University Academic Curriculum Vitae

Personal information

Name: GIOVANNI MODANESE
Telephone number:
- Office: +39-0471-017134

E-Mail: giovanni.modanese@unibz.it

Education since leaving school

- Master degree in Physics, University of Trento, 1988
- PhD in Theoretical Physics, University of Pisa, 1993
- National Scientific Habilitation as associate professor for the scientific-disciplinary sector MAT-07, 2018.

Present appointment

- Associate professor in the scientific-disciplinary sector MAT-07 (Mathematical Physics), Free University of Bozen-Bolzano, Faculty of Engineering.

Professional experience

Chronological list of all previous employments (each with job title, starting and finishing dates, level, employer, responsibilities)

From / to	Job title	Name of academic Institution	Academic level	Responsibilities
Jan. 1993 - Sep. 1993	Researc her	M.I.T., Center f. Theor. Physics, Boston	Post-doc	Study of general properties of Wilson loops in quantum gravity
May 1994 - Oct. 1995	Researc her	Max-Planck-I nst. f. Physik, Munich	Post-doc	Development of a quantum formula for the static gravitational potential
Jan. 1997 - Dec. 1998	Researc her	Eur. Center for Theor. Phys. ECT*, Trento, Ital	Post-doc	Research project “Quantum field theory and quantum gravity”
Sep. 1999 to Sep. 2012	Contract professo r	Free Univ. of Bozen-Bolzan o	Lecturer	Lecturer of mathematics for the Bachelors in Engineering and Agricultural Science. With several research publications in classical and quantum field theory.
Feb. 2013 to Jan. 2018	Junior Researc her (RTDa)	Free Univ. of Bozen-Bolzan o	Researche r with fixed-term contract	Lecturer of Geometry for the Bachelor in Engineering and Mathematics for the Bachelor in Agric. Sci. With several publications and research projects.

Feb. 2018 to Jan. 2021	Senior Researcher (RTDb)	Free Univ. of Bozen-Bolzano	Researcher with fixed-term contract	Lecturer of Geometry for the Bachelor in Engineering and Mathematics for the Bachelor in Agric. Sci. Institutional activity: participation to the research Area of Basic Sciences in the Faculty of Science and Technology, with involvement in several projects in the role of principal investigator or scientific partner; participation to divulgation and "third mission" activities with local companies; member of the committee of the PhD programs in Sustainable Energy and Technology and Advanced Systems Engineering.

Experience in academic teaching

Courses given at the Free Univ. of Bolzano-Bozen

- Academic years 1999-2012: Mathematics 1 and 2 for Engineering and Agricultural Science, under-graduate level, in various combinations.
- Academic years 2013-2024: Geometry for Engineering (8 credits), Mathematics for Agricultural Science (5 credits), under-graduate level, total 120 hours.
- The course evaluations have always been largely positive. In 2015 and 2016 I won Faculty awards for the best teaching in Italian language. Since 2016 I am teaching all courses in English.
- I am listed as “Docente di riferimento” for the MIUR in the course L25.
- I am tutoring students from the Engineering course along their entire bachelor experience.
- I have produced a large amount of didactic material available online. I pay special attention to the active involvement of students in the lessons and especially in the exercise sessions.
- All the lessons since the academic year 2020-21 have been streamed and recorded via Teams-Stream.
- Since 2020 I am a member of the entry exam commission of the course L-25.
- I am part of the committee and I am supervising students in the PhD in Advanced Systems Engineering.

Other academic responsibilities

Effective member of the committees of the PhD programs in Sustainable Energy and Technology (2015 to 2018) and Advanced Systems Engineering (2019 to 2026).

I participate to the meetings of the Course Councils L9 and L25.

I took part in several occasions to ranking committees for the hiring of contract lecturers. Among these, for instance:
ST-21-26 - Teaching assistant
ST-TA-15 and ST-TA-18 - Teaching assistant
ST-41 - Contract lecturers

Representative of fixed-contract researchers in the Faculty Council (2013-2015)

Third mission activities

Collaboration with Dr.s A. Taber, M. Wenin and H. Thaler, from CPE Company, Lana (BZ) and TIS Innovation Park, Bolzano. The activity has been co-financed by the TIS Innovation Park and by the Office for Innovation, Research and Technological Development of the Autonomous Province of Bolzano, through the **technology transfer project** "Computerunterstuetzte Planung einer Materialseilbahn" (Computer aided planning of a material cable railway). The collaboration activity has been reported in 7 co-authored publications.

I also take part, as scientific partner, to the **technology transfer project** "Development of a Simulation tool for cable railway oscillations". The activity has been co-financed by three private enterprises working in the sector of ropeways and alpine technologies. The purpose of the project is the development of a software for the simulation of instabilities and oscillations in critical conditions in ropeways and cable railways. The activities planned for the project also include direct measurements on mountain facilities.

PI-Day - The date of March 14 (3.14 in the American usage) has been adopted worldwide as a day for celebrations and divulgation of Mathematics. The group of mathematicians belonging to the Basic Science Area of our Faculty, including me, has organized on this day since 2014 a divulgation event at the FUB for the high schools and the general public. The event is also supported by the school administration of our Province (Sovrintendenza scolastica italiana, Deutsches Schulamt). Divulgation conferences were offered in Italian and German by internationally recognized invited speakers coming from Italian, German and Austrian universities.

