CURRICULUM VITAE

Dr. Elias Zafiris

PERSONAL INFORMATION

Date and place of birth: Athens, Greece, 2 May 1970
Nationality: Greek
Phone: +306974464277, +302109910768
E-mail: ezafiris@math.uoa.gr
Web: http://users.uoa.gr/~ezafiris, http://www.csus.edu/cpns/fellows/e_zafiris.html

Correspondence address: Institute of Mathematics, 40 Ionias Street, Alimos 17 456, Athens, Greece.

EDUCATION

1994-1998: Imperial College, University of London, **Ph.D. in Theoretical Physics**.
Title: "Covariant Brane Kinematics, Symmetries-Incorporated Field Equations and Decoherence Mechanisms in Spacetime".
Supervisor : Prof. J. J. Halliwell

1993-1994: Imperial College, University of London, **M.Sc. in "Quantum Fields and Fundamental Forces"** (with Distinction).
Dissertation: "Fiber Bundle Structures and their Applications in Mathematical Physics".

1988-1993: National and Kapodistrean University of Athens, **First Class Honours Degree in Physics** with Distinction (Ranked First in Graduation Class).

EMPLOYMENT RECORD

2013 - 2015: **California State University Sacramento**, **Center for Philosophy and the Natural Sciences**, **USA**, Research Fellow and Principal Investigator (with Michael Epperson) in the research project "*Experimental Application of the Relational Realist Formalism: A Topological, Sheaf-Theoretic Explication of Quantum Geometric Phases by Analysis of Experimental Data on the Aharonov-Bohm Effect, the Pancharatnam Phase, and the Quantum Hall Effect, Toward a Unified Interpretation*".

2010 - 2013: **California State University Sacramento**, **Center for Philosophy and the Natural Sciences**, **USA**, Research Fellow and Co-Investigator in the research project "*Foundations of Relational Realism: Logical Causality, Intrinsic Decoherence, and a Category-Theoretic Mereotopological Model of Quantum Spacetime*".

2004 - present: **Department of Mathematics, National and Kapodistrean University of Athens, Greece**, Senior Research Fellow in the fields of Theoretical and Mathematical Physics and Teaching Professor.

2011 – 2014: **Department of Logic, Institute of Philosophy, Eötvös University , Budapest, Hungary**, Senior Research Fellow in Logical Foundations of Quantum Physics and Teaching Professor.

April 2007 - July 2007: **Department of Mathematics**, **University of Louvain, Belgium**, Visiting Senior Research Fellow on Category and Topos Theory.

2002 - 2004: **Department of Mathematics and Informatics**, **University of Sofia, Bulgaria**, Postdoctoral Research Fellow in European Union Network (EDGE) for Research in Mathematics and Theoretical Physics.

2000 - 2002: **Department of Mathematics**, **National and Kapodistrean University of Athens, Greece**, Associate Research Fellow in Mathematical Physics.

1998 – 2000: **Imperial College, Department of Theoretical Physics, Univ. of London**, **U.K.**, Postdoctoral Research Fellow in Theoretical Physics and Teaching Professor.

Selected Recent Citations

1. (2013) Foundations of Physics, 43 (3), pp. 310-328.
2. (2012) Journal of Cosmology and Astroparticle Physics, 2012 (12), art no. 020.
3. (2012) Physical Review A - Atomic, Molecular, and Optical Physics, 86 (1), art no. 012111.
4. (2012) Physical Review D - Particles, Fields, Gravitation and Cosmology, 86 (2), art no.024016.
5. (2012) Complex Analysis and Operator Theory, 6 (3), pp. 775-780.
6. (2012) International Journal of Theoretical Physics, 51 (2), pp.374-389.
7. (2011) *Classical and Quantum Gravity*, 28 (14), art. no. 145009.
8. (2011) *International Journal of General Systems*, 40 (5), pp. 485-486.
9. (2010) *Physical Review A - Atomic, Molecular, and Optical Physics*, 82 (1), art. no. 012116.
10. (2009) *Physics Letters, Section A: General, Atomic and Solid State Physics*, 374 (2), pp. 154-157.
11. (2009) *Physical Review D - Particles, Fields, Gravitation and Cosmology*, 80 (12), art. no. 124032.
12. (2009) *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 465 (2101), pp. 71-86.
13. (2008) *Classical and Quantum Gravity*, 25 (20), art. no. 205008.
14. (2008) *Annals of Physics*, 323 (8), pp. 2044-2072.
15. (2008) *International Journal of Theoretical Physics*, 47 (6), pp. 1512-1532.
16. (2007) *Lecture Notes in Physics*, 734, pp. 163-193.

