CURRICULUM VITAE

FRANCESCA CIOFFI

Education

1991 Laurea (MS) in Mathematics (with top marks 110/110 and honors)
1997 PhD in Applied Mathematics and Computer Science, thesis on Calcolo di generatori di ideali di punti e curve algebriche

Positions

1996-2020 assistant professor of Geometry (MAT03), Università degli Studi di Napoli Federico II, Dipartimento di Matematica e Applicazioni

2020-today associate professor of Geometry (MAT03), Università degli Studi di Napoli Federico II, Dipartimento di Matematica e Applicazioni

Research interests

In the topics of Computational Algebra and Algebraic Geometry, I have published several papers in international journals and in proceedings of international conferences (with anonymous referee) about problems concerning in particular:

- Zero-dimensional schemes and parametric varieties
- Hilbert function and Castelnuovo-Mumford regularity
- Computational methods for the study of the Hilbert scheme
- Liftings of ideals and of projective schemes

also in collaboration with scholars of the Universities of Genoa and Turin. I have been speaker in several international conferences and have had talks in other Universities.

National Evaluations

• ASN 01/A2 II Fascia - GEOMETRIA E ALGEBRA (I quadrimestre 2016-2018). I received the national abilitation for associate professor from March 28, 2017, with the following indicators: #articles=11 (limit=4); #citations=35 (limit=15); Index H=4 (limit=2)

• FFABR 2017 - Ricercatori

(http://www.anvur.it/wp-content/uploads/2018/05/Beneficiari_FFABR_Ricercatori.pdf)

Visitings

Due to the collaborations with scholars of the Universities of Genoa and Turin, I have spent several visiting periods in these universities, even with financial supports from the hosting institution and once from GNSAGA (INdAM) (January 2014).

Publications

- 1. An effective decomposition theorem for Schubert varieties (with D. Franco and C. Sessa). J. Symbolic Comput. 121 (2024).
- 2. Regularity of primes associated with polynomial parametrisations (with A. Conca). Ann. Sc. Norm. Super. Pisa Cl. Sci. Vol. XXIV (2023), 1149–1154.
- 3. Polynomial identities related to special Schubert varieties (with D. Franco, C. Sessa). Appl. Algebra Engrg. Comm. Comput. 34 (2023), no. 2, 245—265.
- 4. The close relation between border and Pommaret marked bases (with C. Bertone). Collectanea Mathematica 73 (2022), 181–201.
- 5. Smoothable Gorenstein points via marked schemes and double generic initial ideals (with C. Bertone and M. Roggero). Experimental Mathematics 31 (2022), 120–137.
- 6. The range of all regularities for polynomial ideals with a given Hilbert function. Journal of Algebra 566 (2021), 435–442.
- 7. From grids to pseudo-grids of lines: Resolution and seminormality (with M. Guida and Luciana Ramella). Journal of Algebra and its Applications 20 (2021), 2150213.
- 8. On almost revlex ideals with Hilbert function of complete intersections (with C. Bertone). Ricerche di Matematica 60 (2020), 153–175.
- Functors of liftings of projective schemes (with C. Bertone and D. Franco). J. Symbolic Comput. 94 (2019), 105-125.
- 10. *Macaulay-Like marked bases* (with C. Bertone and M. Roggero). Journal of Algebra and its Applications 16 (2017), no. 5, 1750100, 36 pp.
- 11. Double-Generic Initial Ideal and Hilbert Scheme (with C. Bertone and M. Roggero). Ann. Mat. Pura Appl. (4) 196 (2017), 19–41.
- The scheme of liftings and applications (with C. Bertone, M. Guida, M. Roggero).
 J. Pure Appl. Algebra 220 (2016), 34--54.
- A combinatorial description of finite O-sequences and aCM genera (with P. Lella, M. G. Marinari).
 J. Symbolic Comput. 73 (2016), 104–119.
- Minimal Castelnuovo-Mumford regularity for a given Hilbert polynomial (with P. Lella, M. G Marinari, M. Roggero). Exp. Math. 24 (2015), 424–437.
- When the positivity of the h-vector implies the Cohen-Macaulay property (with R. Di Gennaro), Ric. Mat. 63 (2014), 195–209.
- Upgraded methods for the effective computation of marked schemes on a strongly stable ideal (with C. Bertone, P. Lella, M. Roggero). J. Symbolic Comput. 50 (2013), 263– 290.
- 17. On rational varieties smooth except at a seminormal singular point (with Ferruccio Orecchia, Luciana Ramella). Communications in Algebra, 40 (2012), 26–41.
- Segments and Hilbert schemes of points (with P. Lella, M. G. Marinari, M. Roggero). Discrete Math. 311 (2011), no. 20, 2238–2252.
- Flat families by strongly stable ideals and a generalization of Gröbner bases (with M. Roggero). J. Symbolic Comput. 46 (2011), 1070–1084.
- Liaison and Cohen-Macaulayness conditions (with R. Di Gennaro). Collect Math. 62 (2011), 173–186.
- 21. Regularity bounds by minimal generators and Hilbert function (with M. Grazia Marinari, Luciana Ramella). Collect. Math. 60 (2009), 89–100.
- 22. Geometric Description of Lifting Monomial Ideals (with M. Grazia Marinari, Luciana Ramella). Communications in Algebra, 33 (2005), 1483–1499.

