Dr. Elena-Mirela Babalic

Contact Information

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Research experience

Oct. 2015 - Oct 2017: postdoctoral researcher on "Constructive string field theory of the open-closed B-type string", at IBS-CGP, Korea

Dec. 2013 – onwards: Senior researcher (CS3), Department of Theoretical Physics, National Institute of Physics (NIPNE), Bucharest, Romania

Oct. 2010 – Dec. 2013: Junior Researcher (CS), Department of Theoretical Physics, National Institute of Physics (NIPNE), Bucharest, Romania

Jun. 2009 – Sep. 2010: Postdoctoral Research Assistant, Department of Theoretical Physics, National Institute of Physics (NIPNE), Bucharest, Romania

Sep. 2007 – Aug. 2008: Early Stage Researcher in Superstring Theory (position within "The European Superstring Theory Network"), Dept. of Fundamental Physics, Chalmers University of Technology, Göteborg, Sweden.
Research area: cohomological aspects in supersymmetric field theory
Supervisors: Prof. Lars Brink and Prof. Niclas Wyllard.

Education

2009: Ph.D. in Theoretical Phyics (awarded cum laudae), University of Craiova, Romania
Thesis title: *"Symmetries, Supersymmetries and Cohomologies in Gauge Theories"*
Supervisor: Prof. Solange-Odile Saliu

2003: M.Sc. (Theoretical High Energy Physics), University of Craiova, Romania
Dissertation: *"Two-dimensional tensor-vector interactions"*
Supervisor: Prof. Constantin Bizdadea

2002: B.Sc. (Physics), University of Craiova, Romania

1998: Graduated from Nicolae Titulescu Highschool (Specialty: Mathematics-Physics), Craiova

Research Grants and Awards

2014 – 2015: strategic postdoctoral grant POSDRU/159/1.5/S/133255, Project ID 133255 (2014), co-financed by the European Social Fund within the Sectorial Operational Program Human Resources Development 2007-2013, in partnership with the University of Craiova, Romania

June 2015 –one month research stage at IPhT-CEA, Paris-Saclay, funded by the postdoctoral grant POSDRU/159/1.5/S/133255

Mar. - Apr. 2014 – funding from CERN for a 2 weeks visit to CERN Theory Division

2011 – present: Romanian Research Council grant, CNCS PN-II-ID-PCE, contract no. 121/2011 (Principal investigator: Prof. Irinel Caprini)

2010 – 2013: Romanian Research Council grant, CNCS PN-II-RU-TE, contract no. 77/2010 (Principal investigator: Dr. Andrei Micu)

Jun. 2009 – Dec. 2010: Romanian Research Council grant, CNCS PN-II-ID-PCE, contract no. 464/2009, (Principal investigator: Prof. Irinel Caprini)

Apr. - Nov. 2010: Romanian Research Council grant, ANCS Euratom PC7/Capacities, contract no. 98/2008 (Principal investigator: Prof. Pometescu Nicolae)

Sep. 2007 – Aug. 2008: European Research grant, contract MRTN-CT-2004-512194 – Superstrings – REF RTD REG/T.3(2007)D/516925 (Principal Investigator: Prof. Lars Brink)

Dec. 21, 2010: *Serban Titeica Prize for remarkable scientific contributions of young researchers*, awarded by Horia Hulubei National Institute of Physics and Nuclear Engineering (IFIN-HH)

Publications and preprints

1. *Generalized compactifications of M-theory and implications for the F-theory limit,*
Elena Mirela Babalic
monograph*,* ISBN 978-606-11-4916-2, Ed. Sitech 2015, pg. 114

2. *Complete integrability of geodesic motion in Sasaki-Einstein toric $Y^{p,q}$ spaces*
Elena Mirela Babalic, Mihai Visinescu
Modern Physics Letters A, Vol. 30, No. 33,1550180 (2015) [arXiv:1505.03976]

