Fabio Ferrari Ruffino

Associate Professor - Mathematics Department

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Personal Details

Date of birth:	December 15, 1981	Citizenship	Italian
Place of birth:	Brescia, Italy	Languages	Italian, English, Portuguese, Spanish

Education

Aug 2010–Jan 2013 **FAPESP Post-doctoral fellowship**, ICMC - Universidade de São Paulo, São Carlos - SP, Brazil.

Nov 209–Dec 209 **Research fellowship**, SISSA, Trieste.

Nov 2005–Oct 2009 **Ph. D. in Mathematical Physics**, SISSA, Trieste.
Thesis: "*Topics on topology and superstring theory*", Advisors: Prof. Loriano Bonora, Prof. Ugo Bruzzo; arXiv:0910.4524

Oct 2003–Jun 2005 **Diploma (Master) in Mathematics**, Scuola Normale Superiore, Pisa.
Advisor: Prof. Fulvio Ricci.

Oct 2003–Jun 2005 **Second level undergraduate degree (Laurea specialistica) in Mathematics**, Università degli Studi di Pisa, Pisa.
Thesis: "*Gelfand pairs*", final mark: 110/110 cum laude, Advisor: Prof. Fulvio Ricci.
13 exams taken, average mark: 30/30, 12 cum laude.

Oct 2000–Sep 2003 **First level undergraduate degree (Laurea triennale) in Mathematics**, Università degli Studi di Milano, Milan.
Thesis: "*Stokes theorem and applications*", final mark: 110/110 cum laude, Advisor: Prof. Massimo Tarallo.
23 exams taken, average mark: 30/30, 20 cum laude.

Employment History

Jan 2023–Now **Associate professor**, Mathematics Department - Universidade Federal de São Carlos, São Carlos - SP, Brazil.

Feb 2013–Dec 2022 **Assistant Professor**, Mathematics Department - Universidade Federal de São Carlos, São Carlos - SP, Brazil.

Research Interests

Algebraic and differential topology, in particular differential cohomology theories. Applications in mathematical physics, especially in string theory.

Publications

Articles

2025 F. Ferrari Ruffino, *Graded Identities of the Virasoro Algebra*, Journal of Algebra 674 (2025) 155–170

2025 F. Ferrari Ruffino, *Introduction to the Birch and Swinnerton-Dyer conjecture*, To appear on *Matemática Contemporânea* (open access journal of the Brazilian Mathematical Society) on a special volume about the Millenium Prize Problems

2021 F. Ferrari Ruffino and J. C. Rocha Barriga, *Relative differential cohomology and generalized Cheeger-Simons characters*, Communications in Analysis and Geometry, Vol. 29, No. 4, pp. 921–1005, 2021, arXiv:1811.07035

2020 F. Ferrari Ruffino and J. C. Rocha Barriga, *Twisted differential K-characters and D-branes*, Nuclear Physics B, Volume 960, November 2020, 115169, https://doi.org/10.1016/j.nuclphysb.2020.115169, arXiv:2009.04223

2015 F. Ferrari Ruffino, *Flat pairing and generalized Cheeger-Simons characters*, Journal of Homotopy and Related Structures, DOI 10.1007/s40062-015-0124-9; arXiv:1208.1288

2015 F. Ferrari Ruffino, *Differential K-characters and D-branes*, Proceedings of String-Math 2014, in Proceedings of Symposia in Pure Mathematics, Volume 93, 2016; arXiv:1603.05323

2014 F. Ferrari Ruffino, *Relative differential cohomology*, Journal of Homotopy and Related Structures (2015) 10:923–937, DOI 10.1007/s40062-014-0088-1; arXiv:1401.1029

2013 F. Ferrari Ruffino, *Relative Deligne cohomology and Cheeger-Simons characters*, Communications in Analysis and Geometry, Volume 22, Number 3, 573-593, 2014; arXiv:1401.0631

2012 F. Ferrari Ruffino, *Freed-Witten anomaly and D-brane gauge theories*, Proceedings of String-Math 2011, em Proceedings of Symposia in Pure Mathematics, Volume 85 (2012) pp. 433-441; arXiv:1104.2798

2012 F. Ferrari Ruffino, *Classifying A-field and B-field configurations in the presence of D-branes - Part II: Stacks of D-branes*, Nuclear Physics, Section B 858 (2012), pp. 377-404; arXiv:1104.2798