Stages for high school students ("Alternanza scuola-lavoro per le scuole superiori") - Since 2017, when the corresponding national law has been approved, I have devoted much time to the organization and realization of such stages in our University. I took part in 2017 to several general meetings, organized among others by the vice-Rector for didactics and by the Commerce Chamber in Bolzano, where the regulations of the stages were defined and a new database of hosting institutions was introduced. Then I repeatedly met prof. Scampicchio, of our Faculty, and teachers from the high school "Gandhi" in Merano for the organization of a project entitled "Chemical analysis on substances of food interest and their antioxidant power". The project was realized with one class in the following school year.
In June 2017 I hosted for three weeks two students from the same school for a project concerning complex networks and their analysis using mathematical software. Also this activity has required a certain amount of organizational and bureaucratic work in cooperation with offices from our University and the high school. In 2018 I repeated the stage for one student working on Monte Carlo simulations in physics. A new stage was being planned for 2020 but suspended because of the Covid pandemics.

I regularly take part to events organized by the Faculty for the public, like Science Live, presenting a stand with information and activities about complex networks and other appealing mathematical concepts.

Memberships

I am a member since 2019 of the Editorial Board of the journals "Stats" and "Quantum Reports", published by MDPI.

I am serving as Editor for Special Issues of the journal "Symmetry", published by MDPI.

Since 1995, I have regularly acted as reviewer for the following journals: Physical Review D, Classical and Quantum Gravity, General Relativity and Gravitation, Physica A, Physica B, Physica C, Foundations of Physics, Nuclear Physics B, Entropy, Symmetry, Physics Essays, J. of the Am. Optical Soc., Europ. J. Phys. C. Europ. J. Phys. ST, Applied Network Science, Applied Mathematical Modelling.

All the journals mentioned above are indexed by Scopus/WoS.

I am a member of the national evaluation system REPRISE.

Scientific affiliations:

UMI - Unione Matematica Italiana
SIMAI - Società Italiana per la Matematica Applicata e Industriale
INDAM – Istituto Nazionale di Alta Matematica
GNFM – Gruppo Nazionale di Fisica Matematica
CSS - Complex Systems Society
ISMRM - International Society of Magnetic Resonance in Medicine
ISCMNS - International Society of Condensed Matter Nuclear Science

Research and scholarships

- Research and scholarship during the previous five years. Summary of significant achievements in research and scholarship.

In recent years I have been working, in collaboration with M.L. Bertotti, on **complex systems of interest in the socio-economic area**, with a new approach based on a kinetic model and systems of nonlinear differential equations. This approach allows us to compute macroscopic properties of the systems starting from the knowledge of microscopic interactions.

The main fields of application are:

1. Economic interactions and income distribution in a society modelled through a finite number of income classes and possibly through a network of interactions.
2. Definition and computation of inter-class mobility in kinetic systems (e.g. mobility between income classes).
3. Computation of the correlation between mobility and inequality indices, like the Gini index.
4. Introduction in the kinetic equations of a network structure; dependence of the equilibrium solutions on the features of the network.
5. Introduction of heterogeneity and new degrees of freedom, for instance in the form of diversified fiscal behavior and means-tested welfare, or in connection with the network structure (number of links).
6. Introduction in the kinetic equations of multiplicative stochastic noise, in order to describe the effect of trade and investment.
7. Phenomena of diffusion of innovations, with a model which extends the Bass equation.
8. Effect on the income distribution and on economic inequality of different types of tax evasion, in kinetic models where the population is divided into behavioral classes (honest, moderate evaders etc.).

9. Effect of the presence of audits and fines proportional to evaded amounts.
10. Connection between the concept of saving propensity in econophysics and the features of scattering processes between high-energy particles in the statistical mechanics of relativistic gases.
11. Definition of a generalization of the Bass diffusion equation on networks containing assortative and disassortative correlations. To this end, the statistical formalism for the description of the networks has been extended to allow the explicit construction of the correlation matrices.
12. Generalization of our network Bass diffusion model to the case of a publicity term depending on the node degree. This allows to study trickle-up diffusion.

The mathematical tools employed include analytical proofs and qualitative studies of the equations, as well as numerical solutions.

Another field of research, developed in collaboration with M.L. Bertotti, M. Wenin and others, concerns the **mathematical modelling of ropeways and cable cars**, aiming at an optimization of their construction and technical management (for instance, with minimization of the number of supports and reduction of the car oscillations). This led to involvement in projects financed by the Autonomous Province of Bolzano-Bozen and involving also private firms, with concrete applications to local ropeways, as documented in several publications.

I am also still active in the field of **theoretical physics**, in which I started my career. In particular, I am studying extended field theories of electromagnetism which describe the coupling of the electromagnetic field to sources which are conserved globally but not locally. Such sources can be present, for instance, in quantum systems with non-local potentials or described by a fractional Schroedinger equation. In recent publications in Physica B, Results in Physics, Applied Sciences etc. (see publication list) I have computed the modified low-frequency and high-frequency field generated by these sources and proposed methods for its detection. Other publications in theoretical physics concern quantum gravity and high-Tc superconductors.

