

Federico Carta

Curriculum Vitae. Updated on February 24th, 2025

Education

Degrees Held

- 2014–2018 PhD in Theoretical Physics, Universidad Autonoma de Madrid and IFT-UAM/CSIC, Madrid (Spain).
Sobresaliente cum laude
- 2012–2014 Laurea Magistrale in Fisica, Università degli Studi di Padova, Padova (Italy).
110/110 e lode
- 2009–2012 Laurea in Fisica, Università degli Studi di Padova, Padova (Italy).
110/110 e lode

PhD Thesis

- Title Aspects of F-Theory engineered Quantum Field Theories
- Supervisor Dr. Fernando Marchesano, from IFT/UAM-CSIC.

Master Thesis

- Title Moduli Spaces of $\mathcal{N} = 4$, $d = 3$ Quiver Gauge Theories and Mirror Symmetry
- Supervisors Professor Amihay Hanany, from Imperial College, London, UK & Professor Gianguido dall'Agata, from Università degli Studi di Padova, Italy.

Bachelor Thesis

- Title Possible Ways of Breaking the Poincaré Group
- Supervisor Professor Marco Matone, from Università degli Studi di Padova, Italy.

Current and previous positions.

- 2024– to date Postdoc, King's College, London (UK).
- 2023– 2024 Postdoc, LIMS, London (UK).
- 2020– 2023 Postdoc, University of Durham, Durham (UK).
- 2018– 2020 Postdoc, DESY, Hamburg (Germany).

Scientific Publications

Generic information

- Total number of publications: 28.
- Total number of citations: 1190.
- h index: 17.

Detailed list of publications

- BPS spectroscopy with reinforcement learning, with A. Gauntlett, F. Griffin, Y. He. 2501.14863 [hep-th]
- Fuzzy axions and associated relics, with E. Sheridan, N. Gendler, M. Jain, D. Marsh, L. McAllister, N. Righi, K. Rogers, A. Schachner; arXiv e-Print: 2412.12012 [hep-th]
- On brane systems with O^+ planes - 5d and 6d SCFTs, with M. Akhond, G. Arias-Tamargo, J. Grimminger and A. Hanany. ; arXiv e-Print: 2411.02491 [hep-th]
- Comments on Non-invertible Symmetries in Argyres-Douglas Theories, with S. Giacomelli, N. Mekareeya, and A. Mininno. ; Published in JHEP 07 (2023) 135; arXiv e-Print: 2303.16216 [hep-th]
- A tale of 2-groups: $D_p(USp(2N))$ theories, with S. Giacomelli, N. Mekareeya, and A. Mininno. ; Published in JHEP 06 (2023) 102; arXiv e-Print: 2208.11130 [hep-th]
- Dynamical consequences of 1-form symmetries and the exceptional Argyres-Douglas theories, with S. Giacomelli, N. Mekareeya, and A. Mininno. Published in JHEP 06 (2022) 059; arXiv e-Print: 2203.16550 [hep-th]
- Exploring the orthosymplectic zoo, with M. Akhond, S. Dwivedi, H. Hayashi, S. Kim, and F. Yagi. Published in JHEP 05 (2022) 054; arXiv e-Print: 2203.01951 [hep-th]
- Systematics of perturbatively flat flux vacua for CICYs, with A. Mininno, and P. Shukla. arXiv e-Print: 2201.10581 [hep-th]
- Divisor topologies of CICY 3-folds and their applications to phenomenology, with A. Mininno, and P. Shukla. Published in JHEP 05 (2022) 101; arXiv e-Print: 2201.02165 [hep-th]
- Systematics of perturbatively flat flux vacua, with A. Mininno and P. Shukla. Published in JHEP 02 (2022) 205; arXiv e-Print: 2112.13863 [hep-th]
- Conformal manifold and 3d mirrors of (D_n, D_m) theories, with S. Giacomelli, N. Mekareeya and A. Mininno. Published in JHEP 02 (2022) 014; arXiv e-Print: 2110.06940 [hep-th]
- Thraxions: towards full string models, with A. Mininno, N. Righi and A. Westphal. Published in JHEP 01 (2022) 082; arXiv e-Print: 2110.02963 [hep-th]
- Magnetic quivers from brane webs with $O7^+$ -planes, with M. Akhond. Published in JHEP 10 (2021) 014; arXiv e-Print: 2107.09077 [hep-th]
- Conformal manifold and 3d mirrors of Argyres-Douglas theories, with S. Giacomelli, N. Mekareeya and A. Mininno. Published in JHEP 08 (2021) 015; arXiv e-Print: 2105.08064 [hep-th]
- Factorised 3d $\mathcal{N} = 4$ orthosymplectic quivers, with M. Akhond, S. Dwivedi, H. Hayashi, S. Kim, and F. Yagi. Published in JHEP 05 (2021) 269; arXiv e-Print: 2101.12235 [hep-th]
- Gopakumar-Vafa hierarchies in winding inflation and uplifts, with A. Mininno, N. Righi and A. Westphal. Published in JHEP 05 (2021) 271; arXiv e-Print: 2101.07272 [hep-th]
- Resolving spacetime singularities in flux compactifications & KKLT, with J. Moritz. Published in JHEP 08 (2021) 093; arXiv e-Print: 2101.05281 [hep-th]
- Five-brane webs, Higgs branches and unitary/orthosymplectic magnetic quivers, with M. Akhond, S. Dwivedi, H. Hayashi, S. Kim, and F. Yagi. Published in JHEP 12 (2020) 164; arXiv e-Print: 2008.01027 [hep-th]
- Harmonic hybrid inflation, with Y. Welling, N. Righi and A. Westphal. Published in JHEP 12 (2020) 161; arXiv e-Print: 2007.04322 [hep-th]
- A landscape of orientifold vacua, with J. Moritz and A. Westphal. Published in JHEP 05 (2020) 107; arXiv e-Print: 2003.04902 [hep-th]
- No go for a flow, with A. Mininno. Published in JHEP 05 (2020) 108; arXiv e-Print: 2002.07816 [hep-th]

