Curriculum Vitae

Paolo Maraner

ORCID ID: 0000-0003-0048-3770

Education - Degrees

- National Certification as Teacher of Mathematics and Physics (1999)

- Dottorato di Ricerca in Fisica (PhD in Physics, September 19$^{\text{th}}$, 1994)
  Università degli Studi di Parma: Parma, Italy
  1990-10-01 to 1994-09-19

- Laurea in Fisica (First Degree in Physics, April 30$^{\text{th}}$, 1990, 110 cum laude)
  Università degli Studi di Trento: Trento, Italy
  1984-10-01 to 1990-04-30

Present Positions

- Liceo G. Carducci, via Manci 8, Bolzano, Italy
  Teacher of Mathematics and Physics
  09/2000 to present

- Free University of Bozen-Bolzano: Bolzano, Italy
  Lecturing Assistant, Contract Professor, Teaching Assistant
  10/2006 to present

Past Positions

- Università degli Studi di Parma: Parma, Italy
  Contract Researcher (Physics)
  10/1999 to 03/2000

- Magyar Tudomnyos Akadmia Wigner Fizikai Kutatkzpont Rszecskeés Magfizikai Intzet: Budapest, Budapest, Hungary
  Researcher (Physics)
  10/1998 to 07/1999

- Massachusetts Institute of Technology: Cambridge, MA, United States
  Post-Doctoral Fellow "Bruno Rossi" MIT-INFN (Center for Theoretical Physics)
  09/1996 to 09/1998

- Università degli Studi di Parma: Parma, Italy
  Post-Doctoral Fellow (Physics)
  10/1994 to 08/1996

Research interests in mathematical physics

- differential (Riemannian and Finsler) geometry and its application

- extensions of general relativity, classical unification schemes, higher dimensional space-time models

- Sagnac and Lorenz interferometry in rotating frames of reference

- charged particles in strong magnetic fields

- adiabatic approximation, effective motion on sub-manifolds in classical and quantum mechanics with applications to roto-vibrational spectra of polyatomic molecules

- quantum mechanics and geometric quantisation schemes

Teaching experience

2000/24 Teacher of Mathematics and Physics, Liceo Classico Carducci, Bolzano, teaching language: Italian

AY 2023/24 Contract Professor, "Preparatory Course in Mathematics", SECS-S/06, Free University of Bozen-Bolzano, 40 hours, teaching language: English

AY 2022/23 Contract Professor, "Preparatory Course in Mathematics", SECS-S/06, Free University of Bozen-Bolzano, 60 hours, teaching language: English

AY 2022/23 Lecturing Assistant, "Mathematics for Economists M1+M2", SECS-S/06, Free University of Bozen-Bolzano, 132 hours, teaching language: English

AY 2022/23 Lecturing Assistant, "Mathematics for PPE M1+M2", SECS-S/06, Free University of Bozen-Bolzano, 72 hours, teaching language: English

AY 2021/22 Lecturing Assistant, "Mathematics for Economists M1+M2", SECS-S/06, Free University of Bozen-Bolzano, 132 hours, teaching language: English

AY 2021/22 Lecturing Assistant, "Mathematics for PPE M1+M2", SECS-S/06, Free University of Bozen-Bolzano, 72 hours, teaching language: English

AY 2020/21 Lecturing Assistant, "Mathematics for Economists M1+M2", SECS-S/06, Free University of Bozen-Bolzano, 132 hours, in English

AY 2020/21 Lecturing Assistant, "Mathematics for PPE M1+M2", SECS-S/06, Free University of Bozen-Bolzano, 72 hours, teaching language: English

AY 2019/20 Lecturing Assistant, "Mathematics for Economists M1+M2", SECS-S/06, Free University of Bozen-Bolzano, 144 hours, teaching language: English

AY 2019/20 Lecturing Assistant, "Mathematics for PPE M2", SECS-S/06, Free University of Bozen-Bolzano, 30 hours, teaching language: English

AY 2018/19 Lecturing Assistant, "Mathematics for Economists M1+M2", SECS-S/06, Free University of Bozen-Bolzano, 144 hours, teaching language: English

AY 2018/19 Lecturing Assistant, "Mathematics for PPE M2", SECS-S/06, Free University of Bozen-Bolzano, 30 hours, in English

AY 2017/18 Lecturing Assistant, "Mathematics for Economists M1+M2", SECS-S/06, Free University of Bozen-Bolzano, 144 hours, teaching language: English

AY 2017/18 Lecturing Assistant, "Mathematics for PPE M2", SECS-S/06, Free University of Bozen-Bolzano, 18 hours, teaching language: English