3. *Internal circle uplifts, transversality and stratified G-structures*
Elena Mirela Babalic, Calin Iuliu Lazaroiu
to appear in JHEP (Journal of High Energy Physics) [arXiv:1505.05238]

4. *Foliated backgrounds for M-theory compactifications (I)*
E.M. Babalic, C.I. Lazaroiu
to appear in AIP Conference Proceedings [arXiv:1503.00373]

5. *Foliated backgrounds for M-theory compactifications (II)*
E.M. Babalic, C.I. Lazaroiu
to appear in Romanian Journal of Physics [arXiv:1503.00273]

6. *Singular foliations for M-theory compactifications*
E. M. Babalic, C. I. Lazaroiu
JHEP 1503 (2015) 116 [arXiv:1411.3148]

7. *Foliated eight-manifolds for M-theory compactifications*
E. M. Babalic, C. I. Lazaroiu
JHEP 1501 (2015) 140 [arXiv:1411.3148v2]

8. *A generalization of Calabi-Yau fourfolds arising from M-theory compactifications*
E. M. Babalic, C. I. Lazaroiu
Bulg. J. Phys. 41 (2014) 109-122

9. *Naturalness in low-scale SUSY models and "non-linear" MSSM*
I. Antoniadis, E. M. Babalic, D. M. Ghilencea
Eur. Phys. J. C 74 (2014) 9, 3050

10. *The geometric algebra of Fierz identities in arbitrary dimensions and signatures*
C. I. Lazaroiu, E. M. Babalic, I. A. Coman
JHEP 09 (2013)156 [arXiv:1304.4403v2]

11. *A unified approach to Fierz identities*
E. M. Babalic, I. A. Coman, C. I. Lazaroiu
AIP Conf. Proc. 1564, 57 (2013) [arXiv:1303.1575]

12. *Geometric algebra and M-theory compactifications*
C. I. Lazaroiu, E. M. Babalic
Romanian Journal of Physics 58, Nos. 5-6 (2013) 609-616 [arXiv:1301.5094]

13. *Geometric algebra techniques in flux compactifications (II)*
C. I. Lazaroiu, E. M. Babalic
JHEP 06 (2013) 054 [arXiv:1212.6918v2]

14. *Geometric algebra techniques in flux compactifications (I)*
C. I. Lazaroiu, E. M. Babalic, I. A. Coman
[arXiv:1212.6766], to appear in Advances of High Energy Physics.

15. *On N = 2 compactifications of M-theory to AdS3 using geometric algebra techniques*
E. M. Babalic, I. A. Coman, C. Condeescu, C. I. Lazaroiu, A. Micu
AIP Conf. Proc. 1564, 63 (2013)

16. *Revisiting eight-manifold flux compactifications of M-theory using geometric algebra techniques*
E. M. Babalic, C. I. Lazaroiu
Romanian Journal of Physics 58, Nos. 5-6 (2013) 414–422 [arXiv:1301.5106v2]

17. *The geometric algebra of supersymmetric backgrounds*
C. I. Lazaroiu, E. M. Babalic, I. A. Coman
Proceedings of Symposia in Pure Mathematics, Vol. 90 (2015) 227-237

18. *Fundamentals of a particular non-stationary stochastic process used to model particle transport in a stochastic magnetic field*
E. M. Babalic, N. I. Pometescu
AIP Conf. Proc. 1387 (2011) 92-97

19. *Some aspects on the correlation between the kappa-symmetric and the pure spinor versions of the supermembrane in D=11*
E. M. Babalic
Proceedings of Science (CORFU 2011) 06

20. *Correlating The Kappa-Symmetric And Pure Spinor Versions Of The Supermembrane In D=11*
E. M. Babalic
AIP Conf. Proceedings, Vol 1262, Issue 1 (2010) 32-38

21. *Yes-go cross-couplings in collections of tensor fields with mixed symmetries of the type (3,1) and (2,2)*
C. Bizdadea, E. M. Cioroianu, S. O. Saliu, E. M. Babalic
Int. J. Mod. Phys. A25 (2010) 1211-1238 [arXiv:1103.0634]

