

CURRICULUM VITAE

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Education

- **PhD in Mathematics**,
Università degli Studi di Firenze, 28 September 2004.
Thesis title: *Simplicity of vector bundles on \mathbb{P}^n and exceptional bundles*.
Advisor: Prof. G. Ottaviani.
- **Degree in Mathematics (Laurea)**,
Università degli Studi di Milano, 26 February 2001, with full marks (110/110 e lode)
Thesis title: *Sul comportamento osculatorio di superfici speciali e una congettura di Pienes-Tai*.
Advisor: Prof. Antonio Lanteri.
- **High school degree**,
Classical studies at Liceo Ginnasio Statale “A. Manzoni”, Lecco, 1996, with full marks.

Employment and Fellowships

- 2018: Winner of the **Italian Habilitation for Full Professorship** (Abilitazione scientifica nazionale - I fascia, S.C. 01/A2 Geometria e Algebra).
- Present position, since November 2016: **Associate Professor, (S.S.D. MAT/03 Geometria)**, at the Industrial Engineering and Mathematical Sciences Department, Università Politecnica delle Marche, Ancona.
- Previous position: December 2008 - October 2016, **Assistant Professor** (Ricercatrice, S.S.D. MAT/03 Geometria), at the Industrial Engineering and Mathematical Sciences Department, Università Politecnica delle Marche, Ancona.
- Maternity Leaves: September 2014 - April 2015 and November 2012 - May 2013.
- 2012: Winner of the **Italian Habilitation for Associate Professorship** (Abilitazione scientifica nazionale - II fascia, S.C. 01/A2 Geometria e Algebra).
- 2009: Winner of a **INDAM fellowship** for studies abroad, one month.
- January 2008 - December 2008: **Postdoctoral fellow**, Department of Mathematics “G. Castelnuovo”, University “La Sapienza”, Rome.
- 2005: Winner of a **CNR-NATO fellowship** for studies abroad, six months.
- July 2004 - June 2007: **Postdoctoral fellow**, Department of Mathematics and Architecture, University of Florence.

Research Projects

- 2009-2023: Responsible for research funds University Scientific Research (RSA). Title of the project: *Geometry of algebraic varieties and applications*.
- Beneficiary of FFABR 2017 funds - Associated professors.

Participation to Research Projects

- 2017-2020: Participant to the Italian Project PRIN 2015: *Geometry of Algebraic Varieties*. Coordinator: Prof. Verra.
- 2013-2016: Participant to the Italian Project PRIN 2010-2011: *Varietà reali e complesse: geometria, topologia e analisi armonica*. Coordinator: Prof. Ricci.
- 2008-2010: Participant to the Italian Project PRIN 2007: *Proprietà geometriche delle varietà reali e complesse*. Coordinator: Prof. Ancona.
- 2006-2007: Participant to the Italian Project PRIN 2005: *Proprietà geometriche delle varietà reali e complesse*. Coordinator: Prof. Ancona.
- 2003-2004: Participant to the Italian Project PRIN 2002: *Proprietà geometriche delle varietà reali e complesse*. Coordinator: Prof. Ancona.

Research Interests

Algebraic Geometry:

Sheaves and vector bundles on complex projective varieties, Simplicity and stability of vector bundles, Moduli spaces, Steiner bundles, Exceptional bundles, ACM bundles, Fano threefolds, Derived categories.

Higher secant varieties of complex projective varieties, Special linear systems, Polynomial interpolation, Zero-dimensional schemes and fat points, Application to real and complex tensor theory.

Birational geometry. Properties of divisors and cycles in higher dimensional varieties. Cones of divisors and curves. Mori dream spaces.