- **Research projects**

MMDTI – "Mathematical models for the diffusion of technological innovations"
Role: Principal investigator
Funding: FUB
Period: 2013-2017
Budget: 3968 euro

MITO – "Micro-to-macro models for complex systems in applied sciences"
Role: scientific partner
PI: Prof. M.L. Bertotti
Funding: FUB
Period: 2014-2017

INNONET - "Technology innovation networks in South Tyrol manufacturing firms"
Role: Principal investigator

Funding: FUB
Period: 2014-2017
Budget: 2500 euro

MACSIMA – "Mathematics, Chemistry, Statistics: innovative methods for applications"
Role: scientific partner
PI: M.L. Bertotti
Funding: FUB
Period: 2014-2017
Budget: 15000 euro

DIFFERENT - "DIFFERential Equations and NeTworks"
Role: scientific partner
PI: L. Levaggi
Funding: FUB
Period: 2014-2018
Budget: 9500 euro

COMPLAB - "FaST Computational Laboratory for Complex Systems"
Role: Principal Investigator
Funding: FUB
Period: 2014-2018
Budget: 20000 euro

DEFENSSE - "Differential equations for the evolution of nonlinear systems of interest in socio-economic sciences"
Role: scientific partner
PI: M.L. Bertotti
Funding: FUB
Period: 2014-2018
External collaboration: Prof. A.K. Chattopadhyay, Aston University, Birmingham, UK
Budget: 3390 euro

SPIDER: “Spreading Information and Data on Complex Networks”
Role: PI
Funding: LUB
Period: since July 2019
Budget: 9990 euro

NMCSYS: Numerical modelling of complex systems in Social Sciences, Finance, Engineering and Physics
Role: PI
Budget: 50'000 euro
Funding: LUB
01/07/2022 - 30/06/2025

DM47: Metodi efficienti di soluzione numerica per equazioni differenziali di interesse per la fisica matematica
Role: PI
Ministerial funding (MUR)
Budget: 109'000 euro
15/05/2025 - 14/05/2027

AISMUD: The use of AI for sustainability: a multi-disciplinary approach
Role: project member
PI: F. Boffa
Budget: 28'000 euro
Funding: LUB
01/12/2025 - 01/12/2028

- **Research grants**

Date granted	Award Holder(s)	Funding Body	Title	Amount received, Euro (approx..)
1993	G.M.	Found. D. Riccia, Florence	Post-doctoral Stage at M.I.T., Center f. Theor. Physics, Boston	15,000
1994	G.M.	A. Von Humboldt Found.	Post-doctoral Stage at Max-Planck-Inst., Munich	25,000
1997	G.M.	Eur. Center for Theor. Phys. ECT*, Trento, Italy	Research project “Quantum field theory and quantum gravity”	15,000
1998	G.M.	Assoc. for the Tech. Development of Piedmont, Torino, Italy	Research project “Superconductors and quantum gravity”	15,000
2000	G.M.	California Inst. f. Physics and Astrophysics, Palo Alto	Research project “Vacuum fluctuations in quantum field theory”	30,000
2004	G.M.	Inst. für Gravitations-forschung, Waldaschaff, Germany	Feasibility study “Reduced replication of the impulse gravity experiment”	40,000

Publications

Summary: I am the author of

- 98 publications indexed by Scopus (many of them also by Web of Science), of which 42 as single author.
- 4 publications indexed by Web of Science, but not by Scopus, of which 3 as single author.
- 1 book
- 3 publications in international journals not indexed by Scopus or WoS
- 6 non-indexed book chapters

My total number of citations in Scopus is 770, and the h-index is 15 (updated on Nov 19, 2025).

List of 98 publications indexed by Scopus (with DOI for the last ten years; journal articles, if not specified)

1. Rufai M.A., Filippone S., Ramos H., Modanese G., A new hybrid block collocation method for solving elliptic PDEs (2025), Scientific Reports, 15 (1), art. no. 36190. DOI: 10.1038/s41598-025-19906-7

2. Gamberale L., Modanese G., Excited States of Coherent Harmonic Qubits With Long-Range Photon Coupling and Dissipation (2025), Annalen der Physik. DOI: 10.1002/andp.202500074

3. Minotti F., Modanese G., Generalized Local Charge Conservation in Many-Body Quantum Mechanics (2025) Mathematics, 13 (5), art.

no. 892. DOI: 10.3390/math13050892

4. Minotti F., Modanese G., A new theory of tensor-scalar gravity coupled to Aharonov—Bohm electrodynamics (2025) Modern Physics Letters A, art. no. 255002. DOI: 10.1142/S0217732325500233

5. Gamberale, L., Modanese, G., An Experimental Study on Deuterium Production from Titanium Hydride Powders Subjected to Thermal Cycles (2024) Symmetry, 16 (11), art. no. 1542. DOI: 10.3390/sym16111542

6. Di Lucchio, L., Modanese, G., Diffusion on assortative networks: from mean-field to agent-based, via Newman rewiring (2024) European Physical Journal B, 97 (10), art. no. 160. DOI: 10.1140/epjb/s10051-024-00797-y

7. Gamberale, L., Modanese, G., Spectral Analysis of Proton Eigenfunctions in Crystalline Environment (2024) Quantum Reports, 6 (2), pp. 172-183. DOI: 10.3390/quantum6020014

8. Minotti, F., Modanese, G. Simple circuit and experimental proposal for the detection of gauge-waves (2024) Journal of Physics Communications, 8 (5), art. no. 055003. DOI: 10.1088/2399-6528/ad4e98

9. Di Lucchio, L., Modanese, G., Generation of Scale-Free Assortative Networks via Newman Rewiring for Simulation of Diffusion Phenomena (2024) Stats, 7 (1), pp. 220-234. DOI: 10.3390/stats7010014

10. Di Lucchio, L., Modanese, G., The Bass diffusion model: agent-based implementation on arbitrary networks (2024) Mathematical and Computer Modelling of Dynamical Systems, 30 (1), pp. 364-384. DOI: 10.1080/13873954.2024.2350244