2009 F. Ferrari Ruffino, *Topics on the geometry of D-brane charges and Ramond-Ramond fields*, JHEP 11 (2009) 012; arXiv:0909.0689

2009 L. Bonora, F. Ferrari Ruffino and R. Savelli, *Revisiting pinors and orientability*, Bollettino U.M.I. (9) IV (2012); arXiv:0907.4334

2009 F. Ferrari Ruffino, *Gysin map and Atiyah-Hirzebruch spectral sequence*, Bollettino U.M.I. (9) IV (2011); arXiv:0904.4103

2008 L. Bonora, F. Ferrari Ruffino and R. Savelli, *Classifying A-field and B-field configurations in the presence of D-branes*, JHEP 12 (2008) 078; arXiv:0810.4291

2008 F. Ferrari Ruffino and R. Savelli, *Comparing two approaches to the K-theory classification of D-branes*, Journal of Geometry and Physics 61 (2011) pp. 191-212; arXiv:0805.1009

2006 F. Ferrari Ruffino, *The topology of the spectrum for Gelfand pairs on Lie groups*, Bollettino U.M.I. (8) 10-B (2007), 569-579; arXiv:0706.0708

2005 F. Ferrari Ruffino, *Coppie di Gelfand*, Master Thesis (in Italian), available in the website http://etd.adm.unipi.it/theses/available/etd-06062005-090954/unrestricted/tesi.pdf

Books

2025 F. Ferrari Ruffino, *Naive Set Theory - A Rigorous Approach*, CRC Press - Taylor & Francis Group, ISBN 978-1-032-93304-7

2025 F. Ferrari Ruffino, *Introduction to Algebraic Geometry - From Algebraic Varieties to Schemes* (in Portuguese), accepted for publication in Edusp

2013 F. Ferrari Ruffino, *Topics on topology and superstring theory*, Ph. D. Thesis, LAP LAMBERT Academic Publishing, ISBN 978-3-659-36834-9

Preprints

2023 F. Ferrari Ruffino, A. G. Hernandez Posada and J. C. Rocha Barriga, *The twisted and differential Atiyah-Jänich theorem*, some revisions required by the referee of Journal of Homotopy and Related Structures.

2022 B. G. Barbosa, F. Ferrari Ruffino and J. C. Nuñez Maldonado, *(Vertically-)Compactly-Supported and Relative Integration in Differential Cohomology*, some revisions required by the referee of Communications in Analysis and Geometry.

Research Grants

2019 **Funding ARC 06/2018 L2 - National or International Events**, CNPq, Recipient as an organizer of the XXXII Summer Program in Mathematics - UFSCar.

Jul 2014–Jun 2018 **Research Grant - Young Researcher**, Fapesp, Mathematics department - UFSCar.

Students and Post-Docs

Supervised

Post-Docs

2019–2024 **Juan Carlos Rocha Barriga**, Post-doc with CAPES fellowship, Mathematics department - UFSCar.

2017–2018 **Rodrigo Pires dos Santos**, Post-doc with PNPD-CAPES fellowship, Mathematics department - UFSCar.

2015–2018 **Julien Korinman**, Post-doc with PNPD–CAPES fellowship, Mathematics department - UFSCar.

Ph. D. Students

2018–2022 **Alffer Gustavo Hernandez Posada**, Ph. D. student with CAPES fellowship, Mathematics department - UFSCar.

2018–2022 **Brenno Gustavo Barbosa**, Ph. D. student with CAPES fellowship, Mathematics department - UFSCar.

2017–2021 **Juan Carlos Nuñez Maldonado**, Ph. D. student with CAPES fellowship, Mathematics department - UFSCar.

2014–2017 **Juan Carlos Rocha Barriga**, Ph. D. student with CAPES fellowship, Mathematics department - UFSCar.

Master Students

2023–2025 **Marina Maria de Miguel**, Master student with CAPES fellowship, Mathematics department - UFSCar.

2020–2022 **Gabriel Longatto Clemente**, Master student with Fapesp fellowship, Mathematics department - UFSCar.

Bachelor Students

Aug 2023 – Jul 2024 **Lucas Novo da Silva**, Bachelor student with Fapesp fellowship and Bachelor thesis, Mathematics department - UFSCar.