AY 2016/17 Lecturing Assistant, "Mathematics for Economists M1+M2", SECS-S/06, Free University of Bozen-Bolzano, 144 hours, teaching language: English

AY 2016/17 Lecturing Assistant, "Mathematics for PPE M2", SECS-S/06, Free University of Bozen-Bolzano, 18 hours, teaching language: English

AY 2015/16 Teaching Assistant, "Mathematics for Economists M1+M2", SECS-S/06, Free University of Bozen-Bolzano, 180 hours, teaching language: English

AY 2015/16 Lecturing Assistant, "Mathematics for PPE M2", SECS-S/06, Free University of Bozen-Bolzano, 18 hours, teaching language: English

AY 2014/15 Teaching Assistant, "Mathematics for Economists M1+M2", SECS-S/06, Free University of Bozen-Bolzano, 180 hours, teaching language: English

AY 2013/14 Teaching Assistant, "Mathematics for Economists M1+M2", SECS-S/06, Free University of Bozen-Bolzano, 180 hours, teaching language: English

AY 2013/14 Teaching Assistant, "Mathematics for PPE M2", SECS-S/06, Free University of Bozen-Bolzano, 50 hours, teaching language: English

AY 2012/13 Teaching Assistant, "Mathematics for Economists", SECS-S/06, Free University of Bozen-Bolzano, 240 hours, teaching language: English

AY 2011/12 Teaching Assistant, "Mathematics for Economists", SECS-S/06, Free University of Bozen-Bolzano, 240 hours, teaching language: English

AY 2010/11 Contract Professor, "Preparatory Course in Mathematics", SECS-S/06, Free University of Bozen-Bolzano, 30 hours, teaching language: English

AY 2010/11 Teaching Assistant, "Mathematics for Economists", SECS-S/06, Free University of Bozen-Bolzano, 240 hours, teaching language: English

AY 2009/10 Teaching Assistant, "Mathematics for Economists", SECS-S/06, Free University of Bozen-Bolzano, 150 hours, teaching language: English

AY 2008/09 Teaching Assistant, "Mathematics for Economists", SECS-S/06, Free University of Bozen-Bolzano, 150 hours, teaching language: English

AY 2007/08 Teaching Assistant, "Mathematics for Economists", SECS-S/06, Free University of Bozen-Bolzano, 150 hours, teaching language: English

AY 2006/07 Teaching Assistant, "Mathematics for Economists", SECS-S/06, Free University of Bozen-Bolzano, 180 hours, teaching language: English

Seminars and Visited Institutions

- *A Local Self-Reducing Space-Time*, Department of Physics, Swansea University (UK), May 2001; Department of Physics, Oxford University (UK), May 2001; Department of Physics, Southampton University (UK), May 2001.

- *Elementary Particles from an Extension of Space-Time Relativity*, Department of Physics, University of Firenze (Italy), May 2000; Department of Physics, University of Parma (Italy), May 2000; Department of Physics, University of Trento (Italy), July 2000; Department of Physics, University of Padova (Italy), September 2000.

- *Gauge Fields induced by Dimensional Reduction*, Department of Physics, KFKI (Hungary), March 1999; Department of Physics, Ötves University (Hungary), April 1999.

- *Effective Motion on a Line*, ICTP (Italy), January 1999; "Seminar in Theoretical Physics and Mathematics", Tiblisi (Georgia), September 1998

- *Dimensional Reduction without Compactification*, Center for Theoretical Physics, MIT (Massachusetts, USA), April 1998.

- *A Dynamical Mechanism for the Selection of Physical States in Geometric Quantization Schemes*, ICTP (Italy), May 1996;

- *Dynamics as Shadows of Phase-Space Geometry*, "Workshop on Geometrical Methods in Physics", Bialowieza (Poland), July 1996.

- *A complete Perturbative Expansion for Quantum Mechanics with Constraints*, Department of Physics, University of Bristol (UK), February 1996.

- *Coriolis Interactions and Induced Gauge Structures in the Rotational Dynamics of Poliatomic Molecules*, Department of Chemistry, University of Florida at Gainesville (Florida, USA), September 1995.

- *Monopole Gauge Fields and Quantum Potentials induced by the Geometry in Simple Dynamical Systems*, Department of Physics, University of Florida at Gainesville (Florida, USA), September 1995; Department of Physics, Boston University (Massachusetts, USA), September 1995.

- *Gauge Fields induced in the Effective Dynamics of Constrained Systems*, Department of Physics, University of Milan (Italy), May 1994.

