

Georgios Pastras

Curriculum vitae

Summary

Dr. Georgios Pastras was born in Patras, Greece in 1980. He received his BS in Physics from University of Patras in 2002 and he obtained his PhD in Physics from Harvard University in 2009. He has worked as a post-doctoral scientific collaborator in École Polytechnique Fédérale de Lausanne, University of Patras, National Technical University of Athens and he is currently a post-doctoral scientific collaborator and the principal investigator of the research program “HAPPEN” at the Institute of Nuclear and Particle Physics in the National Center for Scientific Research “Demokritos”. He has conducted research on Spontaneous Metastable Supersymmetry Breaking, Little Higgs Models, Black Hole Thermodynamics in Higher Derivative Gravity, Tunnelling Solutions in Quantum Field Theory, Entanglement in Quantum Field Theory, Holographic Entanglement Entropy, Pohlmeyer Reduction and Classical String Solutions. Between 2012 and 2014, he had a side-career in Engineering, focusing on Energy Efficiency of Manufacturing Processes, Modelling of Non-conventional Manufacturing Processes and Robotics.

Dr. Georgios Pastras has taught in Harvard University for nine semesters as a teaching fellow; he has received the “Certificate of Distinction in Teaching” by the Derek Bok Center for Teaching and Learning twice and he has been awarded with the “Harold T. White Prize for Excellence in the Teaching of Physics” by the Physics Department. Finally, he has received research funding from the Greek State Scholarship Foundation (2017-2019) and the Hellenic Foundation for Research and Innovation (HFRI) (2019-2021).

Education

- 2004–2009 **Doctor of Philosophy in Physics**, *Harvard University*, Cambridge, MA, USA, received on June 5th 2009.
PhD Thesis: “Thermal Field Theory Applications in Modern Aspects of High Energy Physics”
Supervisor: Prof. Nima Arkani-Hamed
- 2002–2004 **Master of Arts in Physics**, *Harvard University*, Cambridge, MA, USA, received on June 10th 2004, *GPA: 3.625/4*.
- 1998–2002 **Bachelor of Science in Physics**, *Patras University*, Patras, Greece, received on July 24th 2002, *GPA: 9.85/10*.
Bachelor Thesis: “Elements of Quantum Information Theory and Quantum Computers”
Supervisor: Asst. Prof. D. P.K. Ghikas

Work Experience

Academic

- 2019– **Principal Investigator of the research project HAPPEN**, *National Center for Scientific Research “Demokritos”, Institute of Nuclear and Particle Physics, Athens, Greece.*
Project Coordination and research in Theoretical High Energy Physics, focused on Quantum Entanglement in QFT and Holographic Entanglement Entropy.
Projects:
 - [HAPPEN](#) - Holographic APplications of quantum ENtanglement
- 2016– **Post Doctoral Scientific Collaborator**, *National Center for Scientific Research “Demokritos”, Institute of Nuclear and Particle Physics, Athens, Greece.*
Supervisor: Director of Research M. Axenidis
Research in Theoretical High Energy Physics, focused on Quantum Entanglement in QFT, Holographic Entanglement Entropy, Pohlmeyer Reduction and Classical String Solutions.
Projects:
 - Applications of Quantum Entanglement in Holography
- 2014–2016 **Post Doctoral Scientific Collaborator**, *National Technical University of Athens, School of Applied Mathematical and Physical Science, Department of Physics, Athens, Greece.*
Supervisor: Prof. I. Bakas
Research in Theoretical High Energy Physics, focused on Holographic Entanglement Entropy, Non-linear Sigma Models, Pohlmeyer Reduction and Classical String Solutions.
Projects:
 - [HIDEGRA](#) - Investigation of Higher DERivative term field theories and GRAvity models
- 2012–2014 **Post Doctoral Scientific Collaborator**, *University of Patras, Department of Mechanical Engineering and Aeronautics, Laboratory for Manufacturing Systems and Automation, Patras, Greece.*
Supervisor: Prof. G. Chryssolouris
Scientific collaborator involved in European Union projects. Research focused on energy efficiency issues in manufacturing processes and physical modelling of non-conventional processes. Member of the project office of the EU project ENEPLAN.
Projects:
 - [ENEPLAN](#) - ENergy Efficient Process pLANning system
 - [RLW-NAVIGATOR](#) - Remote Laser Welding System Navigator for Eco & Resilient Automotive Factories
- 2009–2011 **Post Doctoral Scientific Collaborator**, *École Polytechnique Fédérale de Lausanne, School of Basic Sciences, Institute of Theoretical Physics, Lausanne, Switzerland.*
Supervisor: Prof. R. Rattazzi
Research in Theoretical High Energy Physics, focused in tunneling solutions in Quantum Field Theory. Part time appointment with CERN.
- 2006–2009 **PhD Candidate**, *Harvard University, Physics Department, Center for the Fundamental Laws of Nature, Cambridge, MA, USA.*
Supervisor: Prof. N. Arkani-Hamed
Research in Theoretical High-Energy Physics, focused on metastable Supersymmetry breaking, little Higgs models and black hole thermodynamics in higher derivative gravity.

