Curriculum Vitae

Roldão da Rocha

Professor of Mathematical-Physics

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Potential References:

Prof. Loriano Bonora, TPP, SISSA, Italy
bonora@sissa.it
Prof. Roberto Casadio, Dipartimento di Fisica, Bologna Università/INFN-Bologna Italy.
casadio@bo.infn.it

Contents

1 Curriculum Vitae

1.1 Degrees

- **Ph.D. in Physics** (02/2001-12/2005), Gleb Wataghin Phys. Inst., Campinas State Univ., Brazil ("*Clifford Algebras and Applications in Mathematical-Physics*", Ph. D. Thesis. Supervisor: Prof. Jayme Vaz).
- **M.Sc. in Mathematical-Physics**, Institute of Mathematics, Statistics and Scientific Computation, Campinas State University, São Paulo, Brazil (02/1999-12/2000) ("*Clifford Algebras and Twistors*", M.Sc. Thesis).
- **B.Sc. in Physics**, Gleb Wataghin Physics Institute, Campinas State University, São Paulo, Brazil (02/1995 - 11/1998).
- **B.Sc. in Mathematics**, Institute of Mathematics, Statistics and Scientific Computation, Campinas State University, São Paulo, Brazil (02/2001 - 12/2002).

1.2 Sabbatical Year

- Senior Researcher Grant CAPES 10942/13-0, Scuola Internazionale Superiore di Studi Avanzati (SISSA), Trieste, Italy (2014) "*Black holes and fluid/gravity correspondence*". Therein I worked mainly with Prof. Loriano Bonora, SISSA.

1.3 Post-Doctoral Research

- NORDITA, Nordic Institute of Theoretical Physics (2006).
- Postdoctoral Grant 2005/03071-0, State Foundation of Research Support, Theoretical Physics Institute, São Paulo State University (2006) *Braneworld Scenarios and Cosmology.*
- Postdoctoral Grant National Council of Scientific and Technological Development, Theoretical Physics Institute, São Paulo State University (2007) *Horava-Witten theory and moduli fields.*

1.4 Awarded Prizes

1. EPL Distinguished Referee (2017).
2. Academic Excellence Award, Federal University of ABC[1] (2015, 2016).
3. Senior Grant of Research by Scientific Merit, by the National Council of Scientific and Technological Development, 2020-....
4. Grant of the Royal Institute of Technology in Stockholm, Stockholm University, European Mathematical Society, 2004.

[1] Prize extinct from 2017 on.

5. Honorable Mention, Kungliska Tekniska Högskolan, 4th European Congress of Mathematics, 27th June - 2nd July, 2004 Stockholm, Sweden.

6. Grant of Research by Scientific Merit, by the National Council of Scientific Development, *General Relativity and Gravitation: Alternative Theories of Gravitation*, 2010-2016.

1.5 Running Research Projects as Coordinator

1. Research Grant, *Gauge/gravity dualities, Navier–Stokes equations with soft hair, and Dirac fluids*, The São Paulo Research Foundation, (2022-2025).

2. Senior Grant of Research by Scientific Merit, PQ-1C CNPq 303390/2019-0, 2020 – 2024.

3. Research Grant CNPq 406134/2018-9, "Gauge/gravity dualities: AdS/CMT and applications".

1.6 Organizer of International Conferences

1. *3rd FLAG (FieLds And Gravity) meeting: the Quantum and Gravity*, 13-14 June, 2019, Catania, Italy.

2. *Thematic Workshop in Field Theory: Topological Defects and Its Applications*, 1st-4th December, Sao Paulo, 2015.

3. *2nd International Workshop on Elko and Mass Dimension One Fermions*, 15-17th May, 2014, Sao Paulo, 2014.

4. *I Workshop César Natividade of Physics*, Sao Paulo, November 2013.

5. *8th International Conference on Clifford Algebras (ICCA8) and their Applications in Mathematical Physics*, 26th - 30th May, Campinas State Univ., Sao Paulo, 2008.

6. *Fifth International School on Field Theory and Gravitation*, 20th - 24th, Cuiaba, Brazil, April 2009.