Apr 2022 – Feb 2024 **Vitor Schiavuzzo Ferreira**, Bachelor student with Fapesp fellowship and Bachelor thesis, Mathematics department - UFSCar.

2024 **Miguel Costa Rosales**, Bachelor thesis, Mathematics department - UFSCar.

Mar 2020 – Set 2021 **Guilherme Marques Sonoda**, Bachelor student with Fapesp fellowship, Mathematics department - UFSCar.

2019 **Gabriel Longatto Clemente**, Bachelor student with Fapesp fellowship and Bachelor Thesis, Mathematics department - UFSCar.

2018 **Gabriel Longatto Clemente**, Bachelor student with Fapesp fellowship, Mathematics department - UFSCar.

Jun 2016 – May 2018 **Murilo Barbosa Alves**, Bachelor student with Fapesp fellowship, Physics department – UFSCar.

Mar 2015 – Mar 2016 **Murilo Barbosa Alves**, Bachelor student with fellowship *Young talents for science* by CAPES, Physics department – UFSCar.

2014 **Laís Romanello**, Bachelor thesis, Mathematics department - UFSCar.

2014 **Tiago de Oliveira**, Bachelor thesis, Mathematics department - UFSCar.

Under supervision

Ph. D. Students

2022–Now **Gabriel Longatto Clemente**, Ph. D. student with Fapesp fellowship, Mathematics department - UFSCar.

Master Students

2024–Now **Lucas Novo da Silva**, Master student with Fapesp fellowship, Mathematics department - UFSCar.

2023–Now **Laurinda Aparecida Ferreira de Morais**, Master student with CAPES fellowship, Mathematics department - UFSCar.

Bachelor Students

2024–Now **Miguel Costa Rosales**, Bachelor student with PIBIC fellowship, Mathematics department - UFSCar.

Talks, Courses and Posters

Feb 2025 **Mini-course: "Introduction to K-theory"**, XXXVIII Summer Program in Mathematics, UFSCar, São Carlos (Brazil).

Aug 2024 **Talk: "Introduction to the Birch and Swinnerton-Dyer conjecture"**, XI Biennal of Mathematics, UFSCar, São Carlos (Brazil).

May 2022 **Talk: "Short introduction to K-theory"**, On-line seminar for the Federal University of Paraíba, João Pessoa (Brazil).

Jan 2022 **Talk: "What is a natural number?"**, DM - UFSCar, São Carlos, SP (Brazil).

Jun 2018 **Talk: "Relative differential cohomology and generalized Cheeger-Simons characters"**, International Conference on Manifolds, Groups and Homotopy, Skye (Scotland).

Jun 2018 **Talk: "Twisted differential K-characters and D-branes"**, VI Workshop on Poisson Geometry and Related Topics, ICMC - USP, São Carlos (Brazil).

Feb 2018 **Poster: "Relative differential cohomology and Cheeger-Simons characters"**, 20th School of Differential Geometry, João Pessoa (Brazil).

Feb 2018 **Mini-course: "Introduction to differential cohomology"**, II Patricio Letelier School on Mathematical Physics, ICMC - USP, São Carlos (Brazil).

May 2016 **Talk: "Generalized Cheeger-Simons characters and D-branes"**, Institut de Physique Théorique - Saclay, Paris (France).

May 2016 **Talk: "Charge quantization and generalized cohomology theories"**, Colóquio MAP, IME - USP, São Paulo, SP (Brazil).

Sep 2014 **Poster: "Flat pairing and differential homology"**, Workshop on Special Geometric Structures in Mathematics and Physics, Universität Hamburg, Hamburg (Germany).

Jun 2014 **Talk: "Differential homology and D-branes"**, String-Math 2014, University of Alberta, Edmonton (Canada).

Feb 2014 **Talk: "Relative differential cohomology"**, Workshop on Topology and dynamics, UFF, Rio de Janeiro, RJ (Brazil).

Jan 2014 **Talk: "Differential cohomology and applications"**, Brescia (Italy).

Oct 2013 **Talk: "Short history of non-Euclidean geometries"**, DM - UFSCar, São Carlos, SP (Brazil).

Jul 2013 **Talk: "Differential cohomology in mathematical physics"**, DM - UFSCar, São Carlos, SP (Brazil).