- Bivariate Hermite Interpolation and Linear Systems of Plane Curves with Base Fat Points (with C. Ciliberto, R. Miranda, F. Orecchia). Proc. of the Sixth Asian Symposium (ASCM 2003). Computer Mathematics, Lect. Notes Series on Computing Vol. 10, 87–102, 2003.
- 24. A termination criterion for algorithms that compute algebraic curves via points. Zerodimensional schemes and applications (Naples, 2000), 23–31, Queen's Papers in Pure and Appl. Math., 123, Queen's Univ., Kingston, ON, 2002.
- Computing minimal generators of ideals of elliptic curves (with L. Chiantini, F. Orecchia). Applications of algebraic geometry to coding theory, physics and computation (Eilat, 2001), 23-35, NATO Sci. Ser. II Math. Phys. Chem., 36, Kluwer Acad. Publ., Dordrecht, 2001.
- 26. Remarks on the computation of minimal finite free resolutions. Appl. Algebra Engrg. Comm. Comput. 12 (2001), 351-363.
- Computation of Minimal Generators of Ideals of Fat Points (with F. Orecchia). Proc. of the 2001 International Symposium on Symbolic and Algebraic Computation (ISSAC 2001) (July 22-25, 2001), 72-76.
- 28. Minimally generating ideals of rational parametric curves in polynomial time (with G. Albano, F. Orecchia, Isabella Ramella). J. Symbolic Comput. 30 (2000), 137–149.
- 29. Minimally generating ideals of points in polynomial time using linear algebra. Ricerche Mat. 48 (1999), 55-63.
- 30. An observation about the computation of the Hilbert function applied to the conductor of points, (Italian). Ricerche Mat. 44 (1995), 449-457 (1996).
- Algorithms for constructing minimal generators of ideals of projective points in polynomial time. Zero-dimensional schemes (Ravello, 1992), 113-120, de Gruyter, Berlin, 1994.

Preprints

- Open Covers and Lex Points of Hilbert schemes over quotient rings via relative marked bases (with Cristina Bertone, Matthias Orth and Werner Seiler). Available at https://arxiv.org/pdf/2203.11770.pdf
- Computing marked families via sygyzy forecasting, (with Cristina Bertone and Paolo Lella), in preparation

Software

Points 3.7 (software for computations on points) (with Ferruccio Orecchia and Isabella Ramella), (2004) available at https://www.dma.unina.it/ cioffi/EPoints.html (also see https://www.swmath.org/software/1064).

This software has been positively evaluated as research product in Italian VQR 2004-2010.

Other research products

• Long abstract: Construction of almost revlex ideals with Hilbert function of some complete intersections (with C. Bertone), Proceedings of EACA 2018, Monografias de la Real Academia de Ciencias n. 43, 55–58, 2018 (E. Artal y J.I. Cogolludo (Editores)). http://www.raczar.es/webracz/seccion4.monografiasPublicadas.do?enlaceMenu= seccion4.monografiasPublicadas ISSN:1132-6360