11. Minotti, F., Modanese, G., Gauge waves generation and detection in Aharonov–Bohm electrodynamics (2023) European Physical Journal C, 83 (11), art. no. 1086. DOI: 10.1140/epjc/s10052-023-12274-4

12. Gamberale, L., Modanese, G., Numerical simulations unveil superradiant coherence in a lattice of charged quantum oscillators (2023) Physica B: Condensed Matter, 671, art. no. 415406. DOI: 10.1016/j.physb.2023.415406

13. Modanese, G., The Network Bass Model with Behavioral Compartments (2023) Stats, 6 (2), pp. 482-494. DOI: 10.3390/stats6020030

14. Minotti, F., Modanese, G., Aharonov–Bohm Electrodynamics in Material Media: A Scalar e.m. Field Cannot Cause Dissipation in a Medium (2023) Symmetry, 15 (5), art. no. 1119. DOI: 10.3390/sym15051119

15. Gamberale, L., Modanese, G. Coherent Plasma in a Lattice (2023) Symmetry, 15 (2), art. no. 454. DOI: 10.3390/sym15020454

16. Gallerati, A., Modanese, G., Ummarino, G.A., Aleshchenko, Y., Editorial: Interaction between macroscopic quantum systems and gravity (2022) Frontiers in Physics, 10, art. no. 1058690. DOI: 10.3389/fphy.2022.1058690

17. Minotti, F., Modanese, G., Electromagnetic Signatures of Possible Charge Anomalies in Tunneling (2022) Quantum Reports, 4 (3), pp. 277-295. DOI: 10.3390/quantum4030020

18. Gallerati, A., Modanese, G., Ummarino, G.A., Interaction Between Macroscopic Quantum Systems and Gravity (2022) Frontiers in Physics, 10, art. no. 941858. DOI: 10.3389/fphy.2022.941858

19. Wenin, M., Bertotti, M.L., Modanese, G., Quasi-Static Ropeway Simulation Using Parallel Computing (2022) Advanced Structured Materials, 172, pp. 103-111. DOI: 10.1007/978-3-030-97925-6_8

20. Minotti, F., Modanese, G., Quantum uncertainty and energy flux in extended electrodynamics (2021) Quantum Reports, 3 (4), pp. 703-726. DOI: 10.3390/quantum3040044

21. Bertotti, M.L., Chattopadhyay, A.K., Modanese, G., Stochastic models with multiplicative noise for economic inequality and mobility (2021) International Journal of Nonlinear Sciences and Numerical Simulation, 22 (3-4), pp. 287-301. DOI: 10.1515/ijnsns-2017-0228

22. G. Modanese, Quantum metrics with very low action in R+R2 gravity (2021), Phys. Rev. D 103, 106020, DOI: 10.1103/PhysRevD.103.106020

23. M.L. Bertotti, G. Modanese, Comparison of Simulations with a Mean-Field Approach vs. Synthetic Correlated Networks, Symmetry 2021, 13(1), 141. DOI:10.3390/sym13010141

24. Minotti, F., Modanese, G., Are current discontinuities in molecular devices experimentally observable? (2021) Symmetry, 13 (4), art. no. 691. DOI: 10.3390/sym13040691

25. Bertotti, M.L., Chattopadhyay, A.K., Modanese, G., Stochastic models with multiplicative noise for economic inequality and mobility (2021) International Journal of Nonlinear Sciences and Numerical Simulation. DOI: 10.1515/ijnsns-2017-0228

26. M. Wenin, S. Ladurner, D. Reiterer, M.L. Bertotti, G. Modanese, Validation of the Velocity Optimization for a Ropeway Passing over a Support, Sustainability 2021, 13(5), 2986; DOI 10.3390/su13052986

27. G. Modanese, Quantum-only metrics in spherically symmetric gravity, Quantum Reports 2020, 2(2), 314-325. DOI 10.3390/quantum2020021

28. G. Modanese, Metrics with zero and almost-zero Einstein action in quantum gravity, Symmetry 2019, 11(10), 1288. DOI 10.3390/sym11101288

29. Wenin, M., Windisch, A., Ladurner, S., Bertotti, M.L., Modanese, G.,

Optimization of the head geometry for a cable car passing over a support (2020) Advanced Structured Materials, 113, pp. 231-241. DOI: 10.1007/978-3-030-20801-1_17

30. Bertotti, M.L., Modanese, G., Network rewiring in the r-K plane (2020) Entropy, 22 (6), art. no. 653, DOI: 10.3390/E22060653

31. G. Modanese, High-frequency electromagnetic emission from non-local wave functions (2019) Applied Sciences 9 (10), art. no. 1982. DOI: 10.3390/app9101982

32. M.L. Bertotti, G. Modanese, The Bass diffusion model on finite Barabasi-Albert networks (2019) Complexity, Vol. 2019, Article ID 6352657. DOI: 10.1155/2019/6352657

33. G. Modanese, Metrics with zero and almost-zero Einstein action in quantum gravity (2019) Symmetry, 11 (10), art. no. 1288. DOI: 10.3390/sym11101288

34. M.L. Bertotti, G. Modanese, On the evaluation of the takeoff time and of the peak time for innovation diffusion on assortative networks (2019) Mathematical and Computer Modelling of Dynamical Systems, 25 (5), pp. 482-498. DOI: 10.1080/13873954.2019.1660997

35. Bertotti, M.L., Modanese, G., The configuration model for Barabasi-Albert networks (2019) Applied Network Science, 4 (1), art. no. 32. DOI: 10.1007/s41109-019-0152-1