May 2013 **Talk: "Differential cohomology and mathematical physics"**, Mini-workshop on Poisson geometry and related topics, IMPA, Rio de Janeiro, RJ (Brazil).

May 2013 **Talk: "Short introduction to mathematical physics and string theory"**, DM - UFSCar, São Carlos, SP (Brazil).

Dec 2012 **Talk: "Differential homology and applications to string theory"**, Christmas Workshop on Moduli Spaces and Integrable Systems, Genova (Italy).

Oct 2012 **Talk: "Dirac monopole and Aharonov-Bohm effect from the topological viewpoint"**, ICMC - USP, São Carlos, SP (Brazil).

Sep-Oct 2012 **Mini-course: "K-theory and Atiyah-Singer index theorem"**, ICMC - USP, São Carlos, SP (Brazil).

Jul 2012 **Talk: "Differential homology"**, Italian-Brazilian Geometry Meeting 2012, Salvador de Bahia (Brazil).

Jul 2012 **Poster: "Flat pairing and differential homology"**, String-Math 2012, Bonn (Germany).

Jul 2011 **Talk: "Freed-Witten anomaly and D-brane gauge theories"**, SISSA, Trieste (Italy).

Jun 2011 **Talk: "Freed-Witten anomaly and D-brane gauge theories"**, String-Math 2011, Philadelphia (USA).

Nov 2010 **Talk: "Non-integral bundles and gerbes"**, Campinas - SP (Brazil).

Oct 2010 **Talk: "Non-integral bundles and gerbes"**, Workshop on Topology, Brotas - SP (Brazil).

Feb 2010 **Talk: "Freed-Witten anomaly and D-brane gauge theories"**, Hannover (Germany).

Nov 2009 **Talk: "Freed-Witten anomaly and D-branes gauge theory"**, Luxembourg City (Luxembourg).

Jul 2009 **Talk: "Spinors and orientability"**, 2nd Workshop on Geometric Methods in Theoretical Physics, Trieste (Italy).

Sep 2008 **Talk: "Freed-Witten anomaly and D-branes gauge theory"**, Workshop on algebraic geometry and physics, Hangzhou (China).

Sep 2008 **Talk: "K-theory and D-brane charges"**, School and workshop on the geometry of algebraic stacks, Trento (Italy).

Jul 2008 **Mini-talk: "K-theory and D-branes: Sen's conjecture"**, Eurostrings, Amsterdam (Netherlands).

May 2006 **Talk: "The topology of the spectrum for Gelfand pairs on Lie groups"**, Italian meeting of harmonic analysis, Cortona (Italy).

Dec 2004 **Talk: "Gelfand pairs: theory and examples"**, Scuola Normale Superiore, Pisa (Italy).

Other Activities

2024 Referee for the journal *JP Journal of Geometry and Topology*.

2024 Referee for the journal *Far East Journal of Mathematical Sciences*.

2023 Referee for the journal *International Journal of Theoretical Physics*.

2023 Referee for the journal *Journal of Lie Theory*.

2021 Referee for the journal *Reports on Mathematical Physics*.

2019 Referee for the journal *Advances in Mathematics*.

2017 Referee for the journal *Communications in Analysis and Geometry*.

2013 Referee for the journal *SIGMA* (Symmetry, Integrability and Geometry: Methods and Applications).

2012–Now MathSciNet reviewer.

Participation in Schools and Congresses

Ago 2024 **XI Biennal of Mathematics**, São Carlos (Brazil).

Jun 2018 **International Conference on Manifolds, Groups and Homotopy**, Skye (Scotland).

Jun 2018 **VI Workshop on Poisson Geometry and Related Topics**, ICMC - USP, São Carlos (Brazil).

Feb 2018 **20th School of Differential Geometry**, João Pessoa (Brazil).

Feb 2018 **II Patricio Letelier School on Mathematical Physics**, ICMC - USP, São Carlos (Brazil).

Sep 2014 **Workshop on Special Geometric Structures in Mathematics and Physics**, Universität Hamburg, Hamburg (Germany).

May 2014 **String-Math 2014**, University of Alberta, Edmonton (Canada).

Feb 2014 **Workshop on topology and dynamics**, UFF, Rio de Janeiro, RJ (Brazil).