- *Geometry and Quantum Mechanics*, Department of Physics, University of Parma (Italy), April 1993.

- *Constrained Systems in Quantum Mechanics*, "Congresso Nazionale di Fisica Teorica e delle Particelle Elementari", Cortona (Italy), May 1993.

- *The Landau Problem on Curved Surfaces* "Congresso Nazionale di Fisica Teorica e delle Particelle Elementari", Isola d'Elba, (Italy), May 1992

- *Functional Integration and Geometric Quantization*, Department of Physics, University of Parma (Italy), February 1992.

Publication List

Paolo Maraner

Refereed Articles

2023 Systems of second order differential equations as auto-parallel equations, Paolo Maraner, *Journal of Mathematical Physics*, volume 64, pp. 122901-1/7, 2023.
https://doi.org/10.1063/5.0167733

2021 Electromagnetic and gravitational interactions from Lagrangian mechanics, Paolo Maraner, *Annals of Physic*, volume 431, pp. 168548-1/15, 2021.
DOI: 10.1016/j.aop.2021.168548

2019 Jacobi-Maupertuis Randers-Finsler metric for curved spaces and the gravitational magnetoelectric effect, S. Chanda , G. W. Gibbons , P. Guha, Paolo Maraner and M. C. Werner, *Journal of Mathematical Physics*, volume 60, pp. 122501-1/9, 2019.
DOI: 10.1063/1.5098869

2019 On the Jacobi metric for a general Lagrangian system, Paolo Maraner, *Journal of Mathematical Physics*, volume 60, pp. 112901-1/10, 2019.
DOI: 10.1063/1.5124142

2019 Specific heat of 2D interacting Majorana fermions from holography, Paolo Maraner, J.K. Pachos and G. Palumbo, *Scientific Reports*, volume 9, pp. 17308-1/7, 2019.
DOI: 10.1038/s41598-019-53771-5 7

2016 A rotating Michelson interferometer from the co-rotating point of view, Paolo Maraner, *General Relativity and Gravitation*, volume 48, pp. 95-104, 2016.
DOI: 10.1007/s10714-016-2078-6

2016 On the phase shift in a uniformly rotating Michelson interferometer (comment on "Quadratic Sagnac effect - The influence of the gravitational potential of the Coriolis force on the phase difference between the arms of a rotating Michelson interferometer (an explanation of D C Miller's experimental

results, 1921 - 1926)" by G B Malykin and V I Pozdnyakova [Phys. Usp. 58 398 (2015); Usp. Fiz. Nauk 185 431 (2015)]), Paolo Maraner, *Physics-Uspekhi*, Volume 59, pp. 716-718, 2016.
DOI: 10.3367/UFNe.2015.12.037675

2014 The effect of rotations on Michelson interferometers, Paolo Maraner, *Annals of Physics*, volume 350, pp. 95-104, 2014.
DOI: 10.1016/j.aop.2014.07.016

2012 General relativistic Sagnac formula revised, Paolo Maraner and J.-P. Zendri, *General Relativity and Gravitation*, volume 44, pp. 1713-1723, 2012.
DOI: 10.1007/s10714-012-1361-4

2012 Conformal flatness, non-Abelian Kaluza-Klein reduction and quaternions, Paolo Maraner and J.K. Pachos, *Journal of Geometry and Physics*, volume 62, pp. 344-351, 2012.
DOI: 10.1016/j.geomphys.2011.10.019

2010 Cold atom simulation of interacting relativistic quantum field theories, J.I. Cirac, Paolo Maraner and J.K. Pachos, *Physical Review Letters*, volume 105, pp. 190403-07, 2010.
DOI: 10.1103/PhysRevLett.105.190403

2010 A Spherical Pythagorean Theorem, Paolo Maraner, *Mathematical Intelligencer*, volume 32, pp. 46-50, 2010.
DOI: 10.1007/s00283-010-9152-9

2009 Yang–Mills gauge theories from simple fermionic lattice models, Paolo Maraner and J.K. Pachos, *Physics Letters A*, volume 373, pp. 2542-2545, 2009.
DOI: 10.1016/j.physleta.2009.05.029

2009 Conformally flat Kaluza–Klein spaces, pseudo-/para-complex space forms and generalized gravitational kinks, Paolo Maraner and J.K. Pachos, *Journal of Geometry and Physics*, volume 59, pp. 1314-1325, 2009.
DOI: 10.1016/j.geomphys.2009.06.013