36. Wenin, M., Irschara, M., Obexer, S., Bertotti, M.L., Modanese, G. Cable railway simulation: A two-span oscillator model (2019) Advanced Structured Materials, 92, pp. 65-79. DOI: 10.1007/978-3-319-79005-3_6

37. Modanese, G., Design of a test for the electromagnetic coupling of non-local wavefunctions (2019) Results in Physics, 12, pp. 1056-1061. DOI: 10.1016/j.rinp.2018.12.078

38. Wenin, M., Windisch, A., Ladurner, S., Bertotti, M.L., Modanese, G. Optimal velocity profile for a cable car passing over a support (2019) European Journal of Mechanics, A/Solids, 73, pp. 366-372. DOI: 10.1016/j.euromechsol.2018.09.013

39. Bertotti, M.L., Chattopadhyay, A.K., Modanese, G., Statistics of correlations and fluctuations in a stochastic model of wealth exchange (2018) Entropy, 20 (3), art. no. 166. DOI: 10.3390/e20030166

40. Bertotti, M.L., Modanese, G., Mathematical models describing the effects of different tax evasion behaviors (2018) Journal of Economic Interaction and Coordination, July 2018, Volume 13, Issue 2, pp 351–363. DOI: 10.1007/s11403-016-0185-9

41. Bertotti, M.L., Chattopadhyay, A.K., Modanese, G., Uncertainty dynamics in a model of economic inequality (2018) International Journal of Design and Nature and Ecodynamics, 13 (1). DOI:

10.2495/DNE-V13-N1-16-2

42. Modanese, G., Time in quantum mechanics and the local non-conservation of the probability current, (2018) Mathematics, 6 (9), art. no. 155. DOI: 10.3390/math6090155

43. Poher, C., Modanese, G., Enhanced induction into distant coils by YBCO and silicon-graphite electrodes under large current pulses (2017) Physics Essays, 30 (4), pp. 435-441. DOI: 10.4006/0836-1398-30.4.435

44. Modanese, G., Electromagnetic coupling of strongly non-local quantum mechanics (2017) Physica B: Condensed Matter, 524, pp.81-84.DOI: 10.1016/j.physb.2017.08.042

45. Bertotti, M.L., Modanese, G., Statistics of binary exchange of energy or money (2017) Entropy, 19 (9), art. no. 465.DOI: 10.3390/e19090465

46. Bertotti, M.L., Chattopadhyay, A.K., Modanese, G., Correlation between Gini index and mobility in a stochastic kinetic model of economic exchange (2017) Results in Physics, 7, pp. 2081-2084.DOI: 10.1016/j.rinp.2017.05.031

47. Modanese, G., Generalized Maxwell equations and charge conservation censorship (2017), Modern Physics Letters B 31(6), art. no. 1750052 - DOI: 10.1142/S021798491750052X

48. Bertotti, M.L., Chattopadhyay, A.K., Modanese, G., Stochastic effects in a discretized kinetic model of economic exchange (2017), Physica A: Statistical Mechanics and its Applications, 471, pp. 724-732.
DOI: 10.1016/j.physa.2016.12.072

49. Modanese, G., Oscillating dipole with fractional quantum source in Aharonov-Bohm electrodynamics (2017) Results in Physics, 7, pp. 480-481.
DOI: 10.1016/j.rinp.2017.01.009

50. Modanese, G., Ultra-light and strong: The massless harmonic oscillator and its singular path integral (2017) International Journal of Geometric Methods in Modern Physics, 14 (1), art. no. 1750010.
DOI: 10.1142/S0219887817500104

51. Thaler, H., Wenin, M., Brunner, J., Reiterer, D., Bertotti, M.L., Modanese, G., Oberhuber, E., Numerical optimization in ropeway planning (2017) Advanced Structured Materials, 33 (Springer), pp. 113-124.
DOI: 10.1007/978-981-10-1602-8_10

52. Bertotti, M.L., Modanese, G., Discretized kinetic theory on scale-free networks (2016) European Physical Journal: Special Topics, 225 (10), pp. 1879-1891.
DOI: 10.1140/epjst/e2015-50119-6

53. Bertotti, M.L., Modanese, G., Economic inequality and mobility in kinetic models for social sciences (2016) European Physical Journal: Special Topics, 225 (10), pp. 1945-1958.

DOI: 10.1140/epjst/e2015-50117-8

54. Bertotti, M.L., Modanese, G., Microscopic models for the study of taxpayer audit effects (2016) International Journal of Modern Physics C, 27 (9), art. no. 1650100.
DOI: 10.1142/S012918311650100X

55. Bertotti, M.L., Brunner, J., Modanese, G., Innovation diffusion equations on correlated scale-free networks (2016) Physics Letters, Section A: General, Atomic and Solid State Physics, 380 (33), pp. 2475-2479.
DOI: 10.1016/j.physleta.2016.06.003

56. Bertotti, M.L., Modanese, G., Microscopic models for welfare measures addressing a reduction of economic inequality (2016) Complexity, 21 (6), pp. 89-98.
DOI: 10.1002/cplx.21669

57. Modanese, G., Functional integral transition elements of a massless oscillator (2016) Applied Mathematical Sciences, 10 (61-64), pp. 3065-3074.
DOI: 10.12988/ams.2016.68237

58. Bertotti, M.L., Modanese, G., Exchange models for the emergence of income distribution and economic inequality (2016) International Journal of Design and Nature and Ecodynamics, 11 (4), pp. 620-627.
DOI: 10.2495/DNE-V11-N4-620-627