May 2013 **Mini-workshop on Poisson geometry and related topics**, IMPA, Rio de Janeiro (Brazil).

Dec 2012 **Christmas Workshop on Moduli Spaces and Integrable Systems**, Genova (Italy).

Jul 2012 **Italian-Brazilian Geometry Meeting 2012**, Salvador de Bahia (Brazil).

Jul 2012 **String-Math 2012**, Bonn (Germany).

May 2012 **Algebraic topology, field theory and strings**, Stony Brook (USA).

Aug 2011 **Simons Summer Workshop**, Stony Brook (USA).

Jun 2011 **String-Math 2011**, Philadelphia (USA).

Oct 2010 **Workshop on Topology**, Brotas - SP (Brazil).

Jul 2009 **2nd Workshop on Geometric Methods in Theoretical Physics**, Trieste (Italy).

Sep 2008 **Workshop on algebraic geometry and physics**, Hangzhou (China).

Sep 2008 **School and workshop on the geometry of algebraic stacks**, Trento (Italy).

Jul 2008 **Eurostrings**, Amsterdam (Netherlands).

Jun 2008 **Vector Bundles**, Madrid (Spain).

Dec 2007 **Avogadro meeting**, Alessandria (Italy).

Sep 2007 **Summer school in mathematical physics**, Modave (Belgium).

Jun 2007 **Workshop on algebraic geometry and physics**, Korean Institute for Advanced Studies, Seoul (South Korea).

Jun 2007 **College on Mirror symmetry**, Chern Institute of Mathematics, Nankai University, Tianjin (China).

Apr 2007 **Workshop on derived categories, non-commutative geometry and strings**, Hamilton Mathematics Institute – Trinity College, Dublin (Ireland).

May 2006 **Italian meeting of harmonic analysis**, Cortona (Italy).

Apr 2005 **Short course on Euclidean harmonic analysis**, Edinburgh (Scotland, UK).

Participation in Committees

Apr 2024 **Ph. D. thesis defence of Murilo do Nascimento Luiz**, ICMC - USP, São Carlos, (Brazil).

Aug 2022 **Ph. D. Thesis defence of Osmar do Nascimento Souza**, DM - UFSCar, São Carlos (Brazil).

Jul 2022 **Ph. D. Thesis defence of Alffer Gustavo Hernandez Posada**, DM - UFSCar, São Carlos (Brazil).

Apr 2022 **Ph. D. Thesis defence of Brenno Gustavo Barbosa**, DM - UFSCar, São Carlos (Brazil).

Mar 2022 **Master Thesis defence of Gabriel Longatto Clemente**, DM - UFSCar, São Carlos (Brazil).

Oct 2021 **Ph. D. Thesis defence of Juan Carlos Nuñez Maldonado**, DM - UFSCar, São Carlos (Brazil).

Nov 2020 **Ph. D. Thesis defence of Jéssica Cristina Rossinati Rodrigues da Costa**, DM - UFSCar, São Carlos (Brazil).

Nov 2019 **Master Thesis defence of Elvis Torres Pérez**, ICMC - USP, São Carlos (Brazil).

Jan 2019 **Academic position committee to select a Temporary Lecturer**, DM - UFSCar, São Carlos (Brazil).

Nov 2018 **Master Thesis defence of Piere Alexander Rodriguez Valerio**, ICMC - USP, São Carlos (Brazil).

2018 **Member of the organizing committee of the XXXII Summer Program in Mathematics**, DM - UFSCar, São Carlos (Brazil).

Sep 2017 **Ph. D. Thesis defence of Juan Carlos Rocha Barriga**, DM - UFSCar, São Carlos (Brazil).

Dec 2016 **Ph. D. Thesis defence of Rafael Ferreira da Silva**, DM - UFSCar, São Carlos (Brazil).

Aug 2016 **Academic position committee to select an Assistant Professor**, DM - UFSCar, São Carlos (Brazil).

May 2016 **Ph. D. Thesis defence of Renan Gambale Romano**, DM - UFSCar, São Carlos (Brazil).

May 2014 **Ph. D. Thesis defence of Nazira Hanna Harb**, ICMC - USP, São Carlos (Brazil).

Oct 2012 **Scientific committee of the II Workshop of Ph. D. and Master Theses**, ICMC - USP, São Carlos (Brazil).

São Carlos, April 28, 2025