- Long abstract: *Borel ideals construction and gin* (with M. Grazia Marinari, Luciana Ramella), abstract of a contribution to the conference "Differential Algebra And Related Computer Algebra" (Catania, March 26-29, 2008). Volume by Tipografia universitaria Catania, March 2008, 65-67.
- Minimal Generators from Reduced Groebner Bases Obtained by Interpolation Methods (with F. Orecchia). LMCS 2002 (Symposium in honor of Bruno Buchberger's 60th birthday, October 20-22, Austria) Edited by Koji Nakagawa, 97–107, 2002.
- Contribution in volume: *The minimal resolution conjecture: a partial solution*, In CO-COA VI, Proc. of The International School (Villa Gualino, Torino, May-June, 1999), 274-275, Queen's Papers in Pure and Applied Mathematics, No. 120, 2001, Kingston, Ontario, Canada. ISBN:0889118566
- PhD Thesis on Calcolo di generatori di ideali di punti e curve algebriche (1997).

Conference talks, posters and seminars

- Marked bases for some quotient rings and applications, November 08, 2023, University of Kassel, Germany (invited by Prof. W. Seiler).
- Marked bases for some quotient rings and applications part II, Special Session on "Effective ideal theory and combinatorial techniques in commutative and non commutative rings and their applications" at ACA 2023, July 17-21, 2023, Warsaw, Poland (invited by the organizers of the Special Session).

https://iit.sggw.edu.pl/instytut-informatyki-technicznej/aca2023/

• Liftings of projective schemes, in: Seminar Algebraische Geometrie, Freie Universität Berlin Fachbereich Mathematik und Informatik Mathematisches Institut, June 13, 2022, (invited by Prof. Klaus Altmann)

http://www.mi.fu-berlin.de/math/groups/ag-algebra/seminaralgeom/index.html

- Regularity of primes associated with polynomial parametrisations, Special Session on "Combinatorics and Computation in Commutative Algebra" at the RSME biannual conference, January 17-21 2022, Ciudad Real, Spain, (online due to the covid 19 pandemic), (invited by Prof. P. Gimenez)
- Colloquium on Lifting of polynomial ideals and of projective schemes: a very useful algebraic and geometric construction, online, School of Mathematics and Natural Sciences University of Southern Mississippi, Hattiesburg (April 30, 2021) (invited by Prof. John Perry)

https://www.usm.edu/mathematics-natural-sciences/mathematics-colloquium.php

- The range of all regularities for polynomial ideals with a given Hilbert function, in: "Algebra&Geometry seminar" organized by the group of Algebra Commutativa of Università degli Studi di Genova (December 04, 2019), (invited) https://gites.google.com/view/eg.googue/cominer?outbucer=2
- https://sites.google.com/view/ag-genova/seminar?authuser=2
- The range of all regularities for a given Hilbert function, in: "Seminari di Algebra e Geometria Algebrica" organized by Università degli Studi di Torino and Politecnico di Torino (February 20, 2019), (invited by Prof. C. Bertone)
- Construction of almost revlex ideals with Hilbert function of some complete intersections (with C. Bertone), EACA 2018, XVI Encuentro de Algebra Computacional y Aplicaciones, Zaragoza, July 3-6 2018.

https://eventos.unizar.es/15634/section/13557/xvi-eaca-encuentro-de-algebra-computational-y-aplicationes.html

- Liftings of projective schemes (with C. Bertone, D. Franco), Workshop on Theory and Computation in Algebra and Algebraic Geometry (with a dedication to Paolo Valabrega on the occasion of his 70th(+2) Birthday), Torino, Italy, May 29-30 2017, (invited)
- Lo Schema dei Lifting (with C. Bertone, M. Guida, M. Roggero), XX Congresso UMI, Siena, 7-12 settembre 2015.
- Poster: What does a Hilbert scheme look like? (with C. Bertone, M. Roggero), MEGA 2015, Trento, Italy, June 15–19, 2015.
- Lo schema dei lifting, in: "Seminari di Algebra e Geometria Algebrica" organized by Università degli Studi di Torino and Politecnico di Torino (November 19, 2014), (invited by Prof. Margherita Roggero)
- Flat Families by strongly stable ideals and a generalization of Gröbner bases (with M. Roggero), MEGA 2011 (Effective Methods in Algebraic Geometry) Stockholm, Sweden, May 30, June 3, 2011, (invited)
- *Ideali di Borel e numeri di Betti*, Dipartimento di Matematica, Università degli Studi di Torino (February 19, 2009), (invited by Prof. Margherita Roggero)
- Regularity bounds for curves by minimal generators and Hilbert function (with M. G. Marinari, Luciana Ramella), "Zero-Dimensional Schemes and Applications". Anacapri 2006, June, 1-3.
- Poster on *Geometric Description of Lifting Monomial Ideals* (with M. G. Marinari, Luciana Ramella), Projective varieties with unexpected properties, Conference in honour of the 150th anniversary of the birth of G. Veronese, Siena June 8-12, 2004
- Remarks on the computation of minimal finite free resolutions, MEGA 2000 Conference, 20-24 June, 2000 (Bath, UK).
- A termination criterion for algorithms that compute algebraic curves via points, International Workshop "Zero-Dimensional Schemes and Applications". Napoli, February 9-12, 2000.
- Poster on *Minimally generating ideals of rational parametric curves in polynomial time* (with G. Albano, F. Orecchia, I. Ramella), COCOA VI Conference (Villa Gualino, Torino, June 1999).