59. Bertotti, M.L., Brunner, J., Modanese, G., The Bass diffusion model on networks with correlations and inhomogeneous advertising (2015) Chaos, Solitons and Fractals, 90, pp. 55-63.
DOI: 10.1016/j.chaos.2016.02.039

60. Modanese, G., Common origin of power-law tails in income distributions and relativistic gases (2016) Physics Letters, Section A: General, Atomic and Solid State Physics, 380 (1-2), pp. 29-32.
DOI: 10.1016/j.physleta.2015.09.004

61. Bertotti, M.L., Modanese, G., Micro to macro models for income distribution in the absence and in the presence of tax evasion (2014) Applied Mathematics and Computation, 244, pp. 836-846.
DOI: 10.1016/j.amc.2014.07.055

62. Letizia Bertotti, M., Modanese, G., Mathematical models for socio-economic problems (2014) Springer INdAM Series, 6, pp.123-134.DOI: 10.1007/978-3-319-02657-2_10

63. Lewis, R.A., Modanese, G., Comparison of metrics from retarded integrals and transverse traceless subgauge (2013) International Journal of Modern Physics A, 28 (19), art. no. 1350093.
DOI: 10.1142/S0217751X13500930

64. Modanese, G., Quantum gravity evaluation of stimulated graviton emission in superconductors (2012) Gravity-Superconductors Interactions: Theory and Experiment, Bentham Publishing, London, pp. 105-131.

DOI: 10.2174/978160805399511201010105 (BOOK CHAPTER)

65. Modanese, G., Robertson, G.A., Gravity-superconductors interactions: Historical background (2012) Gravity-Superconductors Interactions: Theory and Experiment, Bentham Publishing, London, pp. 3-22.
DOI: 10.2174/978160805399511201010003 (BOOK CHAPTER)

66. Modanese, G., Robertson, G.A., Gravity-Superconductors interactions: Theory and experiment (2012) Bentham Publishing, London, 326 p.
DOI: 10.2174/97816080539951120101 (BOOK)

67. Podkletnov, E., Modanese, G., Study of light interaction with gravity impulses and measurements of the speed of gravity impulses (2012) Gravity-Superconductors Interactions: Theory and Experiment, Bentham Publishing, London, pp. 169-182.
DOI: 10.2174/978160805399511201010169 (BOOK CHAPTER)

68. Modanese, G., Robertson, G.A., Preface (2012) Gravity-Superconductors Interactions: Theory and Experiment, Bentham Publishing, London, pp. IV.
DOI: 10.2174/97816080539951120101 00iv (EDITORIAL)

69. Bertotti, M.L., Modanese, G., Exploiting the flexibility of a family of models for taxation and redistribution (2012) European Physical Journal B, 85 (8), art. no. 261.
DOI: 10.1140/epjb/e2012-30239-3

70. Bertotti, M.L., Modanese, G., From microscopic taxation and redistribution models to macroscopic income distributions (2011) Physica A: Statistical Mechanics and its Applications, 390 (21-22), pp. 3782-3793.
DOI: 10.1016/j.physa.2011.06.008

71. Modanese, G., The vacuum state of quantum gravity contains large virtual masses (2007) Classical and Quantum Gravity, 24 (8), pp. 1899-1909.
DOI: 10.1088/0264-9381/24/8/001

72. Podkletnov, E., Modanese, G., Investigation of high voltage discharges in low pressure gases through large ceramic superconducting electrodes (2003) Journal of Low Temperature Physics, 132 (3-4), pp. 239-259.

73. Modanese, G., Intertial mass and vacuum fluctuations in quantum field theory (2003) Foundations of Physics Letters, 16 (2), pp. 135-141.

74. Modanese, G., Local contribution of a quantum condensate to the vacuum energy density (2003) Modern Physics Letters A, 18 (10), pp. 683-690.

75. Taylor, C.Y., Modanese, G., Evaluation of an impulse gravity generator based beamed propulsion concept (2002) 38th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit.

(CONFERENCE PROCEEDING)

76. Modanese, G., Reply to "comment on 'Wilson loops in four-dimensional quantum gravity'" (2001) Physical Review D - Particles, Fields, Gravitation and Cosmology, 64 (8), art. no. 088502, p. 885021.

77. Modanese, G., Schnurer, J., Possible quantum gravity effects in a charged Bose condensate under a variable e.M. field, (2001) Physics Essays, 14 (2), pp. 93-105.

78. Modanese, G., Large "dipolar" vacuum fluctuations in quantum gravity (2000) Nuclear Physics B, 588 (1-2), pp. 419-435.

79. Modanese, G., Paradox of virtual dipoles in the Einstein action (2000) Physical Review D - Particles, Fields, Gravitation and Cosmology, 62 (8), art. no. 087502, pp. 1-3.

80. Modanese, G., Virtual dipoles and large fluctuations in quantum gravity (1999) Physics Letters, Section B: Nuclear, Elementary Particle and High-Energy Physics, 460 (3-4), pp. 276-280.

81. Modanese, G., Effect of a scale-dependent cosmological term on the motion of small test particles in a Schwarzschild background (1999) Nuclear Physics B, 556 (1-2), pp. 397-408.

82. Modanese, G., Tunneling of a massless field through a 3D Gaussian barrier (1999) Journal of Mathematical Physics, 40 (7), pp. 3300-3310.

83. Modanese, G., Stability issues in Euclidean quantum gravity (1999) Physical Review D - Particles, Fields, Gravitation and Cosmology, 59 (2), pp. 1-8.

84. Modanese, G., Role of a "local" cosmological constant in Euclidean quantum gravity (1996) Physical Review B-Condensed Matter, 54 (8), pp. 4997-5001.