22. *Dual linearized gravity in D=6 coupled to a purely spin-two field of mixed symmetry (2,2)*
C. Bizdadea, E. M. Cioroianu, S. O. Saliu, E. M. Babalic
Fortschr. Phys. 58, No. 4-5, 341-363 (2010) [arXiv:1103.0623]

23. *QCD Correlation functions and the shape of K_l3 form factors*
I. Caprini, E. M. Babalic
Romanian Journal of Physics 55, (2010) 920-930 [arXiv:1011.5023]

24. *Selfinteractions in collections of massless tensor fields with the mixed symmetry (3,1) and (2,2)*
C. Bizdadea, S. O. Saliu, E. M. Babalic
Physics AUC 19, part I (2009) 1-21 [arXiv:0909.1170]

25. *Towards relating the kappa-symmetric and pure spinor versions of the supermembrane*
M. Babalic, N. Wyllard
JHEP 0810 (2008) 059-073 [arXiv:0808.3691]

26. *Two dimensional interactions in a class of tensor gauge fields from local BRST cohomology*
E. M. Babalic, C. C. Ciobarca, E. M. Cioroianu, I. Negru, S. C. Sararu
Acta. Phys. Polon. B34 (2003) 2673-2682

Seminar talks

1.*" M theory foliated backgrounds and non-commutative geometry",* Séminaire de matrices, cordes et géométries aléatoires, IPhT-CEA, Saclay, 31 Mar. 2015

2.*" M-theory foliated backgrounds and non-commutative geometry",* Geometry and Physics group, Dept. of Theoretical Physics, NIPNE, Romania, 24 Apr. 2015

3.*"Geometric algebra techniques in supersymmetric flux compactications of supergravity theories - generalities and examples",* Geometry and Physics group, Dept. of Theoretical Physics, NIPNE, Bucharest, Romania, 19 Apr. 2013

4.*"Hidden aspects of quantization and geometry",* Center for Geometry and Physics, Institute for Basic Science, Pohang, Korea, 27 Mar. 2013

5. *"Revisiting M-theory compactifications on eight-manifolds with two generalised Killing spinors using geometric algebra techniques",* Dept. of Theoretical Physics, NIPNE, Romania, 18 Oct. 2012

6. *"Interactions between collections of massless tensor fields with the mixed symmetry (3,1) and (2,2)",* Dept. of Theoretical Physics, NIPNE, Romania, 19 Feb. 2010

7. *"Correlating the kappa-symmetric and pure-spinor formulations for the superparticle and supermembrane in eleven dimensions",* Dept. of Theoretical Physics, NIPNE, Romania, 17 Sep.2009

8. *"Relating different formulations for the d=11 supermembrane",* Dept. of Fundamental Physics, Chalmers University of Technology, Göteborg, Sweden, 8 Sep. 2008

Conference talks

1. *Foliated backgrounds for M-theory compactifications*
E. M. Babalic, C. I. Lazaroiu
Physics Conference TIM 14 – Physics without frontiers, West University, Timisoara, Romania, November 20-22, 2014

2. *Foliated backgrounds for M-theory compactifications*
E. M. Babalic, C. I. Lazaroiu
The 9th Workshop "Quantum Field Theory and Hamiltonian Systems" (QFTHS 2014), Sinaia, Romania, September 24-28, 2014

3. *A generalization of Calabi-Yau fourfolds arising from M-theory compactifications*
E. M. Babalic, C. I. Lazaroiu
Mathematics days in Sofia - Algebraic methods in quantum field theory, (MDS2014), Sofia, Bulgaria, July 7-10, 2014

4. *A reconstruction theorem for spinors with applications to flux compactifications*
E. M. Babalic
Geometry and Physics of F-Theory, Heidelberg, Germany, February 24-27, 2014

5. *Geometric algebra, Fierz identities and supergravity*
E.M.Babalic
XXXII Workshop on Geometric Methods in Physics, Bialowieza, Polonia, 30 Jun. - 6 Jul. 2013