Publications

26. E. Ballico, M.C. Brambilla, *On minimally Terracini finite sets of points in projective spaces*. Preprint 2023.
25. M.C. Brambilla, O. Dumitrescu, E. Postingshel, and L.J. Santana Sánchez, *Duality and polyhedrality of cones for Mori dream spaces*. Preprint 2023.
24. A. Altavilla, E. Ballico, M.C. Brambilla, *Twistor fibers in hypersurfaces of the flag threefold*. **New York Journal of Mathematics**, Volume 29 (2023), pp 1117 - 1148.
23. A. Altavilla, E. Ballico, M.C. Brambilla, S. Salamon, *Twistor geometry of the flag manifold*. **Mathematische Zeitschrift** vol. 303, 24 (2023).
22. M.C. Brambilla, O. Dumitrescu and E. Postingshel, *Weyl cycles on the blow-up of \mathbb{P}^4 at eight points*. The Art of Doing Algebraic Geometry. **Trends in Mathematics**. Birkhauser, Cham. (2023).
21. A. Altavilla, E. Ballico, M.C. Brambilla, *Surfaces in the flag threefold containing smooth conics and twistor fibers*. **Mediterr. J. Math.** 19, 281 (2022).

20. M.C. Brambilla, G. Staglianò, *Algebraic Boundaries Among Typical Ranks for Real Binary Forms of Arbitrary Degree*. **Foundations of Computational Mathematics**, vol. 21 (2021), 1003-1022.
19. M.C. Brambilla, G. Staglianò, *On the algebraic boundaries among typical ranks for real binary forms*. **Linear Algebra and its Applications**, vol. 557 (2018), 403-418.
18. M.C. Brambilla, O. Dumitrescu and E. Postinghel, *On the effective cone of \mathbb{P}^n blown-up at $n+3$ points*. **Experimental Mathematics**, vol. 25 (2016) 4, 452-465.
17. M.C. Brambilla, O. Dumitrescu and E. Postinghel, *On linear systems of \mathbb{P}^3 with nine base points*. **Annali di Matematica Pura ed Applicata**, DOI: 10.1007/s10231-015-0528-5
16. M.C. Brambilla, O. Dumitrescu and E. Postinghel, *On a notion of speciality of linear systems in \mathbb{P}^n* . **Transactions of the American Mathematical Society**, vol. 367 (2015), 5447-5473.
15. M.C. Brambilla and D. Faenzi, *Vector bundles on Fano threefolds of genus 7 and Brill-Noether loci*. **International Journal of Mathematics**, vol. 25 (2014) 3, 1450023 (59 pages).
14. M.C. Brambilla and D. Faenzi, *Rank 2 stable sheaves with odd determinant on Fano threefolds of genus 9*. **Mathematische Zeitschrift**, vol. 275 (2013) 1-2, 185-210.
13. H. Abo and M.C. Brambilla, *On the dimensions of secant varieties of Segre-Veronese varieties*. **Annali di Matematica Pura ed Applicata**, vol. 192 (2013) 1, 61-92.
12. H. Abo and M.C. Brambilla, *New examples of defective secant varieties of Segre-Veronese varieties*. **Collectanea Mathematica**, vol. 63, (2012) 3, 287-297.
11. E. Ballico, M.C. Brambilla, F. Caruso, and M. Sala, *Postulation of general quintuple fat point schemes in \mathbb{P}^3* . **Journal of Algebra**, vol. 363, (2012), 113-139.
10. M.C. Brambilla and G. Ottaviani, *On partial polynomial interpolation*. **Linear Algebra and its Applications**, vol. 435 (2011), p. 1415–1445.
9. M.C. Brambilla and D. Faenzi, *Moduli spaces of rank 2 ACM bundles on prime Fano threefolds*. **Michigan Mathematical Journal**, vol. 60 (2011), 113–148.
8. H. Abo and M.C. Brambilla, *Secant varieties of Segre-Veronese varieties $\mathbb{P}^m \times \mathbb{P}^n$ embedded by $\mathcal{O}(1, 2)$* . **Experimental Math.**, vol. 18 (2009) n. 3, 369–384.
7. M.C. Brambilla and L. Costa, *G-exceptional vector bundles on \mathbb{P}^2 and representations of quiver*. **Journal of Algebra**, vol. 321 (2009), n. 4, 1343–1365.
6. E. Ballico and M.C. Brambilla, *Postulation of general quartuple fat point schemes in \mathbb{P}^3* . **Journal of Pure and Applied Algebra**, vol. 213 (2009), n. 5, 1002–1012.
5. M.C. Brambilla and D. Faenzi, *Spazi di moduli di fasci aritmeticamente Cohen-Macaulay su varietà di Fano della serie principale*. **Boll. Unione Mat. Ital. (9)**, vol. II (2009), 71-91.
4. M.C. Brambilla, *Semistability of certain bundles on a quintic Calabi-Yau threefold*. **Revista Matematica Complutense**, vol. 22 (2009), n. 1, 53–61.
3. M.C. Brambilla and G. Ottaviani, *On the Alexander-Hirschowitz theorem*. **Journal of Pure and Applied Algebra**, vol. 212 (2008), n. 5, 1229–1251.
2. M.C. Brambilla, *Cokernel bundles and Fibonacci bundles*. **Mathematische Nachrichten**, vol. 281 (2008), n. 4, 499–516.
1. M.C. Brambilla, *Simplicity of generic Steiner bundles*. **Boll. Unione Mat. Ital. Sez. B, Artic. Ric. Mat.(8)**, vol. 8 (2005), n. 3, 723–735.