Organization of conferences

• ORGANIZER (with C. Bertone): Special Session Algebraic Geometry from an Algorithmic Point of View at the 28th Conference on Applications of Computer Algebra (ACA 2023), July 17-21, 2023, Warsaw, Poland.

Url: https://sites.google.com/view/cristinabertone/acasession2023

• ORGANIZER (with C. Bertone): Special Session Algebraic Geometry from an Algorithmic Point of View at the 26th Conference on Applications of Computer Algebra (ACA 2021), July 23-27 2021, Virtual, Online.

Url: https://sites.google.com/view/cristinabertone/acasession2021

• ORGANIZER (with C. Bertone): Special Session Algebraic Geometry from an Algorithmic Point of View at the 25th Conference on Applications of Computer Algebra (ACA 2019), July 16-20 2019, Montréal, Canada.

Url: https://sites.google.com/view/cristinabertone/acasession2019.

• ORGANIZER (with A. Ardizzoni, C. Bertone, P. Lella): International Workshop A twoday journey in Computational Algebra and Algebraic Geometry (dedicated to Margherita Roggero), Turin, September 27-28 2018. Url: https://www.2dayjourneycaag.unito.it/home

 LOCAL ORGANIZER (with A. De Paris, F. Orecchia): International Workshop Zero-Dimensional Schemes and Applications. Napoli, Italy, February 9-12, 2000. Proceedings: Zero-Dimensional Schemes and Applications (Naples, 2000), Queen's Papers in Pure and Appl. Math., 123, Queen's Univ., Kingston, ON, 2002.

Editorial activity

 Guest editor (with Cristina Bertone and Luis M. Pardo): Special Issue: "Algebraic Geometry from an Algorithmic Point of View", ACA 2019, Montréal, Canada, July 16–20, 2019 Bertone, C., Cioffi, F., Pardo, L.M. Applicable Algebra in Engineering, Communications and Computing, 2020, 31(5-6), pp. 323–324

Participation to research groups

- Participation to Progetto strategico CNR 1996: "Applicazioni della matematica per la tecnologia e la società", Sottoprogetto "Calcolo simbolico", Tema di ricerca "Sistemi di calcolo polinomiale", from January 01, 1997 to January 01, 1999
- Participation to Sezione 3 of GNSAGA (Gruppo Nazionale per le Strutture Algebriche, Geometriche e le loro Applicazioni), INdAM, from January 01, 1998 to December 31, 1998
- Participation to PRIN 1997: Geometria Algebrica, algebra commutativa e aspetti computazionali, from February 15, 1998 to January 01, 2000
- Participation to Progetto Giovani Ricercatori 1999: Teoria degli invarianti e coomologia degli spazi classificanti di gruppi affini, from January 01, 2000 to January 01, 2001
- Participation to Sezione 3 of GNSAGA (Gruppo Nazionale per le Strutture Algebriche, Geometriche e le loro Applicazioni), INdAM, from which I have been several financial supports for participation to conferences, schools and other research activities; from January 01, 2000 to today
- Participation to PRIN 2000: Geometria sulle Varietà Algebriche Geometria Algebrica e Algebra Computazionale, from December 20, 2000 to December 20, 2002
- Participation to PRIN 2002: Geometria delle Varietà Algebriche Geometria Algebrica e Algebra Computazionale, from December 16, 2002 to December 16, 2004
- Participation to PRIN 2004: Geometria sulle Varietà Algebriche Geometria Algebrica e Algebra Computazionale, from November 30, 2004 to November 30, 2006
- Participation to PRIN 2006: Varietà Algebriche, Teoria dei Motivi e Geometria Aritmetica - Geometria Algebrica e Algebra Computazionale, from February 09, 2007 to February 09, 2008
- Participation to the project FARO 2009: Metodi analitici e computazionali per problemi matematici avanzati a carattere intra e interdisciplinari, from January 01, 2010 to June 01, 2012
- Participation to PRIN 2008: Geometria Algebrica e Aritmetica, Teorie Coomologiche e Teoria dei Motivi Geometria Algebrica e Algebra Computazionale, from March 22, 2010 to March 22, 2012
- Participation to PRIN 2010-2011: Geometria delle Varieà Algebriche, from February 01, 2013 to February 01, 2016
- Collaboration (with financial support) to Prin 2015 (2015EYPTSB_011 Geometry of Algebraic Varieties, Unità locale Tor Vergata, CUP E82F16003030006)