1.7 Talks Presented at International Conferences

1. *Fluid/Gravity Correspondence and CFM solutions*, Eighth International Workshop DICE2016, Spacetime - Matter - Quantum Mechanics, September 12-16, Castiglioncello, Italia, 2016.

2. *Fluid/Gravity Correspondence and CFM solutions*, Strings at Dunes, Natal, 3-15 July 2016.

3. *New Spinor Fields Classes and Applications*, XXIV International Colloquium on Integrable Systems (ISQS-24), Czech Technical University in Prague, 13-18 Junho 2016.

4. *Fluid/Gravity Correspondence and CFM solutions* ERC and Solvay Workshop - Holography for Black Holes and Cosmology, Université Libre de Bruxelles, Brussels, Belgium 9 - 13 Maio 2016.

5. *Flag-dipole Spinor Fluids*, Quantum Theory and Symmetries IX, Yerevan State University, Armenia, 13-18 de July, 2015.

6. *Towards the Fluid/Gravity Correspondence for Black Strings*, String Field Theory and Related Aspects VI, July 28 - August 01 2014, SISSA, Trieste, 2015.

7. *Realistic Black Strings*, Summer School on Cosmology, 4-15 August 2014, ICTP, Trieste, Italy.

8. *Exotic Dark Spinor Fields*, II International Workshop on Elko and Mass Dimension One Fermions, Unicamp, 12-14 de Maio de 2014.

9. *The Dark Side of String Theory: Black Strings*, String Phenomenology Conference, 7-11 July 2014, ICTP, Trieste, Italy.

10. *Casadio-Fabbri-Mazacuratti black strings and black hole recoil effects*, VIII Quantum Theory and Symmetries, 5^{th}-9^{th} August 2013, Mexico City, Mexico.

11. *Black strings and fluid/gravity correspondence*, 21^{st} International Conference on Supersymmetry and Unification of Fundamental Interactions, ICTP, Trieste 2013.

12. *Kac -Moody Algebras in the non-Associative Clifford Bundle on S7 and Hopf Maps*, Symmetries in Mathematics and Physics II, Rio de Janeiro, 2013.

13. *A tutorial on dark spinor fields*, Workshop on Extra Dimensions and Cosmology, 29^{th}-31^{th} July 2013, UNAM – Cuernavaca, Mexico.

14. *Black string corrections in variable tension braneworld scenarios*, Spring School on Superstring Theory and Related Topics, 19^{th}-31^{th} March 2012, ICTP, Trieste, Italy.

15. *Exotic (dark) eigenspinors of the charge conjugation operator and cosmological applications*, "Relativity and Gravitation: 100 Years after Einstein in Prague", 25^{th}-29^{th} June 2012, Charles University, Prague, Czech Republic.

16. *Dark Spinor Fields Dynamics and Exotic Topological Consequences in the Search for the Dark Matter*, 9^{th} International Conference on Clifford Algebras and their Applications in Mathematical Physics, 13^{th}-17^{th} July 2011, Weimar, Bauhaus Univ., Germany.

17. *Generalized non-Associative Structures on the 7-sphere*, Seventh International Conf. Quantum Theory and Symmetries (QTS-7), 11^{th}-17^{th} August 2011, Prague, Czech Republic.

18. *A Tutorial on Quantum Clifford Algebras*, Supersymmetry in Integrable Systems, 24^{th}-28^{th} August 2010, Yerevan, Armenia.

19. *Clifford algebra-parametrized octonions and generalizations*, Lie and Jordan Algebras, their Representations and Applications - III, 6^{th}-11^{th} July 2007 Brazil.

20. *Hecke Algebras and Quantum Clifford Algebras*, XVIII Latin American Algebra Colloquium, 3^{rd} - 8^{th} August 2009, Manaus, Brazil.

21. *Torsion Influence in Braneworld Scenarios*, Fifth International School on Field Theory and Gravitation, 14^{th}-18^{th} April, 2009, Cuiaba, Brazil.

22. *Geometric Aspects of Elko Spinor Fields:Pure Spinors, Supergravity and Flagpoles*, 8^{th} International Conference on Clifford Algebras and their Applications in Mathematical Physics, 26^{th}-30^{th} May, 2008, Campinas, Brazil.