Miscellaneous

2011–2012 **Private**, Greek Army, Patras, Greece.

Publications in Physics

Books

1. Pastras G., “*The Weierstrass Elliptic Function and Applications in Classical and Quantum Mechanics; A Primer for Advanced Undergraduates*”, To be published by SpringerBriefs in Physics 8902 eBook ISBN 978-3-030-59385-8, Softcover ISBN 978-3-030-59384-1, DOI:10.1007/978-3-030-59385-8 (2020)
2. Pastras G., “*Thermal Field Theory Applications in Modern Aspects of High Energy Physics*”, Scholars’ Press Publishing, ISBN 978-3-639-51203-8 (2013)

International Journals

1. Katsinis D., Manolopoulos D., Mitsoulas I., Pastras G., “*Dressed Minimal Surfaces in AdS_4* ”, *JHEP* 11 (2020) 128, DOI:10.1007/JHEP11(2020)128 arXiv:2007.10922 [hep-th]
2. Katsinis D., Mitsoulas I., Pastras G., “*Geometric Flow Description of Minimal Surfaces*”, *Phys. Rev. D* 101 (2020) 8, 086015, DOI:10.1103/PhysRevD.101.086015 arXiv:1910.06680 [hep-th]
3. Katsinis D., Pastras G., “*An Inverse Mass Expansion for the Mutual Information in Free Scalar QFT at Finite Temperature*”, *JHEP* 02 (2020) 091, DOI:10.1007/JHEP02(2020)091, arXiv:1907.08508 [hep-th]
4. Katsinis D., Pastras G., “*Area Law Behaviour of Mutual Information at Finite Temperature*”, arXiv:1907.04817 [hep-th]
5. Katsinis D., Mitsoulas I., Pastras G., “*Stability Analysis of Classical String Solutions and the Dressing Method*”, *JHEP* 09 (2019) 106, DOI:10.1007/JHEP09(2019)106, arXiv:1903.01412 [hep-th]
6. Katsinis D., Mitsoulas I., Pastras G., “*Salient Features of Dressed Elliptic Strings on $\mathbb{R} \times S^2$* ”, *Eur.Phys.J. C* 79 (2019) 10, 869, DOI:10.1140/epjc/s10052-019-7369-0, arXiv:1903.01408 [hep-th]
7. Katsinis D., Mitsoulas I., Pastras G., “*Dressed Elliptic String Solutions on $\mathbb{R} \times S^2$* ”, *Eur.Phys.J. C* 78 (2018) 8, 668, DOI:10.1140/epjc/s10052-018-6129-x, arXiv:1806.07730 [hep-th]
8. Katsinis D., Mitsoulas I., Pastras G., “*Elliptic String Solutions on $\mathbb{R} \times S^2$ and Their Pohlmeyer Reduction*”, *Eur.Phys.J. C* 78 (2018) 11, 977, DOI:10.1140/epjc/s10052-018-6429-1, arXiv:1805.09301 [hep-th]
9. Katsinis D., Pastras G., “*An Inverse Mass Expansion for Entanglement Entropy in Free Massive Scalar Field Theory*”, *Eur.Phys.J. C* 78 (2018) 4, 282, DOI:10.1140/epjc/s10052-018-5596-4, arXiv:1711.02618 [hep-th]
10. Pastras G., “*On the Holographic Entanglement Entropy for Non-smooth Entangling Curves in AdS_4* ”, *Fortsch.Phys.* 66 (2018) 3, 1700090, DOI:10.1002/prop.201700090 (2018), arXiv:1710.01948 [hep-th]