2009 Centrifugal deformations of the gravitational kink, Paolo Maraner and J.K. Pachos, *Physics Letters A*, volume 373, pp. 2616-2619, 2009.
DOI: 10.1016/j.physleta.2009.05.051

2008 Universal features of dimensional reduction schemes from general covariance breaking, Paolo Maraner and J.K. Pachos, *Annals of Physics*, volume 323, pp. 2044-2072, 2008.
DOI: 10.1016/j.aop.2007.11.004

2004 Elementary particles and spin representations, Paolo Maraner, *Modern Physics Letters A*, volume 19, pp. 357-362, 2004.
DOI: 10.1142/s0217732304013258

1998 Charged particles in a (2 + 1)-curved background, Paolo Maraner, *Journal of Physics A: Mathematical and General*, volume 31, pp. 9309-9319, 1998.
DOI: 10.1088/0305-4470/31/46/020

1997 Quantum charged spinning particles in a strong magnetic field (a quantal guiding centre theory), Paolo Maraner, *Journal of Physics A: Mathematical and General*, volume 30, pp. 2163-2179, 1997.
DOI: 10.1088/0305-4470/30/6/036

1997 Dynamics as shadow of phase space geometry, J.R. Klauder and Paolo Maraner, *Annals of Physics*, volume 253, pp. 356-375, 1997.
DOI: 10.1006/aphy.1996.5631

1997 A dynamical mechanism for the selection of physical states in 'geometric quantization schemes', Paolo Maraner, *Reports on Mathematical Physics*, volume 40, pp. 265-271, 1997.
DOI: 10.1016/S0034-4877(97)85923-X

1996 Adiabatic motion of a quantum particle in a two-dimensional magnetic field, Paolo Maraner, *Journal of Physics A: Mathematical and General*, volume 29, pp. 2199-2210, 1996.
DOI: 10.1088/0305-4470/29/9/030

1996 Monopole gauge fields and quantum potentials induced by the geometry in simple dynamical systems, Paolo Maraner, *Annals of Physics*, volume 246, pp. 325-346, 1996.
DOI: 10.1006/aphy.1996.0029

1995 A complete perturbative expansion for quantum mechanics with constraints, Paolo Maraner, *Journal of Physics A: General Physics*, volume 28, pp. 2939-2951, 1995.
DOI: 10.1088/0305-4470/28/10/021

1994 On the definition of quantum free particle on curved manifolds, C. Destri, Paolo Maraner and E. Onofri, *Il Nuovo Cimento A*, volume 107, pp. 237-241, 1994.
DOI: 10.1007/BF02781555

1993 Geometry-induced Yang-mills fileds in constrained quantum mechanics, Paolo Maraner and C. Destri, *Modern Physics Letters A*, volume 08, pp. 861-868, 1993.
DOI: 10.1142/s0217732393000891

1992 Landau ground state on Riemannian surfaces, Paolo Maraner, *Modern Physics Letters A*, volume 07, pp. 2555-2558, 1992.
DOI: 10.1142/s0217732392004018

1992 Klauder's quantization in the almost-Kaehler case, Paolo Maraner, E. Onofri and G.P. Tecchiolli, *Modern Physics Letters A*, volume 07, pp. 1377-1380, 1992.
DOI: 10.1142/s021773239200104x

1991 Spectral methods in computational quantum mechanics, Paolo Maraner, E. Onofri and G.P. Tecchioli, *Journal of Computational and Applied Mathematics*, volume 37, pp. 209-219, 1991.
DOI: 10.1016/0377-0427(91)90119-5

Contributions to Books

1996 Teorie di gauge in meccanica quantistica (in Italian), Paolo Maraner. In: E. Onofri, C. Destri, **Istituzioni di Fisica Teorica**, Carocci, 1996.
ISBN: 9788843010615

2001 Le geometrie non euclidee (in Italian), F. Di Benedetto, E. Chierici M. Mora, Paolo Maraner, La cittá del sole, 2001.
ISBN: 8882921182

Non-Refereed Articles

2018 Riemannian geometry without the hypotheses of homogeneity and symmetry, Paolo Maraner, arXiv:1804.00488 [physics.gen-ph]

2001 Dimensional Reduction by a Two-Form (another alternative to compactification), Paolo Maraner, arXiv: hep-th/0102034, 2001.

2000 Fermion Quantum Numbers and Families Replication from an Extension of Space-Time Relativity, Paolo Maraner, arXiv: hep-th/0006109, 2000.

1998 Effective Dynamics on a Line, Paolo Maraner, arXiv: hep-th/9809189, 1998.

Bozen-Bolzano, July 4, 2024 Paolo Maraner