6. *Geometric algebra techniques and applications to flux compactifications (poster presentation)*
I. A. Coman, E. M. Babalic
Summer School: Toric Geometry, Dimers and String Theory", Hanovra, Germania, 21-24 May 2013

7. *General Compactifications of M-theory to AdS3 preserving N=2 SUSY - Study of geometrical set-up using Geometric Algebra and Implications*
I. A. Coman (speaker), E. M. Babalic, C. I. Lazaroiu, A. Micu, C. Condeescu
TIM-12 Physics Conference, West University of Timisoara, Romania, Nov. 27-30, 2012

8. *N=2 flux compactification of M-theory to AdS3 using geometric algebra techniques*
E. M. Babalic (speaker), I. A. Coman, C. I. Lazaroiu, A. Micu, C. Condeescu
TIM-12 Physics Conference, West University of Timisoara, Romania, Nov. 27-30, 2012

9 *Revisiting eight-manifolds flux compactifications of M-theory using geometric algebra techniques*
E. M. Babalic
Quantum Field Theory & Hamiltonian Systems, Craiova, Romania, Sept. 19-22, 2012

10. *Some aspects on the correlation between the k-symmetric and the pure spinor versions of the supermembrane in D=11*
E. M. Babalic
11th Helenic School and Workshops on Elementary Particle Physics and Gravity, Corfu, Greece, 2011

11. *Fundamentals of a particular non-stationary stochastic process used to model particle transport in a stochastic magnetic field*
E. M. Babalic (speaker), N. I. Pometescu
TIM-10 Physics Conference, West University of Timisoara, Romania, 25 - 27 Nov. 2010

12. *Symmetries, supersymmetries and cohomologies in gauge theories*
E. M. Babalic
International School on Strings and Fundamental Physics (SFP10), 25 Jul-6 Aug 2010, Munich, Germany

13. *Correlating the kappa-symmetric and pure spinor versions of the supermembrane in D=11*
E. M. Babalic
TIM-09 Physics Conference, 27-28 Nov. 2009, West University of Timisoara, Romania

Other workshops and conferences attended:

-"De Sitter and Microstate Landscapes in String Theory", IPhT-CEA, Saclay,16-19 Jun. 2015
-"Claude Itzykson – Random Surfaces and Random Geometry", IPhT-CEA, 10-12 Jun. 2015
- "Strings 2013", Seoul, Korea, 24-29 Jun. 2013

- "String-Math 2012", Bonn, Germany, 16-21 Jul. 2012
- "Strings 2011", Uppsala, Sweden, 27 Jun. - 2 Jul. 2011
- "Bielefeld Workshop on Matrix Factorizations", Bielefeld, Germany, 6-8 May 2011
- "Physics Conference TIM 10", West University, Timisoara, Romania, 25-27 Nov. 2010
- "International School on Strings and Fundamental Physics – SFP10", Garching-Munich, Germany, 25 Jul. - 6 Aug. 2010
- "Quantum Field Theories and Hamiltonian Systems", Calimanesti, Romania, 10-15 May 2010
- "RTN Winter School on Strings, Supergravity and Gauge Theories", CERN, Geneva, 21-25 Jan. 2008
- "Swedish String/Supergravity Course", May 2008

Computing skills

- experienced in **Linux** and **Windows**
- experienced user of some expert symbolic computation packages (**Mathematica**, **Cadabra**)
- website administrator for the Geometry and Physics Seminar

Other Scientific Activities

- Co-organizer for the Bucharest 2015 PhD Training School (part of the regional CERN – SENET-MTP Program)
- Scientific Reviewer for **Mathematical Reviews** of the American Mathematical Society
- Seminar co-organizer for the Geometry and Physics Group, Romania
- Translation of the book *The Theory of Everything* (by Stephen Hawking), Humanitas Publishing House, 2014, Bucharest, Romania

Language Proficiency

- **English** (excellent), **French** (good), **Spanish** (good)