11. Pastras G., "Revisiting the $O(3)$ Non-linear Sigma Model and Its Pohlmeyer Reduction", *Fortsch.Phys.* 66 (2018) 1, 1700067, DOI:10.1002/prop201700067 , arXiv:1612.03840 [hep-th]
12. Pastras G., "Static Elliptic Minimal Surfaces in AdS_4 ", *Eur.Phys.J. C* 77 (2017) 11, 797, DOI:10.1140/epjc/s10052-017-5292-9, arXiv:1612.03631 [hep-th]
13. Bakas I., Pastras G., "On Elliptic String Solutions in AdS_3 and dS_3 ", *JHEP* 07 (2016) 070, DOI:10.1007/JHEP07(2016)070, arXiv:1605.03920 [hep-th]
14. Bakas I., Pastras G., "Entanglement Entropy and Duality in AdS_4 ", *Nucl.Phys. B* 896 (2015) 440-469, DOI:10.1016/j.nuclphysb.2015.04.027, arXiv:1503.00627 [hep-th]
15. Pastras G., Manolopoulos D., "Charged Rényi Entropies in CFTs with Einstein-Gauss-Bonnet Holographic Duals", *JHEP* 11 (2014) 007, DOI:10.1007/JHEP11(2014)007, arXiv:1404.1309 [hep-th]
16. Pastras G., "Exact Tunneling Solutions in Minkowski Spacetime and a Candidate for Dark Energy", *JHEP* 08 (2013) 075, DOI:10.1007/JHEP08(2013)075, arXiv:1102.4567 [hep-th]
17. Katifori E., Pastras G., "Thermal Evolution of the Non Supersymmetric Metastable Vacua in $\mathcal{N} = 2$ $SU(2)$ SYM Softly Broken to $\mathcal{N} = 1$ ", *JHEP* 05 (2013) 142, DOI:10.1007/JHEP05(2013)142, arXiv:0811.3393 [hep-th]
18. Anninos D., Pastras G., "Thermodynamics of the Maxwell-Gauss-Bonnet anti-de Sitter Black Hole with Higher Derivative Gauge Corrections", *JHEP* 07 (2009) 030, DOI:10.1088/1126-6708/2009/07/030, arXiv:0807.3478 [hep-th]
19. Pastras G., "Non Supersymmetric Metastable Vacua in $\mathcal{N} = 2$ SYM Softly Broken to $\mathcal{N} = 1$ ", *JHEP* 10 (2013) 060, DOI:10.1007/JHEP10(2013)060, arXiv:0705.0505 [hep-th]

Conference Proceedings

20. Pastras G., "Elliptic String Solutions in AdS_3 and Elliptic Minimal Surfaces in AdS_4 ", Corfu Summer Institute, 16th School and Workshops on Elementary Particle Physics and Gravity, Workshop on Geometry and Physics, November 20 - 25, 2016, Ringberg Castle, Germany, *PoS CORFU2016* (2017) 111, DOI: 10.22323/1.292.0111, arXiv:1710.00545 [hep-th]
21. Pastras G., Manolopoulos D., "Holographic Calculation of Rényi Entropies and Restrictions on Higher Derivative Terms", Corfu Summer Institute, 14th School and Workshops on Elementary Particle Physics and Gravity, Workshop on Quantum Fields and Strings, September 14 - 21, 2014, Corfu, Greece, *PoS CORFU2014* (2015) 157, DOI: 10.22323/1.231.0157, arXiv:1507.08595 [hep-th]

Lecture Notes

22. Pastras G., "Four Lectures on Weierstrass Elliptic Function and Applications in Classical and Quantum Mechanics", arXiv:1706.07371 (2017)