Visiting positions

- April 2011, Institut Mittag-Leffler, Stockholm: participant at the program “Algebraic Geometry with a view toward applications”.
- May 2009, Pau (France): visiting at the Mathematics Department, University of Pau.
- May - June 2008, Pau (France): visiting at the Mathematics Department, University of Pau.
- February - March 2008, Barcelona: participant at the program “*Semester on Moduli Spaces*”, invited by Rosa Maria Miró-Roig and Laura Costa.
- January 2008, Moscow (Idaho): visiting at the Department of Mathematics, University of Idaho, invited by Hirotachi Abo.
- April - October 2005, Warsaw: fellowship at Instytut Matematyki, Uniwersytet Warszawski, advisors: Jarosław Wiśniewski and Adrian Langer.
- March 2005, Salamanca: visiting at the Mathematics Department, University of Salamanca.
- May - June 2002, Madrid: visiting student at the Algebra Department, Universidad Complutense de Madrid, invited by Enrique Arrondo.

Invited talks

- July 2023: *Duality of cones for Mori dream spaces*, Conference “Homemade Algebraic Geometry, celebrating Enrique Arrondo’s 60th birthday”, 10-13 July, 2023, Alcalà de Henares, Spain.
- September 2022: *On the dimension of linear systems with multiple base points*. AGATES kickoff workshop, 19-23 September, 2022 Warsaw University, Poland.
- August 2021: *Algebraic Boundaries among Typical Ranks for Real Binary Forms*. SIAM Conference on Applied Algebraic Geometry (AG21), Minisymposium: “Algebra and Geometry of Tensors 2: Structured Tensors”, online event.
- September 2019: *On the algebraic boundaries among typical ranks for real binary forms*. “XXI Congresso UMI”, Pavia.
- July 2019: *On special linear systems of \mathbb{P}^n with multiple base points*, Classical Algebraic Geometry in Milano.
- September 2015: *Specialità di sistemi lineari con punti multipli in spazi proiettivi*, “XX Congresso UMI”, Siena.
- June 2015: *On special linear systems of P_n with multiple base points*, MEGA Conference, Trento.
- September 2011: *Varietà delle secanti a varietà di Segre-Veronese*, “XIX Congresso UMI”, Bologna.
- April 2011: *Dimension of higher secant varieties of Segre-Veronese varieties*, Mittag-Leffler Institut, Stockholm.
- May 2009: *Vector bundles on projective spaces and Fibonacci numbers*, “Rencontre d’Algèbre Pau-Zaragoza”, Pau.
- December 2008: *Fibrati ACM su varietà di Fano tridimensionali*, Christmas Workshop, University of Milano.
- May 2008: *Variétés de sécants et interpolation polynomiale*, University of Pau.