23. *Unraveling extra dimensions via quasar properties*, XXIII Texas Symposium on Relativistic Astrophysics "Theme III. Compact Objects Prince Philip Atrium", 11^{th}-15^{th} December 2006, Melbourne, Australia.

24. *The super-Poincaré algebra via pure spinors and the Interaction Principle in 3D Euclidian space*, International Conference on Classical and Quantum Aspects of Gravity and Cosmology, Theoretical Physics Institute, 22^{th} - 24^{th} August 2005, Sao Paulo, Brazil.

25. *Gravitational collapse on the brane and the formation of quasars*, PHYSICS - A Century After Einstein, 10^{th} - 14^{th} April 2005, University of Warwick, United Kingdom.

26. *Twistors, triality and the Wess-Zumino superfield formalism*, 2004 Workshop on Algebraic Geometry and Physics IST, 7^{th} - 12 September 2004, Lisbon, Portugal.

27. *Twistors, generalizations and exceptional structures*, IV International Winter Conference on Mathematical Methods on Physics, 09 - 13 August, Brazilian Center for Physical Research, 2004 Rio de Janeiro, Brazil.

28. *Twistors, triality and the Wess-Zumino superfield formalism*, 4^{th} European Congress of Mathematics, Stockholm Universitet, 27 June - 2 July 2004, Stockholm, Sweden.

29. *Octonions and the Standard Model of Elementary Particles*, Lie and Jordan Algebras, Representations and Applications-II, 3 - 8, May 2004, Maresias, Brazil

30. *Standard Model of elementary particles and extensions using the exceptional Lie algebras*, IX Hadron Physics and VII Relativistic Aspects of Nuclear Physics (HADRON-RANP 2004), 28 March - 3 April 2004, Angra dos Reis, Brazil

31. *Atiyah-Bott-Shapiro Periodicity Theorem*, I Latin American Congress for Mathematicians, Applied and Pure Math. Institute, 31 July - 4 August 2000, Rio de Janeiro, Brazil.

32. *On Dirac and Weyl spinors, Clifford algebras and spacetime structure*, ICTP Conference on Fundamental Interactions, 20 - 26 August 2000, Pirenópolis, Brazil.

1.8 Experience as a Lecturer

1) (2004-2005) *Institute of Mathematics, Campinas State Univ., Sao Paulo*, I was Lecturer on: Mechanics, Analytical Geometry, Linear Algebra, Calculus of Several Variables.

2) (2007-. . .) At *Federal University of ABC, Sao Paulo*, where I have a permanent position as an Associate Professor in Mathematical-Physics, I have given lectures on the undergraduate as well as the graduate programs in Physics and Mathematics, including the subjects:

(a) **Graduate Program** (Physics and Mathematics):

i. Quantum Field Theory II
ii. Quantum Field Theory I
iii. Quantum Mechanics III
iv. Quantum Mechanics II
v. Quantum Mechanics I
vi. Lie Algebras
vii. Functional Analysis
viii. Clifford Algebras and Spinors
ix. Spinors in Hilbert Spaces
x. Linear and Multilinear Algebra

(b) **Undergraduate Program (Physics and Mathematics)**:

i. Fundaments of Fluid Mechanics (NHZ3019)
ii. Complex Functions and Integral Transforms (MCTB015)
iii. Theory of Distributions (MCT0308)
iv. Fourier Analysis and Applications (NHT3067)
v. Real Analysis (MCTB005)
vi. Calculus II
vii. Tensor Calculus (MCTB010)
viii. Advanced Linear Algebra I (MCTB002)
ix. Advanced Linear Algebra II (MCTB002)
x. Linear Algebra (MCTB001)
xi. Differential Equations (BCN0405)
xii. Analytical Geometry (BCN0404)
xiii. Physics I (BCJ0204)
xiv. Calculus I (BCN0406)
xv. $\cdots \quad \infty$

1.9 Post-Doc, Ph.D. and M.Sc. Students I Supervised

1. **Post-Doctoral Supervisions**. All my post-docs are now respectively Assistant Professors and Lecturers at Institutes of Federal University of ABC, Sao Paulo State University, Brazil. Below I list their respective grants obtained:

   (a) (Dr Daniel Lombelo Teixeira), National Council of Scientific and Technological Development 62902/2020-4, *Aspects of entanglement, chaos and complexity: from many-body to high-energy systems.*

   (b) (Dr Diego Marinho Rodrigues), National Council of Scientific and Technological Development 152447/2019-9, *AdS/QCD and pomerons*

(c) (Dr Luiz Faulhaber), National Council of Scientific and Technological Development 153337/2018-4, Project: *AdS/QCD and Information theory* (Jan/2019 - Dez/2019).