- From 2009, participation to a research group on algorithmic methods for the study of the Hilbert scheme, consisting of scolars from Dipartimento di Matematica e Applicazioni dell'Università di Napoli Federico II, from Dipartimento di Matematica dell'Università di Torino and also from Dipartimento di Matematica dell'Università di Genova
- From 2021, participation to a project for the development of computational methods by quasi-stable ideals features, together with C. Bertone (University of Turin, Italy), M. Oorth and W. Seiler (University of Kassel, Germany).

Referee and review activity

• Reviewer for Zentralblatt MATH.

• Referee for several mathematical journals and proceedings of conferences, among which: AAECC, Journal of Symbolic Computation, Ricerche di Matematica, ISSAC 2016 (International Symposium on Symbolic and Algebraic Computation), Mega 2019, Mega 2021, Journal of Algebra and Its Applications, Journal of Commutative Algebra, Mathematical Methods in the Applied Sciences and others.

Teaching activity

(from 1996/97 to 2011/12, for a total of 16 years) Problem sessions in *Geometria* 1 and 2 for Mathematics

- (2004/05 and 2005/06, for a total of 2 years) *Elementi di Geometria Algebrica* (modulo 1) for Mathematics
- (1996/97, 1997/98, for a total of 2 years) Collaboration to *Geometria Algebrica* for Mathematics, about the Computational Aspects of Algebraic Geometry

(2005/06, for 1 year) Collaboration to Fondamenti di Geometria Algebrica e Geometria Differenziale for Mathematics, covering the part about Algebraic Geometry (from 2006/07 up today, for a total of 17 years) Geometria for Computer Science

(from 2014/15 up today, for a total of 10 years) Geometria e Algebra for Engineering

Tutorial activity

Participation to exams and graduation exam commissions Advisor of 21 thesis in Algebraic Geometry and in Computational Algebra.

- PLS (Progetto Lauree Scientifiche) Introduzione alla Geometria for students from the last year of Italian high school (February 3,13,22,28, 2023).
- Supervision of PhD students (Dott.ssa Margherita Guida, thesis on "Computer Algebra Algorithms on Projective Curves", tutor Prof. F. Orecchia, November 2002).
 Component of a judging commission PhD "MATEMATICA" XXVI ciclo (2014). Dipartimento di Matematica "Giuseppe Peano" dell'Università degli Studi di Torino (candidate Michela Ceria, thesis on "Combinatorial structure of monomial ideals", tutor Proff. M. G. Marinari e M. Roggero).

Institutional activity

• Representative of researchers in the Faculty of Scienzes MFN of Università degli Studi di Napoli Federico II for the academic years 1998-2001 and 2004/05-2006/07.

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- Contribution to the event *Università Porte Aperte*, Università di Napoli Federico II, 2007.
- Component of two judging commissions for the assignment of research fellowships, Dipartimento di Matematica e Appl. dell'Università di Napoli Federico II (MAT03, Geometry) (years 2003 and 2012)
- Component of one commission for the proposal of assignment of teachings (MAT03, Geometry), academic year 2016-2017

Naples, November 15, 2023

DIPARTIMENTO DI MATEMATICA E APPLICAZIONI "R. CACCIOPPOLI", UNIVERSITÀ DEGLI STUDI DI NAPOLI FEDERICO II, VIA CINTIA, 80126 NAPOLI, ITALY