Publications in Engineering

International Journals

1. Pastras G., Fysikopoulos A., Chryssolouris G., "A Theoretical Investigation on the Potential Energy Savings by Optimization of the Robotic Motion Profiles", *RCIM*, Volume 58, pp 55–68, DOI:10.1016/j.rcim.2019.02.001 (2019)
2. Pastras G., Fysikopoulos A., Chryssolouris G., "A Numerical Approach to the Energy Efficiency of Laser Welding", *IJAMT*, Volume 92, Issue 1–4, pp 1243–1253, DOI:10.1007/s00170-017-0187-3 (2017)
3. Fysikopoulos A., Stavridis J., Pastras G., Stavropoulos P., Chryssolouris G., "On the Performance Evaluation of Remote Laser Welding Process: An Automotive Case Study", *Procedia CIRP*, Volume 41, pp 969–974, DOI:10.1016/j.procir.2016.01.005 (2016)
4. Pastras G., Fysikopoulos A., Giannoulis C., Chryssolouris G., "A Numerical Approach to Modelling Keyhole Laser Welding", *IJAMT*, Volume 78, Issue 5-8, pp 723-736, DOI:10.1007/s00170-014-6674-x (2015)
5. Fysikopoulos A., Pastras G., Alexopoulos T., Chryssolouris G., "On a Generalised Approach to Manufacturing Energy Efficiency", *IJAMT*, Volume 73, Issue 9-12, pp 1437-1452, DOI:10.1007/s00170-014-5818-3 (2014)
6. Pastras G., Fysikopoulos A., Stavropoulos P., Chryssolouris G., "An Approach to Modeling Evaporation Laser Pulsed Drilling and its Energy Efficiency", *IJAMT*, Volume 72, Issue 9-12, pp 1227-1241, DOI:10.1007/s00170-014-5668-z (2014)
7. Fysikopoulos A., Papacharalampopoulos A., Pastras G., Stavropoulos P., Chryssolouris G., "Energy Efficiency of Manufacturing Processes: A Critical Review", *Procedia CIRP*, Volume 7, pp 628-633, DOI:10.1016/j.procir.2013.06.044 (2013)

Conference Proceedings

8. Fysikopoulos A., Alexopoulos T., Pastras G., Stavropoulos P., Chryssolouris G., "On the Design of a sustainable Production Line: The MetaCAM Tool", Advances in Multidisciplinary Engineering, 13–19 November 2015, Houston, Texas, USA, *ASME IMECE2015-52960*, pp. V015T19A015, DOI:10.1115/IMECE2015-52960 (2016)
9. Fysikopoulos A., Pastras G., Vlachou K., Chryssolouris G., "An Approach to Increase Energy Efficiency Using Shutdown and Standby Machine Modes", IFIP WG 5.7 International Conference, APMS 2014, 20-24 September, Ajaccio, France, *Advances in Production Management Systems. Innovative and Knowledge-Based Production Management in a Global-Local World, IFIP Advances in Information and Communication Technology Volume 439*, pp 205-212, DOI:10.1007/978-3-662-44736-9_25 (2014)

Academic Supervision Activity

Post-docs

1. Dimitrios Manolopoulos, 2020-present
2. Georgios Linardopoulos, 2019-present

3. Ioannis Mitsoulas, 2019-2020
[PhD Students](#)
4. Dimitrios Katsinis, 2016-present
5. Ioannis Mitsoulas, 2016-2019

Teaching Experience

Physics Courses at Graduate Level

Fall 2006 **Teaching Assistant**, *Harvard University*, “*General Theory of Relativity*”, Instructor: Prof. M. Zaldarriaga.

Physics Courses at Advanced Undergraduate Level

Fall 2007 **Teaching Assistant**, *Harvard University*, “*Mechanics*”, Instructor: Prof. G. Murthy.

Physics Courses at Introductory Undergraduate Level

Fall 2008 **Teaching Assistant**, *Harvard University*, “*Mechanics and Special Relativity*”, Instructor: Prof. H. Georgi.
Certificate of Distinction in Teaching

Spring 2008 **Teaching Assistant**, *Harvard University*, “*Introductory Electromagnetism*”, Instructor: Prof. S. Sachdev and Prof. R. Walsworth.

Fall 2004 **Teaching Assistant**, *Harvard University*, “*Mechanics and Special Relativity*”, Instructor: Prof. H. Georgi.