(d) (Dr Ibere Kuntz), National Council of Scientific and Technological Development 155342/2018-5, Project: *Aspects of quantum gravity* (Jan/2019 - Dez/2019).

(e) (Dr Anderson Tomaz), National Council of Scientific and Technological Development, Project: *Factorization of the partition point on AdS_3 and fluid/gravity correspondence*, (Jun/2018 - May/2019).

(f) (Dr Anderson Tomaz), National Council of Scientific and Technological Development, Project: *Quantum gravity and holographic entanglement entropy*, (Jun/2019 - Apr/2020).

(g) (Dr Rafael A. C. Correa), grant of the State Foundation of Research Support CAPES, Project: *Thick Branes Entropy*) (2015).

(h) (Dr Dagoberto Morejón-Malagón), grant of the State Foundation of Research Support FAPESP 2012/20625-2, Project: *New physical effects in braneworld models and fluid/gravity correspondence.*

(i) (Dr Elias Leite), grant of the National Council of Scientific and Technological Development, Project: *Higher-spin theories* (2013).

(j) (Dr Antonio Carlos Amaro), grant of the National Council of Scientific and Technological Development, Project: *Thick braneworlds and Brans-Dicke formalism* (2010).

(k) (Dr Julio M. Hoff), grant of the State Foundation of Research Support FAPESP 2008/00949-2 Project: *Braneworld Cosmological Aspects* (2009-2010).

2. **Ph.D. Students Supervisions**

(a) Pedro Henrique Meert Ferreira, *Investigating black holes on the brane using AdS/CFT correspondence and transport coefficients*, National Council of Scientific and Technological Development, (2019-2022)

(b) Tiago Henrique dos Reis, *On finite dimension evolution algebras*, National Council of Scientific and Technological Development (2019-2022).

(c) Alfredo Jara Grados, *Dynamics of self-propelled particles in flows*, National Council of Scientific and Technological Development (2016-2019).

(d) Armando Fernandes, *Extended method of geometrical deformation and applications*, National Council of Scientific and Technological Development (2016-2019).

(e) Allan Gonçalves Silva, *The entropy of shape*, grant of the National Council of Scientific and Technological Development (2015-2018).

(f) Rian Lopes de Lima, *New classes of spinors in the Clifford–Graf algebra*, grant of the National Council of Scientific and Technological Development (2014-2018).

(g) Jose Antonio Silva Neto: *Non-standard Spinors and Field Theory*, grant of the State Foundation of Research Support (2014-2017).

(h) Rogerio T. Cavalcanti, *Aspects of Black Holes and the hoop conjecture*, grant of the National Council of Scientific and Technological Development (2014-2017).

(i) Kelvyn Paterson Brito, *Spinors on Higher Dimensional Manifolds*, grant of the State Foundation of Research Support (2014-2017).

(j) André M. Kuerten, *Dark Spinors and Braneworld Scenarios*, grant of the State Foundation of Research Support (2011-2015).

3. **M.Sc. Students Supervisions**

(a) André Juan Ferreira–Martins Moraes, *Gravity and its wonders: braneworlds and holography*, grant of the National Council of Scientific and Technological Development (2020-2021).

(b) Aquerman Yanes Martinho, *Clifford fiber bundles, Moufang loops, G_2 structures and deformations*, grant by the São Paulo Research Foundation 2018/10367-2 (2019-2020)

(c) Rian Lopes de Lima, *Spinors in Hilbert Spaces*, grant of the National Council of Scientific and Technological Development (2013-2014).