Awards

- Greek State Prizes in Mathematics and Physics (1988-1992).
- Boudouris Foundation, Greece, Scholarship in Physics (1992-1993).
- NATO Fellowship in Theoretical Physics (1993-1994).
- Honours Diploma of Imperial College, U.K., in Theoretical Physics (D.I.C.) (1993-1994).
- S. Onassis Foundation, Greece, Scholarship for Doctoral Research in Theoretical Physics (1994-1998).
- Imperial College, U.K., Postdoctoral Research Fellowship in Theoretical Physics (1998-2000).
- European Community Senior Postdoctoral Research Fellowship in the context of EDGE ResearchNetwork HPRN-CT-2000-00101, supported by the European Human Potential Programme (2002-2004).
- National and Kapodistrean University of Athens, Greece, Senior Research Fellowship in Theoretical and Mathematical Physics, I.K.Y. Greek State Research Fellowship Program (2004-2005).
- University of Louvain, Belgium, Visiting Research Fellowship in Mathematical Category Theory and Applications, (April 2007- July 2007).
- Eötvös University, Hungary, Research Fellowship in Logical Foundations of Quantum Physics (2011-2013).
- Parmenides Foundation, Munich, Research Fellowship in Applied Category Theory: The Graph Matching Problem (2014).

Dr. Elias Zafiris

LIST OF PUBLICATIONS

I. Peer Reviewed Articles

1. E. Zafiris and J. J. Halliwell, "Decoherent Histories Approach to the Arrival Time Problem", *Phys. Rev*. **D57** 3351 (1998).
2. E. Zafiris, "Incorporation of Spacetime Symmetries in Einstein's Field Equations", *J. Math. Phys*. **38**(11), 5854, (1997).
3. E. Zafiris, "Kinematical Approach to Brane Worldsheet Deformations in Spacetime", *Annals of Physics* **264**(1), 75 (1998).
4. E. Zafiris, "Irreducible Decomposition of Einstein's Equations in Spacetimes with Symmetries", *Annals of Physics* **263**(2), 155 (1998).
5. E. Zafiris, "Covariant Generalisation of Codazzi-Raychaudhuri and Area Change Equations for Relativistic Branes", *Journal of Geometry and Physics* **27**(3), 292 (1998).
6. E. Zafiris, "Generalised Raychaudhuri and Area Change Equations for Classical Brane Models in Space- time with Torsion", *Phys. Rev.* **D58**, 043509 (1998).
7. E. Zafiris, "On Quantum Event Structures. Part I: The Categorical Scheme", *Foundations of Physics Letters* **14**(2), (2001).
8. E. Zafiris, "On Quantum Event Structures. Part II: Interpretational Aspects", *Foundations of Physics Letters* **14**(2), (2001).
9. E. Zafiris, "Probing Quantum Structure through Boolean Localization Systems", *International Journal of Theoretical Physics* **39**(12) (2001).
10. E. Zafiris, "Boolean Coverings of Quantum Observable Structure: A Setting for an Abstract Differential Geometric Mechanism", *Journal of Geometry and Physics* **50**, 99 (2004), math-ph/0306045.
11. E. Zafiris, "On Quantum Event Structures. Part III: Object of Truth Values", *Foundations of Physics Letters* **17**(5), (2004).
12. E. Zafiris, "Quantum Event Structures from the perspective of Grothendieck Topoi", *Foundations of Physics* **34**(7), (2004).
13. E. Zafiris, "Interpreting Observables in a Quantum World from the Categorial Standpoint", *International Journal of Theoretical Physics* **43**(1) (2004).
14. E. Zafiris, "Complex Systems from the perspective of Category Theory: I. Functioning of the Adjunction Concept", *Axiomathes* **15**(1) (2005).
15. E. Zafiris, "Complex Systems from the perspective of Category Theory: II. Covering Systems and Sheaves", *Axiomathes* **15**(2) (2005).
16. E. Zafiris, "Category-Theoretic Analysis of the Notion of Complementarity for Quantum Systems", *International Journal of General Systems* **35**(1) (2006).
17. E. Zafiris, "Sheaf-Theoretic Representation of Quantum Measure Algebras", *Journal of Mathematical Physics* **47** 092103 (2006).
18. E. Zafiris, "Generalized Topological Covering Systems on Quantum Events Structures", *Journal of Physics A: Mathematical and General* **39** (2006).

19. E. Zafiris, "Topos-Theoretic Classification of Quantum Events Structures in terms of Boolean Reference Frames", *International Journal of Geometric Methods in Modern Physics* **3**(8) (2006).

20. E. Zafiris, "Quantum Observables Algebras and Abstract Differential Geometry: The Topos-Theoretic Dynamics of Diagrams of Commutative Algebraic Localizations", *International Journal of Theoretical Physics* **46**(2) (2007).

21. E. Zafiris, "A Sheaf-Theoretic Topos Model of the Physical Continuum and its Cohomological Observable Dynamics", *International Journal of General Systems* **38**(1) (2009).

22. E. Zafiris, "Boolean Information Sieves: A Local-to-Global Approach to Quantum Information", *International Journal of General Systems* **39**(8) (2010).

23. E. Zafiris and A. Mallios, "The Homological Kahler-De Rham Differential Mechanism part I: Application in General Theory of Relativity", *Advances in Mathematical Physics*, doi:10.1155/2011/191083 (2011).

24. E. Zafiris and A. Mallios, "The Homological Kahler-De Rham Differential Mechanism part II: Sheaf-Theoretic Localization of Quantum Dynamics", *Advances in Mathematical Physics*, doi:10.1155/2011/189801 (2011).