Spring 2004 **Teaching Assistant**, *Harvard University*, “*Introductory Electromagnetism*”, Instructor: Prof. H. Georgi and Prof. C. Stubbs.
Harold T. White Prize for Excellence in the Teaching of Physics

Fall 2003 **Teaching Assistant**, *Harvard University*, “*Mechanics and Special Relativity*”, Instructor: Prof. H. Georgi.
Certificate of Distinction in Teaching and Harold T. White Prize for Excellence in the Teaching of Physics

Physics Courses for Non-physicists

Spring 2006 **Teaching Assistant**, *Harvard University*, “*The Nature of Light and Matter*”, Instructor: Prof. R. Glauber.

Spring 2005 **Teaching Assistant**, *Harvard University*, “*Principles of Physics: Electricity and Magnetism, Circuits and Optics*”, Instructor: Prof. E. Mazur.

Seminars

Spring 2017 **4 lectures**, *National Technical University of Athens*, “*Elliptic Functions and Applications in Physics*”.

Spring 2012 **12 lectures**, *Patras University*, “*Introduction to Quantum Field Theory*”.

Administrative Experience

2019–2021 Principal investigator of the research project [HAPPEN](#) funded by the Hellenic Foundation for Research and Innovation (HFRI) and the General Secretariat for Research and Technology (GSRT) and hosted by the Institute of Nuclear and Particle Physics in NCSR “Demokritos”

2012–2014 Member of the project office of the European Commission project [ENEPLAN](#). Tasks included consortium coordination and interaction with EU commission administration on technical and financial issues. The project consortium consisted of 17 partners including industries, software companies, universities and research institutes.

Research Funding

2019–2021 “[First Post-doctoral researchers support](#)” action of the Hellenic Foundation for Research and Innovation (HFRI) and the General Secretariat for Research and Technology (GSRT).

Project Title: HAPPEN - Holographic APPLICATIONS of quantum ENTanglement

2017–2019 “[Post-doctoral researchers support](#)” action of the operational programme “Human Resources Development, Education and Lifelong Learning 2014-2020”, with priority axes 6, 8, and 9, implemented by the Greek State Scholarship Foundation and co-funded by the European Social Fund - ESF and National Resources of Greece. Project Title: Applications of Quantum Entanglement in Holography

Awards

2009 [Certificate of Distinction in Teaching](#), *Derek Bok Center for Teaching and Learning, Harvard University.*

2004 [Harold T. White Prize for Excellence in the Teaching of Physics](#), *Harvard University, Physics Department.*

2004 [Certificate of Distinction in Teaching](#), *Derek Bok Center for Teaching and Learning, Harvard University.*

2001 [First award at the 13th Summer School of Advanced Physics](#), *University of Crete, Physics Department, Greece.*

1998–2002 [Award for undergraduate studies](#), *Greek State Scholarship Foundation.*

1995,1997 [Finalist in the Hellenic Mathematical Society National Contest](#), *Hellenic Mathematical Society.*

Scholarships

2002–2006 [Fellowship for graduate studies](#), *Ioannis S. Latsis Foundation.*

2002–2003 [Purcell Fellowship](#), *Harvard University.*

1998–2002 [Scholarship for undergraduate studies](#), *Greek State Scholarship Foundation.*

1998–2002 [Scholarship for undergraduate studies](#), *Ioannis S. Latsis Foundation.*

Conferences Participation

Sep. 2019 10th Regional Meeting in String theory, Kolymbari, Greece,
Talk: [“Mutual Information and Area Law at Finite Temperature”](#)

Apr. 2019 HEP 2019 - Conference on Recent Developments in High Energy Physics and Cosmology, NCSR “Demokritos”, Athens, Greece,
Talk: [“Pohlmeyer Reduction, Dressing Method and String Solutions on \$\mathbb{R} \times S^2\$ ”](#)