(d) Igor Bernardi, *Black holes in braneworld scenarios*, grant of the National Council of Scientific and Technological Development (2011-2012).

(e) Jose Antonio Silva: *Spinors and Geometry*, grant of the State Foundation of Research Support (2011-2012).

(f) Icaro Goncalves, *Introduction to Quantum Groups*, grant 2008/10452-8 of the State Foundation of Research Support (2008-2010).

(g) Rogerio Cavancanti, *Representations of Clifford Algebras and Spinors*, grant of the National Council of Scientific and Technological Development (2009-2010).

(h) Marcio A. Traesel, *Clifford Algebras and Octonions*, grant of the National Council of Scientific and Technological Development (2008-2010).

1.10 Current Post-Docs, Ph.D. and M.Sc. Students

(a) (PhD) Pedro Meert, *Fluid/gravity correspondence and condensed matter*, grant of the National Council of Scientific and Technological Development (2017-$\cdots$).

(b)

1.11 Editorial Board Member

Advances in Applied Clifford Algebras, Birkhäuser, 2020 - ...

1.12 Advisory Committee Member

Vice-president of the Mathematical-Physics Committee of the Brazilian Physical Society (2019-2023).

1.13 Administrative Activities

(a) Member of the Council of the Graduate Program in Physics (2018-2023).

(b) Coordinator of the Graduate Program in Mathematics, Federal Univ. of ABC (2008-2010)

(c) Member of the Council of the Department of Mathematics (2009-2013).

1.14 Courses and Schools Attended

- Summer School on Particle Physics, ICTP, Trieste 2021.
- Workshop on Black Holes and Neutron Stars (RAGtime 22), Czech Republic 2020.
- Spring School on Superstring Theory, ICTP, Trieste 2018.
- ERC and Solvay Workshop - *Holography for Black Holes and Cosmology*, ULB - Campus Plaine, Brussels, 9 - 13 May 2016.
- Lehner/Pretorius Minicourse on Numerical Relativity, ICTP-SAIFR, Brazil 2016
- School on Effective Field Theory across Length Scales, ICTP-SAIFR, Brazil 2016
- Summer School on Cosmology, ICTP, Trieste 2014.
- School on String Field Theory, SISSA, Trieste 2014.
- II Workshop Nuclear Astrophysics, IAS, USP, 2014.
- School on Approaches to Quantum Gravity, ICTP - SAIFR, Brazil 2013.
- School on Supersymmetry and Unification of Fundamental Interactions, ICTP, Trieste 2013.
- Spring School on Superstring Theory, ICTP, Trieste 2012.
- Spring School on Superstring Theory, ICTP, Trieste 2010.
- ICTP Latin-American School on Superstrings, Bariloche, Argentina, 2007.
- Vertex Algebras (Prof. Victor Kač), Sao Paulo State Univ., Brazil, 2007.
- Chern-Simmons/Spinors in Curved Spaces, Chile, 2006.
- 2004 Workshop on Algebraic Geometry and Physics, September 2004, IST, Lisbon.
- Second IST Courses on Algebraic Geometry: Degeneration techniques in algebraic geometry, IST, Lisbon, Portugal, 2004.
- Fundamental Symmetries and Fundamental Constants, ICTP, Trieste, 2004.

1.15 Languages

I am fluent and proficient in English, Italian and Armenian (and Portuguese, as my native language).

1.16 Journals Refereeing

I am currently Referee of the following Journals:

(a) Physics Reports
(b) JHEP
(c) JCAP
(d) JSTAT
(e) Annals of Physics
(f) Physics Letters A
(g) Physics Letters B
(h) International Journal of Modern Physics A
(i) European Phys. Journal C
(j) Classical and Quantum Gravity
(k) General Relativity and Gravitation
(l) Journal of Mathematical Physics
(m) EPL
(n) Canadian Journal of Physics
(o) European Physics Journal Plus
(p) International Journal of Modern Physics D
(q) Foundations of Physics
(r) Physica Scripta
(s) Reports on Mathematical Physics
(t) International Journal of Modern Physics A
(u) Modern Physics Letters A
(v) International Journal of Modern Physics B

Sao Paulo, 2022

Dr Roldao da Rocha