Grassmannian is a  $gl_n$ -module*, Communication in Algebra 2020, **48**, no. 1, 274–290, [doi:10.1080/00927872.2019.1640240](https://doi.org/10.1080/00927872.2019.1640240), 2019 (with P. Salehyan).
17. *Hasse–Schmidt derivations and the Cayley–Hamilton theorem for exterior algebras*, [Functional Analysis and Geometry](#). Selim Grigorievich Krein Centennial (P. Kuchment, E. Semenov eds.), [Contemporary Mathematics](#) **733**, American Mathematical Society, 144–165, 2019, [doi:10.1090/conm/733](https://doi.org/10.1090/conm/733), (con Inna Scherbak).
18. *On Plücker equations characterizing Grassmann cones*, Schubert varieties, equivariant cohomology and characteristic classes – IMPANGA 15, EMS Ser. Congr. Rep., Eur. Math. Soc., Zürich, 2018, pp. 97–125, <https://arxiv.org/abs/1603.00510> [MR3754189](#) (with P. Salehyan);
19. *From linear recurrence relations to linear ODEs with constant coefficients*, J. Algebra Appl. **15** (2016), no. 6, 1650109, 23, [MR3479813](#) (with D. Laksov).
20. *The boson-fermion correspondence from linear ODEs*, J. Algebra **415** (2014), 162–183, [MR3229512](#), (with P. Salehyan).
21. *“On one property of one solution of one equation” or linear ODE’s, Wronskians and Schubert calculus*, Moscow Math. J. **12** (2012), no. 2, 275–291, 460, [MR2978757](#), (with I. Scherbak) .
22. *On generalized Wronskians*, Contributions to algebraic geometry, EMS Ser. Congr. Rep., Eur. Math. Soc., Zürich, 2012, pp. 257–295, [MR2976945](#), (with I. Scherbak).
23. *The Wronskian and its derivatives*, Atti Accad. Peloritana Pericolanti Cl. Sci. Fis. Mat. Natur. **89** (2011), no. 2, C1C8902001, 14, [MR2899163](#)
24. *Jets of line bundles on curves and Wronskians*, J. Pure Appl. Algebra **215** (2011), no. 6, 1528–1538, [MR2769248](#), (with C. Cumino e A. Nigro).
25. *Equivariant Schubert calculus*, Ark. Mat. **48** (2010), no. 1, 41–55, [MR2594585](#), (with T. Santiago).
26. *Schubert calculus on a Grassmann algebra*, Canad. Math. Bull. **52** (2009), no. 2, 200–212, [MR2512308](#), (with T. Santiago).
27. *Families of special Weierstrass points*, C. R. Math. Acad. Sci. Paris **347** (2009), no. 21–22, 1295–1298, [MR2561041](#), (with P. Salehyan).
28. *Limits of special Weierstrass points*, Int. Math. Res. Pap. IMRP (2008), no. 2, Art. ID rpn001, 65, [MR2431731](#), (with C. Cumino e E. Esteves).



29. *Special ramification loci on the double product of a general curve*, Q. J. Math, **59** (2008), no. 2, 163–187, [MR2428074](#) (with C. Cumino e E. Esteves).
30. *Schubert Calculus via Hasse-Schmidt Derivations*, Asian J. Math. **9** (2005), no. 3, 315–321. [MR2214955](#)
31. *A geometric interpretation and a new proof of a relation by Cornalba and Harris*, Comm. Algebra **31** (2003), no. 8, 3753–3770, Special issue in honor of Steven L. Kleiman, [MR2007383](#), (with E. Esteves).
32. *Limit Weierstrass schemes on stable curves with 2 irreducible components*, Atti Accad. Naz. Lincei Cl. Sci. Fis. Mat. Natur. Rend. Lincei (9) Mat. Appl. **12** (2001), 205–228 (2002), [MR1898462](#), (with M. Coppens).
33. *On the closure in  $\overline{M}_g$  of smooth curves having a special Weierstrass point*, Math. Scand. **88** (2001), no. 1, 41–71, [MR1813519](#).
34. *Derivatives of Wronskians with applications to families of special Weierstrass points*, Trans. Amer. Math. Soc. **351** (1999), no. 6, 2233–2255, [MR1615963](#), (with F. Ponzà).
35. *Families of Wronskian correspondences*, Geometric and combinatorial aspects of commutative algebra (Messina, 1999), Lecture Notes in Pure and Appl. Math., vol. **217**, Dekker, New York, 2001, pp. 199–210, [MR1824229](#).
36. *Weierstrass points on singular curves*, Rend. Sem. Mat. Univ. Politec. Torino **55** (1997), no. 2, 145–170 (1998), [MR1680491](#), (with E. Ballico).
37. *On the monodromy of Weierstrass points on Gorenstein curves*, J. Algebra **175** (1995), no. 2, 633–643. [MR1339660](#), (with E. Ballico).
38. *On bounds for the Weierstraß weight at singular points of Gorenstein curves*, Boll. Un. Mat. Ital. B (7) **9** (1995), no. 4, 901–918, [MR1369384](#), (with E. Ballico).
39. *Weight sequences versus gap sequences at singular points of Gorenstein curves*, Geom. Dedicata **54** (1995), no. 3, 267–300. [MR1326732](#)
40. *Weierstrass loci and generalizations, I*, Projective geometry with applications, Lecture Notes in Pure and Appl. Math., vol. **166**, Dekker, New York, 1994, pp. 137–166, [MR1302947](#).
41. *Computing gaps sequences at Gorenstein singularities*, Projective geometry with applications, Lecture Notes in Pure and Appl. Math., vol. **166**, Dekker, New York, 1994, pp. 111–128, [MR1302945](#).

