

# Curriculum Vitae

Paolo Maraner

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## Education - Degrees

- National Certification as Teacher of Mathematics and Physics (1999)
- Dottorato di Ricerca in Fisica (PhD in Physics, September 19<sup>th</sup>, 1994)  
Università degli Studi di Parma: Parma, Italy  
1990-10-01 to 1994-09-19
- Laurea in Fisica (First Degree in Physics, April 30<sup>th</sup>, 1990, 110 cum laude)  
Università degli Studi di Trento: Trento, Italy  
1984-10-01 to 1990-04-30

## Present Positions

- Liceo G. Carducci, via Mancini 8, Bolzano, Italy  
Teacher of Mathematics and Physics  
09/2000 to present
- Free University of Bozen-Bolzano: Bolzano, Italy  
Contract Professor, Lecturing Assistant, Teaching Assistant  
10/2006 to present

## Past Positions

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

- Magyar Tudományos Akadémia Wigner Fizikai Kutatóközpont Részecske és Magfizikai Intézet: 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**

**2000/25** Teacher of Mathematics and Physics, Liceo Classico Carducci, Bolzano, teaching language: Italian

**AY 2024/25** Contract Professor, “Mathematics for Economists M1”, SECS-S/06, Free University of Bozen-Bolzano, 36 hours, teaching language: English

**AY 2024/25** Lecturing Assistant, “Mathematics for Economists M2”, SECS-S/06, Free University of Bozen-Bolzano, 48 hours, teaching language: English

- AY 2024/25** Lecturing Assistant, “Mathematics for EPE M2”, SECS-S/06, Free University of Bozen-Bolzano, 36 hours, teaching language: English
- AY 2023/24** Contract Professor, “Preparatory Course in Mathematics”, SECS-S/06, Free University of Bozen-Bolzano, 40 hours, teaching language: English
- AY 2023/24** Lecturing Assistant, “Mathematics for Economists M1+M2”, SECS-S/06, Free University of Bozen-Bolzano, 132 hours, teaching language: English
- AY 2023/24** Lecturing Assistant, “Mathematics for EPE M1+M2”, SECS-S/06, Free University of Bozen-Bolzano, 72 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”, Tbilisi (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”, Białowieża (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 Polyatomic 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 Physics*, 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 fields in constrained quantum mechanics**, Paolo Maraner and C. Destri, *Modern Physics Letters A*, volume 8, pp. 861-868, 1993.  
DOI: 10.1142/s0217732393000891
- 1992 Landau ground state on Riemannian surfaces**, Paolo Maraner, *Modern Physics Letters A*, volume 7, pp. 2555-2558, 1992.  
DOI: 10.1142/s0217732392004018
- 1992 Klauder's quantization in the almost-Kaehler case**, Paolo Maraner, E. Onofri and G.P. Tecchioli, *Modern Physics Letters A*, volume 7, 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 città 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, 19 May 2025

Paolo Maraner