25. E. Zafiris and A. Mallios, "A Functorial Approach to Quantum Gravity via Differential Sheaf Theory", *Advances and Developments in Modern Physics*, **1**(1) (2012).

26. E. Zafiris, "Rosen's Modelling Relations via Categorical Adjunctions", *International Journal of General Systems*, **41** (5) (2012).

27. E. Zafiris, V. Karakostas, "A Categorial Semantic Representation of Quantum Event Structures" *Foundations of Physics* **43** (2013).

28. E. Zafiris, "Topological and Geometric Phases. Conceptual Foundations, Experimental Applications and Mathematical Modeling: A Unified Sheaf-Theoretic Explication and its Relational Realist Interpretation", *CPNS Research Report (2014).*

29. E. Zafiris, "The Global Symmetry Group of Quantum Spectral Beams and Geometric Phase Factors", *Advances in Mathematical Physics*, http://dx.doi.org/10.1155/2015/124393 (2015).

30. E. Zafiris, "Contributions of Abstract Differential Geometry in Physics", *Contemporary Mathematics* (2015) (to appear in print).

II. Books

31. M. Epperson, E. Zafiris, "*Foundations of Relational Realism: A Topological Approach to Quantum Mechanics and the Philosophy of Nature*". Lexington Books / Rowman & Littlefield (2013).

32. A. Mallios, E. Zafiris, *"Differential Sheaves and Connections: A Natural Approach to Physical Geometry".* Series on Concrete and Applicable Mathematics, Volume 18. World Scientific (to appear in print November 2015).

III. Recent Book Chapters

33. E. Zafiris, "*A Sheaf-Theoretic Approach to the Graph Matching Problem*", On Thinking Volume 5, Series Editors: Pöppel, Ernst, von Müller, Albrecht, Springer (2015).

34. E. Zafiris, '*A Categorical Perspective on Connections with Application in the Formulation of Functorial Physical Dynamics*', invited paper in the edited collection 'Emerging Topics on

Differential Geometry and Graph Theory', Lucas Bernard and Francois Roux (ed.), Nova Science, (2011).

35. E. Zafiris, "*The Nature of Local/Global Distinctions, Group Actions and Phases: A Sheaf-Theoretic Approach to Quantum Geometric Spectrums*", Coding as Literacy – Metalithicum IV, Series Editors: Vera Bühlmann, Ludger Hovestadt, Birkhäuser Basel/Vienna (2015).

36. E. Zafiris, "*Sheaf-Theoretic Boolean Localization: A Categorical Bridge between Process Metaphysics and Quantum Theory*", Physics and Speculative Philosophy: Potentiality, Actuality, and Process, Editors: Michael Epperson, David Ray Griffin and Tim Eastman, De Gruyter, Berlin (forthcoming in 2015).

IV. Recent Conference /Workshop Papers and Presentations (2013-2015)

37. E. Zafiris, "*A Whitehedian Approach to Quantum Geometry via Sheaf Theory*", paper presented at the Tenth International Whitehead Conference: "Seizing an Alternative: Toward an Ecological Civilization", Swiss Federal Institute of Technology, June 2015.

38. E. Zafiris, "*Natural Communication*", intensive teaching seminar delivered at the Applied Virtuality Lab, Swiss Federal Institute of Technology, 28-30 April 2015.

39. E. Zafiris, "*Sheaves of Boolean Logical Frames: A Local-to-Global Approach to Quantum Geometry and Logic*", paper presented at the Fifth Metalithikum Symposium: "Computation as Literacy: Self Organizing Maps", Swiss Federal Institute of Technology, May 2014.

40. E. Zafiris , M. Epperson, *"Relational Realism and the Topological Approach to Quantum Mechanics"*, Parmenides Foundation - Ludwig-Maximilians-Universität, Munich, Germany, October 2013.

41. E. Zafiris, V. Karakostas*, "A Category-Theoretic Perspective on Truth Valuation in Quantum Mechanics",* paper presented at the international conference of the European Philosophy of Science Association, Helsinki, Finland. August 2013.

42. E. Zafiris, *"Relational Localization of Quantum Observables",* paper presented at the Symposium "Relational Realism, Quantum Gravity, and the Holographic Principle", Institute of Physics, University of Amsterdam, Netherlands. August 2013.

43. E. Zafiris, V. Karakostas, "*On the Notion of Truth in Quantum Mechanics: A Category-Theoretic Standpoint*", paper presented at the 'XXIII World Congress of Philosophy', University of Athens, Greece. August 2013.

44. E. Zafiris, *"The Role of Topology in the Interpretation of Quantum Event Structures",* paper presented at the Department of Logic, Institute of Philosophy, Eötvös University, Budapest, Hungary. April 2013.

45. E. Zafiris*, "A Sheaf-Theoretic Perspective on Quantum Decoherence: Boolean Partition Algebras and Conditionalization"*, paper presented at the Swiss Federal Institute of Technology, ETH Zurich, Switzerland. February 2013.