42. *A remark on Griffiths' cohomological interpretation of Lax equations: higher-genus case*, Atti Accad. Sci. Torino Cl. Sci. Fis. Mat. Natur. **126** (1992), no. 3-4, 63–70. [MR1231817](#), (with E. Previato).
43. *Algebraic curves and differential equations: an introduction*, The Curves Seminar at Queen's, Vol. VIII (Kingston, ON, 1990/1991), Queen's Papers in Pure and Appl. Math., vol. **88**, Queen's Univ., Kingston, ON, 1991, pp. Exp. B, 69, [MR1143106](#), (with S. Greco).
44. *An introduction to hypersymplectic vector spaces*, Atti Accad. Sci. Torino Cl. Sci. Fis. Mat. Natur. **124** (1990), no. 5-6, 235–247, [MR1146290](#).
45. *Closed subschemes of  $\mathbf{P}^r$ : remarks on the cohomology of their 1-codimensional subschemes*, J. Algebra **163** (1994), no. 1, 265–280, [MR1257318](#), (con M. L. Spreafico).
46. *Principal connections from  $G$ -invariant linear connections*, Boll. Un. Mat. Ital. B (7) **4** (1990), no. 4, 905–926, [MR1086711](#), (with M. Ferraris e M. Francaviglia).
47. *Reducibility of  $G$ -invariant linear connections in principal  $G$ -bundles*, Differential geometry and its applications (Eger, 1989), Colloq. Math. Soc. János Bolyai, vol. **56**, North-Holland, Amsterdam, 1992, pp. 231–252, [MR1211660](#), (with M. Ferraris e M. Francaviglia).
48. *Towards an affine approach to Kaluza-Klein theory*, Atti Sem. Mat. Fis. Univ. Modena **37** (1989), no. 1, 131–145, [MR994060](#), (with M. Ferraris e M. Francaviglia).
49. *Remarks on right-invariant vectorfield bases in principal bundles and their applications to decomposition theorems*, Rend. Sem. Mat. Univ. Politec. Torino **46** (1988), no. 3, 309–322 (1990), [MR1101107](#), (with M. Ferraris e M. Francaviglia).
50. *A natural decomposition of  $S^1$ -invariant linear connections on  $S^1$ -bundles*, Istit. Lombardo Accad. Sci. Lett. Rend. A **122** (1988), 65–77 (1989), [MR1053574](#), (with M. Ferraris e M. Francaviglia).

– **More Papers** –

51. *Lectures on  $K$ -theoretic computations in enumerative geometry, by A. Okounkov*, invited book review, [EMS Newsletter](#), European Math. Society, June 2019, [Issue 112](#), p. 52–53, ISSN 1027-488X.
52. *La mosca di Hilbert: l'ultimo teorema di Fermat da Fermat ai nostri giorni*, Associazione Subalpina Mathesis, Conferenze e Seminari 1995–1996, 134–148 (historical article, in italian).

– [Selected popular articles about math \(in italian\)](#) –

[Mathematical tales on \*Mathematical Fiction Page\* by Alex Kasman \(in Italian\)](#)

### [Selected Citations](#)

(click on the links)