- Mar. 2019 Athens Regional Meeting in Theoretical High Energy Physics, Athens, Greece
Talk: "[Pohlmeyer Reduction, Dressing Method and String Solutions on \$\mathbb{R} \times S^2\$](#) "
- Mar. 2018 HEP 2018 - Conference on Recent Developments in High Energy Physics and Cosmology, National Technical University of Athens, Greece,
Talk: "[An Inverse Mass Expansion for Entanglement Entropy in Free Massive Scalar Field Theory](#)"
- Dec. 2017 4th annual Xmas Theoretical Physics Workshop, Athens, Greece
- Feb. 2017 Athens Inter-Institutional Meeting in High Energy Physics, Athens, Greece,
Talk: "[Static Elliptic Minimal Surfaces in \$AdS_4\$](#) "
- Nov. 2016 Workshop on Geometry and Physics, Ringberg Castle, Tegernsee, Germany,
Talk: "[Elliptic String Solutions in \$AdS_3\$ and Elliptic Minimal Surfaces in \$AdS_4\$](#) "
- Jul. 2015 8th Regional Meeting in String theory, Nafplion, Greece,
Talk: "[Entanglement Entropy and Duality in \$AdS_4\$](#) "
- Feb. 2015 "Progress in Fluid/Gravity Correspondence", Institute of Theoretical Physics, Aristotle University of Thessaloniki, Greece,
Talk: "[Entanglement Entropy and Duality in \$AdS_4\$](#) "
- Sep. 2014 14th Corfu Summer Institute 2012, "School and Workshops on Elementary Particle Physics and Gravity", Workshop on Quantum Fields and Strings, Corfu, Greece,
Talk: "[Holographic Calculation of Rényi Entropies and Restrictions on Higher Derivative Terms](#)"
- Jun. 2011 6th Regional Meeting in String theory, Milos, Greece
- Jun. 2007 4th Regional Meeting in String theory, Patras, Greece
- Mar. 2005 "*QFT & QCD Past, Present and Future*", Harvard University, Boston, MA, USA
- Jul. 2004 The 2004 Onassis Foundation Lecture Series "*Fields and Strings*", Foundation of Research and Technology, Heraclion, Greece
- Nov. 2001 22nd Solvay Physics Conference "*Physics of Communication*", Delphi Conference Center, Greece
- Jun. 2001 The 2001 Onassis Foundation Lecture Series "*Ultrafast Processes, Methods and Applications*", Foundation of Research and Technology, Heraclion, Greece

Invited Talks

- Nov. 2018 National and Kapodistrian University of Athens, "*Dressed Elliptic Strings on $\mathbb{R} \times S^2$* "
- Jan. 2018 National Technical University of Athens, "*An Inverse Mass Expansion for Entanglement Entropy in Free Massive Scalar Field Theory*"
- Nov. 2017 NCSR Demokritos, "*Quantum Entanglement and Gravity as an Entropic Force*"
- Oct. 2017 Patras University, "*Elliptic Minimal Surfaces in AdS_4* "
- Feb. 2017 National Technical University of Athens, "*Static Elliptic Minimal Surfaces in AdS_4* "
- Jun. 2016 National Technical University of Athens, "*Elliptic String Solutions in AdS_3 and dS_3* "
- May 2016 National and Kapodistrian University of Athens, "*Elliptic Classical String Solutions in AdS_3 and dS_3* "

Mar. 2016 National Technical University of Athens, "*Merons, Instantons and Elliptic Solutions in the $O(3)$ NLSM and Its Pohlmeyer Reduction*"

Apr. 2015 NCSR Demokritos, "*Entanglement and Duality in AdS_4* "

Professional Activities

2017– Referee in European Physical Journal C

Professional Memberships

2018– Member of the Hellenic Society for the Study of High Energy Physics

Popularized Dissemination

Jul. 2020 Talk: "Gravity as an Entropic Force" at the [55th Demokritos Summer School](#)

Jul. 2019 Talk: "Gravity as an Entropic Force" at the [54th Demokritos Summer School](#)

Jul. 2018 Talk: "Gravity as an Entropic Force" at the [53th Demokritos Summer School](#)

Mar. 2017 Public talk: "[What is Gravity?](#)" in the framework of [Cafe Scientific](#) and [Bodossaki Lectures on Demand](#)

Feb. 2016 Popularized scientific article on Physics: "*100 Years of General Relativity*", *Nea Politiki*, Volume 19, pp 100-104, Papazisis Publications

Languages

Greek **Native**

English **Fluent**

French **Elementary**

Computer skills

Advanced Wolfram Mathematica, Latex, C

Intermediate Visual Basic, CorelDraw, Microsoft Office

Interests

Programming, [Project Euler](#): Problems solved 150/618, top 0.481%

Amateur Astronomy

[Digital painting](#)