- The Geometry of SUSY Enhancement, with S. Giacomelli, H. Hayashi and R. Savelli. Published in JHEP 02 (2020) 106 ; arXiv e-Print: 1910.09568 [hep-th]
- Gaugino condensation and small uplifts in KKLT, with J. Moritz and A. Westphal. Published in JHEP 08 (2019) 141; arXiv e-Print: 1902.01412 [hep-th]
- SUSY enhancement from T-branes, with S. Giacomelli and R. Savelli. Published in JHEP 12 (2018) 127; arXiv e-Print: 1809.04906 [hep-th]
- The String Landscape, the Swampland and the Missing Corner, with T. D. Brennan and C. Vafa. arXiv e-Print: 1711.00864 [hep-th]
- Hilbert series and mixed branches of $T[SU(N)]$ theory, with H. Hayashi. Published in JHEP 1702 (2017) 037; arXiv e-Print: 1609.08034 [hep-th]
- Open string multi-branched and Kahler potentials, with F. Marchesano, W. Staessens and G. Zoccarato. Published in JHEP 09 (2016) 062; arXiv e-Print: 1606.00508 [hep-th]
- Fitting fermion masses and mixings in F-theory GUTs, with F. Marchesano, and G. Zoccarato. Published in JHEP 03 (2016) 126; arXiv e-Print: 1512.04846 [hep-th]

Selection of invited talks at Conferences & Seminars

- Non-invertible symmetries in Argyres-Douglas theories, 15/11/2022, Virginia Tech seminar.
- Non-invertible symmetries in Argyres-Douglas theories, 09/06/2022, Quiver Meeting seminar.
- Bad dualities from accidental isomorphisms, 21/10/2022, 5d $N=1$ SCFTs and Gauge Theories on Brane Webs, Simons Center for Geometry and Physics.
- Flat vacua and divisor topologies, 03/02/2022, Utrecht University seminar.
- Flat vacua and divisor topologies, 01/02/2022, Stringpheno Seminars, Harvard.
- CICY orientifolds and GV invariants, 16/03/2021, Stringpheno Seminars, Harvard.
- Supersymmetry Enhancement, 13/11/2020, Durham University, Durham.
- Supersymmetry Enhancement, 4/11/2019, Roma3, Rome, Italy.
- Supersymmetry Enhancement, 30/10/2019, Bremen, Germany.
- The Swampland & (Anti-)de Sitter, Avogadro Meeting 2018, Rome, Italy.
- Supersymmetry Enhancement, 09/12/2018, KU Leuven, Leuven, Belgium.

Selection of talks at Conferences & Seminars

- "Divisor topology and GV invariants of CICYs", Stringpheno 2022. July 7th, 2022, at Liverpool, UK.
- "Supersymmetry Enhancement", Geometry and Strings. September 3, 2019, at Oxford, UK.
- "Supersymmetry Enhancement", Strings 2019. July 9, 2019, at Brussels, Belgium.
- "SUSY enhancement via T-branes and Hitchin systems", SUSY 2019. May 23, 2019, at Corpus Christi, Texas, USA.
- "SUSY enhancement via T-branes", StringPheno 2018, July 7, 2018, at Warsaw, Poland.
- "Hilbert Series and Mixed Branches of 3d $\mathcal{N} = 4$ theories", Stringpheno 2017. July 4, 2017, at VirginiaTech, Blacksburg, USA.
- "Hilbert Series and Mixed Branches of 3d $\mathcal{N} = 4$ theories", Strings, Cosmology and Gravity Student Conference 2017. February 16, 2017, at the Institut Henri Poincaré, Paris, France.
- "Hilbert Series and Mixed Branches of 3d $\mathcal{N} = 4$ theories", Iberian Strings 2017. January 14, 2017, Lisbon, at the Universidade de Lisboa. Portugal.
- "Hilbert Series and Mixed Branches of 3d $\mathcal{N} = 4$ theories" IV Postgraduate meeting. November 17, 2016, at the IFT UAM/CSIC, Madrid, Spain.
- "Yukawa couplings from the E7 point in F-Theory", Stringpheno 2016, June 24, 2016 at the

University of Ioannina, Greece

- "Yukawa couplings from the E7 point in F-Theory", IV Postgraduate meeting. November 19, 2015, at the IFT UAM/CSIC, Madrid, Spain.
- "Yukawa couplings from the E7 point in F-Theory", seminar at the PhDForum, November 12, 2015, at the IFT UAM/CSIC, Madrid, Spain.