- May 2008: *Moduli di fibrati vettoriali su Fano threefold di genere 7 e luoghi di Brill-Noether su curve di genere 7*, University of Milan.
- May 2008: *Spazi di secanti e interpolazione polinomiale*, University of Rome 3.
- March 2008: *Moduli spaces of bundles without intermediate cohomology on anticanonical threefolds*, Workshop “Moduli spaces of vector bundles: algebro-geometric aspects”, Barcelona.
- February 2008: *Fibrati senza coomologia intermedia su varietà di Fano tridimensionali*, “Seminario di Algebra e Geometria”, University of Roma I.
- January 2008: *Vector bundles on Fano threefolds and Brill-Noether loci*, Colloquium, University of Idaho, Moscow.
- January 2008: *Secant varieties and polynomial interpolation*, AMS Special Session on Secant Varieties and Related Topics (Joint Mathematics Meetings), San Diego (California).
- December 2007: *Moduli of Vector Bundles and Brill-Noether loci*, SISSA, Trieste.
- September 2007: *Spazi di secanti e interpolazione polinomiale*, “XVIII Congresso UMI”, Bari.
- September 2007: *Secant varieties and polynomial interpolation*, Workshop “The Geometry of Special Varieties”, Trento.
- June 2007: “*Vector bundles on Fano threefolds of genus 7*”, GAEL XV, Istanbul.
- March 2007: *Vector bundles on Fano threefolds of genus 7 and Brill-Noether loci*, University of Barcelona.
- October 2006: *Moduli di fibrati vettoriali su Fano threefold di genere 7 e luoghi di Brill-Noether su curve di genere 7*, Conference “Progressi Recenti in Geometria Reale e Complessa”, Levico Terme.
- February 2006: “*Fibrati di Steiner e di Fibonacci*”, University of Pisa.
- October 2005: “*Stability of vector bundles*”, University of Warsaw.
- August 2005: *Steiner and Fibonacci bundles on \mathbb{P}^n* , SMI, Cortona.
- May 2005: *Steiner and Fibonacci bundles on \mathbb{P}^n* , University of Warsaw.
- April 2005: *Fibrati di Fibonacci su \mathbb{P}^n* , Firenze.
- March 2005: *Numeri di Fibonacci e fibrati su spazi proiettivi*, University of Salamanca.
- September 2004: *Semplicità di fibrati su spazi proiettivi*, Workshop “Progressi Recenti in Geometria Reale e Complessa”, Levico Terme.
- May 2004: *Fibrati di Steiner e numeri di Fibonacci*, Conference “Giornate di geometria algebrica e argomenti correlati VII”, Rimini.
- July 2003: *Simplicity of generic Steiner bundles*, SMI, Cortona.

Poster presentations

- June 2007: Conference “Algebraic Geometry in Higher Dimensions”, Levico Terme. Two posters with titles: *Vector bundles on Fano Threefolds of Genus 7 and Brill-Noether Loci* and *Bundles with no intermediate cohomology on prime anticanonical threefolds*.
- June 2004: Conference “Projective varieties with unexpected properties”, Siena. Poster with title: *Steiner bundles and Fibonacci numbers*.

Organization of conferences and workshops

- October 2023: co-leader (with Alessandra Bernardi) in the research group on *Tensor Decompositions* at WICA (Woman in Commutative Algebra) II, Trento.
- June 2021: Part of the organizing committee of *GO60, Pure Applied Algebraic Geometry, celebrating Giorgio Ottaviani's 60th birthday*, an online CIRM event.
- September 2017: Organizer of the workshop *Geometria Algebrica e Tensori 2017-2018*, Ancona.

Working Seminars

- 2015-17: I contributed to the joint working seminar on *Real Algebraic Geometry and Tensors*, organized by the Algebraic Geometry Group of Universities of Siena, Ferrara and Firenze.
- 2007: Co-organizer with Daniele Faenzi of a working seminar on *Vector bundles on Fano three-folds*, University of Firenze.
- 2006: I contributed to the working seminar on *Secant varieties of projective varieties and applications*, organized by Giorgio Ottaviani, University of Florence.
- 2002-2003: Co-organizer of a graduate students working seminar on *Surfaces*. Firenze.
- 2001-2002: Co-organizer of a graduate students working seminar on *Curves*. Firenze.

Teaching Experience

Schools for Graduate Students

- July 2014: Summer School “An Interdisciplinary Approach to Tensor Decomposition”, Trento. As a *junior speaker*, I gave the lecture “Tensors, secant varieties and interpolation problems” and I was in charge of the exercise session.
- June 2009: a lecture on *Secant varieties to Segre-Veronese varieties*, in the Ph.D. course by J.M. Landsberg on “Geometry of varieties in spaces of tensors”, University of Florence.