85. Fiore, G., Modanese, G., General properties of the decay amplitudes for massless particles (1996) Nuclear Physics B, 477 (3), pp. 623-651.

86. Modanese, G., Role of a "local" cosmological constant in Euclidean quantum gravity (1996) Physical Review D - Particles, Fields, Gravitation and Cosmology, 54 (8), pp. 5002-5009.

87. Modanese, G., Theoretical analysis of a reported weak-gravitational-shielding effect (1996) Europhysics Letters, 35 (6), pp. 413-418.

88. Modanese, G., General estimate for the graviton lifetime (1995) Physics Letters B, 348 (1-2), pp. 51-54.

89. Modanese, G., Potential energy in quantum gravity (1995) Nuclear Physics, Section B, 434 (3), pp. 697-708.

90. Modanese, G., Vacuum correlations at geodesic distance in quantum gravity (1994) La Rivista Del Nuovo Cimento Series 3, 17

(8), pp. 1-62.

91. Modanese, G., On the absence of localized curvature in the weak coupling phase of quantum gravity (1994) Physics Letters B, 325 (3-4), pp. 354-358.

92. Modanese, G., Wilson loops in four-dimensional quantum gravity (1994) Physical Review D, 49 (12), pp. 6534-6542.

93. Menotti, P., Modanese, G., Seminara, D., The Radial Gauge Propagators in Quantum Gravity (1993) Annals of Physics, 224 (1), pp. 110-138.

94. Modanese, G., Geodesic round trips by parallel transport in quantum gravity (1993) Physical Review D, 47 (2), pp. 502-509.

95. Modanese, G., The propagator in the radial gauge (1992) Journal of Mathematical Physics, 33 (4), pp. 1523-1528.

96. Modanese, G., On the motion of test particles in a fluctuating gravitational field (1992) Journal of Mathematical Physics, 33 (12), pp. 4217-4219.

97. Modanese, G., Vacuum correlations in quantum gravity (1992) Physics Letters B, 288 (1-2), pp. 69-71.

98. Modanese, G., Toller, M., Radial gauge in Poincaré gauge field theories (1990) Journal of Mathematical Physics, 31 (2), pp. 452-458.

Publications indexed by Web of Science, but not by Scopus:

Modanese G. (2016) Velocity requirements for causality violation. In: (Editors) R.L. Amoroso, L.H. Kauffman, P. Rowlands, Unified Field Mechanics, p. 39-45, World Scientific, Singapore. ISBN 978-981-4719-05-6 (BOOK CHAPTER)

Lewis R.A.L., Modanese G. (2016) Gravitational radiation of a vibrating physical string as a model for the gravitational emission of an astrophysical plasma. In: (Editors) R.L. Amoroso, L.H. Kauffman, P. Rowlands, Unified Field Mechanics, p. 113-121, World Scientific, Singapore. ISBN 978-981-4719-05-6 (BOOK CHAPTER)

G. Fontana, G. Modanese (2004) Effect of the Vacuum Energy Density on Graviton Propagation, Space Technology and Applications Internat. Forum STAIF 2004. AIP Conference Proceedings, February 4, 2004, Volume 699, pp. 1198-1205. (CONFERENCE PROCEEDING)

G. Modanese (2002) The dipolar zero-modes of Einstein action: An informal summary with some new issues. In Gravitation and Cosmology: from the Hubble Radius to the Planck Scale, edited by R.L. Amoroso, G. Hunter, M. Kafatos, J.-P. Vigier, p. 259-266, Kluwer Academic Publishers, Dordrecht. (CONFERENCE PROCEEDING)

Book:

Bertotti ML, Modanese G (2015): Elementi di Meccanica Razionale: una prospettiva dinamica. Edizioni Scientifiche Italiane, Napoli. ISBN: 978-8849530438

Articles in international journals not indexed by ISI-WoS or SCOPUS:

Modanese G (2013). A comparison between the YBCO discharge experiments by E. Podkletnov and C. Poher, and their theoretical interpretations. Applied Physics Research 5, 59-73
DOI: 10.5539/apr.v5n6p59

Modanese G (2014). Gravity-Superconductors Interactions as a Possible Means to Exchange Momentum with the Vacuum. J. of Space Exploration, Special Issue "Spaceflight Perspectives from Novel Concepts of Spacetime, Gravitation and Symmetries", Ed. J. Hauser; ISSN:2319-9814

Modanese G (2014). Theoretical Limits on the Efficiency of a Quantum Vacuum Thruster, International Journal of Astrophysics and Space Science. Special Issue: Quantum Vacuum, Fundamental Arena of the Universe: Models, Applications and Perspectives. Vol. 2, No. 6-1, pp. 39-45.
DOI: 10.11648/j.ijass.s.2014020601.15

Chapters of non-indexed books:

G. Modanese (2012) Anomalous gravitational vacuum fluctuations which act as virtual oscillating dipoles. In: R. Sobreiro, Ed., Quantum gravity, Intech, 2012.

T. Junker, G. Modanese (2008) Conditions for stimulated emission in anomalous gravity-superconductors interactions. In: Classical and Quantum Gravity Research, ed.s M.N. Christiansen, T.K. Rasmussen, Nova Science Publishers, New York.

G. Modanese (2002) Zero-point field induced mass vs. QED mass renormalization, in Proceedings of the 18th Advanced ICFA Beam Dynamics Workshop on “Quantum Aspects of Beam Physics”, Capri, Italy, P. Chen editor, World Scientific.