Participation in Research Projects/Grants

- Topology from Cosmology, supported by the Leverhulme Trust. IP: David Marsh.
- Particles, Fields and Spacetime, supported by the Science and Technology Facilities Council (STFC). IP: Simon Ross, ST/T000708/1.
- Inflation in String Theory - Connecting Quantum Gravity with Observations, supported by the European Union. IP: Alexander Westphal, ERC-2014-CoG.
- Grant FPA2015-65480-P, supported by MINECO. IP: Karl Landsteiner.
- String Phenomenology in the LHC Era, supported by the European Union. IP: Luis E. Ibáñez, ERC-2012-ADG-20120216-320421.
- Centro de excelencia Severo Ochoa Program. Grant SEV-2012-0249. IP: Luis E. Ibáñez.
- Grant FPA2012-32828, supported by MINECO. IP: Ángel M. Uranga.

Grants won, prizes and scholarships

- Marie Curie Global fellowship, seal of excellence. Call of 2024.
- Marie Curie Global fellowship, seal of excellence. Call of 2022.
- PhD Grant La Caixa- Severo Ochoa, to complete a PhD program at the IFT UAM/CSIC during the period 01/10/2014-01/10/2018.
- Grant within the Erasmus Program, from Università degli Studi di Padova, to spend the period 01/09/2013-01/07/2014 at the Imperial College, London, UK.

Organization of international conferences, seminars and events

- Member of the organizers' committee for the Avogadro Meeting (largest annual conference in String Theory and related topics within the Italian community) for the years 2022-2025.
[Avogadro Meeting's website](#)

Teaching experience

- Spring 2021: Durham University, Durham. 3 hours as a teaching assistant for problem classes for the course of Cosmology 2 for the students of the Master's degree.
- Spring 2021: Durham University, Durham. 3 hours as a teaching assistant for problem classes for the course of Introduction to String Theory for the students of the Master's degree.
- Spring 2021: Durham University, Durham. 3 hours as a teaching assistant for problem classes for the course of Supersymmetry for the students of the Master's degree.
- Fall 2020: Durham University, Durham. 4 hours as a teaching assistant for problem classes for the course of Standard Model for the students of the Master's degree.
- Fall 2020: Durham University, Durham. 4 hours as a teaching assistant for problem classes for the course of Group theory for the students of the Master's degree.
- Spring 2018: UAM, Madrid. 15 hours as a teaching assistant for the course of Advanced Mathematical Methods for the students of the 3rd year of the Bachelor's degree.

- Fall 2017: UAM, Madrid. 15 heures as a teaching asisstant for the course of Quantum Mechanics 1 for the students of the 3rd year of the Bachelor's degree.
- Spring 2017: UAM, Madrid. 15 heures as a teaching asisstant for the course of Advanced Mathematical Methods for the students of the 3rd year of the Bachelor's degree.
- Fall 2016: UAM, Madrid. 15 heures as a teaching asisstant for the course of Quantum Mechanics 1 for the students of the 3rd year of the Bachelor's degree.
- Spring 2016: UAM, Madrid. 15 heures as a teaching asisstant for the course of Advanced Mathematical Methods for the students of the 3rd year of the Bachelor's degree

Students & thesis supervised

- Deniz Bozkurt. Master level Summer Student at DESY, Hamburg. "A test of Argyres-Seiberg duality by a Schur Index match". Summer 2019.
- José Manuel Cano. Bachelor Thesis at UAM. Madrid. "Introducción a la Teoria de Cuerdas". Co-supervised with Luis Ibañez and Eduardo Garcia-Valdecasas. Spring 2018.
- Daniel Oliviera. Bachelor Thesis at UAM. Madrid. "Introducción a la Supersimetría". Co-supervised with Luis Ibañez and Eduardo Garcia-Valdecasas. Spring 2018.
- Manuel Fernandez. Bachelor Thesis at UAM. Madrid. "Introducción a la Teoria de Cuerdas". Co-supervised with Luis Ibañez and Aitor Landete. Spring 2017.

Scientific outreach activities

- Administrator of the Facebook group [Meccanica Quantistica: gruppo serio](#), a scientific outreach and discussion group which, currently counting more than 38000 members, is one of the largest and most active italian communities of this kind.

Computer skills

Advanced $\text{\LaTeX}$, Mathematica
 Intermediate CY-tools, Linux Distributions, Microsoft Windows, OpenOffice
 Basic Macaulay2, SageMath, html, C++, Python

Languages

Italian Mother tongue.
 English Proficiency. Cambridge's certificate of C2-level obtained in June 2008.
 Spanish Advanced. Fluent.
 German Basic.
 日本語 これは私の趣味です