Undergraduate level

- Engineering Faculty, Università Politecnica delle Marche, Ancona:
 - 2023-2024: *Geometry* (72 hours) for Civil and Environmental Eng. *Elements of linear algebra and geometry* (48 hours) for Videogame and virtual reality Eng. and *Linear Algebra and Geometry* (48 hours) for Computer and Automation Eng.
 - 2022-2023: *Geometry* (72 hours) for Civil and Environmental Eng. *Elements of linear algebra and geometry* (48 hours) for Videogame and virtual reality Eng. and *Algebra and Logic* (48 hours) for Computer and Automation Eng.
 - 2021-2022: *Geometry* (72 hours) for Civil and Environmental Eng. *Geometry* (48 hours) for Biomedical Eng. and *Algebra and Logic* (48 hours) for Computer and Automation Eng.
 - Settembre 2021: *Precorso di Matematica* (24 ore) per Ing. Informatica e dell'Automazione e Ing. Elettronica.
 - 2020-2021: *Geometry* (72 hours) for Civil and Environmental Eng. *Geometry* (48 hours) for Biomedical Eng. and *Algebra and Logic* (48 hours) for Computer and Automation Eng.
 - 2019-2020: *Geometry* (72 hours) for Civil and Environmental Eng. and *Algebra and Logic* (48 hours) for Computer and Automation Eng.

- 2018-2019: *Geometry* (72 hours) for Building Engineering and Architecture, *Linear Algebra and Geometry* (48 hours) for Computer and Automation Eng. and *Geometry* (48 ore) for Building Eng.
- September 2018: *Preliminary course in Mathematics* (24 hours) for Computer and Automation Eng.
- 2017-2018: *Geometry* (72 hours) for Building Engineering and Architecture, *Linear Algebra and Geometry* (48 hours) for Computer and Automation Eng. and *Algebra and logic* (48 hours) for Computer and Automation Eng.
- 2017-2018: *Preliminary course in Mathematics* (20 hours) for Mechanical, Civil and Building Eng.
- 2016-2017: *Geometry* (72 hours) for Building Engineering and Architecture, *Linear Algebra and Geometry* (48 hours) for Computer and Automation Eng. and *Algebra and logic* (48 hours) for Computer and Automation Eng.
- September 2016: *Preliminary course in Mathematics* (20 hours) for Computer and Automation Eng.
- 2015-2016: *Geometry* (72 hours) for Civil and Environmental Eng. and *Algebra and Logic* (48 hours) for Computer and Automation Eng.
- 2013-2014: *Geometry* (72 hours) for Civil and Environmental Eng.
- 2011-2012: *Linear Algebra and Geometry* (48 hours) for Computer and Automation Eng. and *Geometry* (48 hours) for Biomedical Eng.
- September 2011: *Preliminary course in Mathematics* (20 hours) for Management Eng. (Fermo).
- 2010-2011: *Linear Algebra and Geometry* (48 hours) Computer and Automation Eng. and *Geometry* (48 hours) Biomedical Eng.
- September 2010: *Preliminary course in Mathematics* (20 hours) for Management Eng. (Fermo).
- 2009-2010: *Linear Algebra and Geometry* (48 hours) for Computer and Automation Eng. and *Geometry* (48 hours) for Biomedical Eng.
- September 2009: *Preliminary course in Mathematics* (20 hours) for Management Eng. (Fermo).
- University of Florence:
 - 2006/2007: *Geometry* (60 hours) Mechanical Engineering.
 - September 2004: *Preliminary course in Mathematics* (20 hours) for Architecture, University of Florence.

Supervisor of undergraduate theses

Engineering Faculty, Università Politecnica delle Marche, Ancona:

- Cecilia Giombi, *Dalla teoria di Herbrand al metodo di risoluzione*, defended in July 2018.
- Antonio Politano, *Numeri di Fibonacci e frazioni continue*, defended in July 2021.