G. Modanese (1999) “Tunneling” amplitudes of a massless quantum field. G. Modanese, in Proceedings of the Sixth International Conference on Path Integrals from PeV to TeV, Ed.s R. Casalbuoni et al., World Scientific.

G. Modanese (1993) Vacuum correlations in quantum gravity. G. Modanese, in Proceedings of the X Italian Conference on General Relativity and Gravitational Physics, Bardonecchia, 1992, Ed.s A. Marzuoli et al., World Scientific.

Publications <u>about</u> the applicant

M. Odenwald, “Kraft aus dem Quantenschaum” (in German), Focus 1-2003 (30/12/2002) pp. 58-61, www.focus.de

Further data

Recent participations to international conferences as speaker

Oral communication: "Rewiring of scale-free networks vs. degree correlation properties" - International Conference Sigma-Phi on Statistical Physics, Chania (Crete-Greece), 10-14 July 2023

Oral communication: "Construction of scale-free assortative networks for the study of diffusion processes through differential equations or agent-based models" - International Conference on Discrete and Combinatorial Mathematics-2024" (ICDCM-24), Singapore, 3-4 May 2024

Oral communication: "Recent advances in Aharonov-Bohm extended electrodynamics" - International Conference"Symmetry 2025", Hangzhou (China) 16-19 May 2025

Oral communication: "Collective Oscillations of Protons in Hydrogen-loaded Metals" - 26th International Conference of Condensed Matter Nuclear Science (ICCF26), Morioka, Japan, May 26-30 2025

International workshop "Quantum Gravity and Quantum Geometry", Nijmegen, NL, Oct. 30 - Nov. 1, 2019. Invited keynote talk on "Metrics with zero and almost-zero Einstein action in quantum gravity".

"International Conference on Complex Networks", Cambridge, UK, Dec. 10-12, 2018. Oral communication "The mixed assortativity of Barabasi-Albert networks and its influence on diffusion times".

Conference "Sigma-Phi - Statistical Physics 2017", Corfu, Greece, July 10-14, 2017. Oral communication "Statistics of correlations and fluctuations in a stochastic model of wealth exchange".

"Conference on Complex Systems CCS2016", Amsterdam, from 19-09-2016 to 22-09-2016. Oral communication "The Bass diffusion model on correlated scale-free networks"

"10th International Symposium Honouring Mathematical Physicist J-P. Vigier", Portonovo (AN), from 25-07-2016 to 28-07-2016. Oral communication "A New Formulation of Aharonov-Bohm Generalized Electrodynamics"

"Challenges in Data Science: a complex systems perspective", Torino, from 14-10-2015 to 17-10-2015. Oral communication "The Bass diffusion equation on scale-free networks with correlations and inhomogeneous advertising".

"Granada Seminar on Computational and Statistical Physics - Physics meets the social sciences", La Herradura, Spain, from 15-06-2015 to 19-06-2015. Oral communication "Innovation diffusion on scale-free networks".

"SigmaPhi 2014: International Conference on Statistical Physics", Rhodos, Greece, from 07-07-2014 to 11-07-2014. Oral communication "Discretized kinetic theory on a network as a tool for the study of economic interactions"

"Gravitation and Cosmology: from the Hubble Radius to the Planck Scale", Berkeley, USA, from 15-08-2000 to 20-08-2000. Oral communication "The dipolar zero-modes of Einstein action"

"Path Integrals from peV to TeV", Firenze, from 25-08-1998 to 29-08-1998. Oral communication "Tunneling of a Massless Field through a 3D Gaussian Barrier"

Earlier participations to conferences and seminars as speaker

1997: seminar at ECT*, Trento, on General Properties of the Decay Amplitudes for Massless Particles

1996: internal seminar at MIT, Boston, on Anomalous Coupling of Gravity to a Bose Condensate

1995: invited seminar at Parma University on The Quantum Formula for the Static Gravitational Potential

1995: Meeting "Constrained Systems and Quantum Gravity", Dubna (Russia); presented a communication on The Decay Amplitudes for Massless Particles

1994: Italian "Cortona" Theory Meeting, Cortona; presented a communication on The Absence of Localized Curvature in Euclidean Quantum Gravity to Leading Order

1994: invited seminar at Trento University on Radial Gauge and Vacuum Correlations

1994: "Rindberg Castle" Meeting (Germany); presented a communication on Information Loss in Black Holes and Ergodic Theorem

1993: internal seminar at MIT, Boston, on Properties of Wilson Loops to Leading Order in Quantum Gravity

Language competence

1993: Meeting "The Form of Space" at Trento University; presented a communication on The Quantum Formula for the Static Gravitational Potential

1992: Italian "Cortona" Theory Meeting, Isola d'Elba; presented a communication on Geodesic Round Trips in Quantum Gravity

1992: General Relativity 14, National Meeting, Bardonecchia; presented a communication on Vacuum Correlations in Quantum Gravity

1992: invited seminar at Pavia University on Properties of Lattice Quantum Gravity and Wilson Loops

1991: Italian "Cortona" Theory Meeting, Isola d'Elba; presented a communication on The Radial Gauge Propagator

1991: invited seminar at Trento University on The Radial Gauge Propagator

Italian: first language

German: level C1 (A-grade bilingual certificate of the South Tyrol province, obtained in Bolzano, 28/03/1995)

English: level C1 (Certification of the Language Center of the Univ. of Bolzano, obtained on March 6, 2019, and Cambridge ESOL Level 2 certificate, 2013)

Date Feb. 2, 2026 Giovanni Modanese