Counseling Experience for High School Students (Attività di orientamento)

- June 2022: I contributed to the project “Percorso di eccellenza nelle materie STEM” for high school students, giving five lectures on “Complex numbers”.
- April 2014 and April 2012: I contributed to the project “Progetto Ponte per l’Orientamento”, giving a lecture on “Introduction to the logical and mathematical language” in the “Didactic Workshop (LAC) on Computer and Automation Engineering”, Università Politecnica delle Marche, Ancona.

- 2006-2008: I contributed to the project “Orientamento Matematica, Lauree Scientifiche” organized by the University of Florence, giving many series of lectures in high schools of Florence and Prato.

Selected Conferences and Schools Attended

- September 2017: conference “Quaternioni sul Conero”, Ancona.
- June 2017: Conference “Modern Algebra and Classical Geometry”, Trento
- June 2015: CIME school: “Rationality Problems in Algebraic Geometry”, Levico Terme.
- September 2010: Conference “Perspectives on Algebraic Varieties”, Levico Terme.
- June 2010: School “Geometry of tensors and applications”, Sophus Lie Conference Center, Nordfjordeid, Norway.
- February 2008: School “Moduli spaces in geometry, topology and physics”, Castro Urdiales, Cantabria.
- January 2008: *Joint Mathematics Meetings*, San Diego (California).
- Aprile 2007: School “Projective and birational geometry of algebraic varieties”, Gargnano.
- September 2006: “School (and Workshop) on Vector Bundles and Low Codimensional Subvarieties”, Povo (Trento).
- May 2006: Conference “Birational Geometry of Varieties”, Pisa
- September 2005: School on “Equivariant intersection theory”, Lukecin (Poland),
- August 2005: SMI summer school, Cortona. prof. Chris Peterson and Alessio Corti.
- June 2005: AG.a.Fe. Conference “Geometry of Algebraic Varieties”, Ferrara.
- 2003: SMI summer school, Cortona “Representation theory and projective geometry”, prof. L. Manivel and J. Landsberg.
- December 2002: Workshop on “Global Geometry of Algebraic Varieties”, Universidad Complutense de Madrid. “Algebraic Varieties”, Firenze.
- September 2001: EAGER summer school, “Moduli of vector bundles and group action”, Wykno, Poland.

Service and affiliations

- Since 2002: member of Unione Matematica Italiana.
- Since 2002: member of the INDAM-GNSAGA group.
- Since 2020: member of the UMI Group *DiGiMath*.
- **Guest editor** for Rendiconti dell’Istituto di Matematica dell’Università di Trieste, vol. 54 (2023).
- **Referee (selection)**: Journal of Pure and Applied Algebra, Rendiconti dell’Istituto di Matematica dell’Università di Trieste, Communications in Mathematical Physics, Geometria Dedicata, Revista Matematica Iberoamericana, Journal of Algebra, Forum Mathematicum, Annali di Matematica Pura e Applicata, Journal of Algebraic Geometry, Transactions of the American Mathematical Society, Advances in Geometry, Revista Matematica Complutense, Selecta Mathematica.

- Reviewer for Mathematical Reviews and for Zentralblatt.
- 2021: Reviewer for grant proposals for the National Science Center (Poland).
- Since 2021: member of the *Consiglio di Facoltà* of the Faculty of Engineering.
- 2021: Representative of the Mathematical Area for the DIISM Department.
- Since 2018: member of the *Orientamento in Itinere* committee of the Faculty of Engineering.
- Since 2018: member of the GAQ (*Gruppo Gestione Qualità*) committee for CUCS of Computer and Automation Engineering.
- Since 2009: member of the Academic Board of the *Civil, Environmental and Building Engineering And Architecture Ph.D. Course*, Università Politecnica delle Marche.
- Member of the PhD jury of Maciej Galazka (December 15, 2023). Title of the thesis: Secant varieties, Waring rank and generalizations from algebraic geometry viewpoint. Ph.D. supervisor: Jaroslaw Buczyinski.
- Member of the PhD jury of Vincenzo Galgano (December 18, 2023). Title of the thesis: Secant varieties of Spinor varieties and of other generalized Grassmannians. Ph.D. supervisor: Alessandra Bernardi.