

ELENI PANAGIOTOU

RESEARCH INTERESTS: Knot theory, polymer physics, molecular simulations

EDUCATION:

Ph.D. in Mathematics 2013 National Technical University of Athens (NTUA), Greece

Title of Ph.D. Thesis: Topological methods for measuring the entanglement in polymers

Advisor: Professor Sofia Lambropoulou

Members of the Advisory Committee: Professor K. C. Millett, UCSB, Professor D. N. Theodorou, NTUA

M.Sc. in Applied Mathematical Sciences 2008 National Technical University of Athens, Greece

Title of M.Sc. Dissertation: A study of the entanglement in polymers

Advisor: Professor Sofia Lambropoulou

Diploma in Applied Mathematics (5 year cycle of studies) 2007 School of Applied Mathematical and Physical Sciences National Technical University of Athens, Greece

Title of Diploma Dissertation: Twelve Proofs of the Fundamental Theorem of Algebra

Advisor: Professor Sofia Lambropoulou

ACADEMIC POSITIONS:

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|-----------------------|--|
| August 2018 - Present | University of Tennessee at Chattanooga (UTC) , Assistant Professor (tenure-track), Department of Mathematics and SimCenter |
| July 2016 - July 2018 | University of California, Santa Barbara (UCSB), Lecturer, Department of Mathematics |
| July 2013 - July 2016 | University of California, Santa Barbara, Visiting Assistant Professor, Department of Mathematics |
| Jan - June 2013 | National Technical University of Athens, Greece, MIS grant of Professor S. Lambropoulou, grant no. 380154 |

VISITING POSITIONS:

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| June-July 2020 | Kavli Institute of Theoretical Physics, UCSB (virtual) |
| Sep - Dec 2012 | Isaac Newton Institute for the Mathematical Sciences, Cambridge, UK |
| 2011-2012 | Visiting Researcher, Swiss Federal Institute of Technology ETH Zurich, Department of Materials
Supervisor: Professor M. Kröger |

RESEARCH FUNDING:

August 2020 - Dec. 2020	“A topological analysis of viral glycoproteins-application to the Spike protein of SARS-CoV-2” Center of Excellence in Applied Computational Science and Engineering UTC internal grant program (PI)
July 2020 - June 2021	“Topological design of porous metals for biomedical applications” Center of Excellence in Applied Computational Science and Engineering UTC internal grant program (PI)
August 2019 - July 22	“RUI: Computational methods for measuring topological entanglement in polymers”, National Science Foundation, Division of Mathematical Sciences, Computational Mathematics, 1913180 (PI)
July 2019 - July 2020	“A study on the local and global effects of polymer entanglement in material properties and biological functions” Center of Excellence in Applied Computational Science and Engineering UTC internal grant program (PI)
June 2019-May 2022	“CC* Compute: A cost-effective 2,048 InfiniBand cluster at UTC for campus research and education”, National Science Foundation (co-PI)
Sep - Dec 2012	Financial Support of the Isaac Newton Institute for the Mathematical Sciences, Cambridge, UK for participation in the Programme “Topological Dynamics in the Physical and Biological Sciences”.
2011-2012	Swiss Government Scholarship for research Swiss Federal Institute of Technology ETH Zurich
2010-2011	Greek Ministry of Education, in collaboration with the European Commission PhD Scholarship “Irakleitos II”
2008-2010	National Technical University of Athens Program Supporting Basic Research
Spring 2008	Ecole Polytechnique Fédérale de Lausanne, Switzerland Erasmus scholarship for MSc dissertation.

PUBLICATIONS:

1. Panagiotou E. and Kauffman L. H., 2020, Knot polynomials of open and closed curves *Proc. R. Soc. A* **476** 20200124 [\[link to full paper\]](#)

2. Panagiotou E. and Plaxco, K. W., 2020, A topological study of protein folding kinetics, *Topology of Biopolymers, AMS Contemporary Mathematics Series* **746** [[link to preprint](#)]
3. Panagiotou E., Delaney K. T. and Fredrickson G. H., 2019, Theoretical prediction of an isotropic to nematic phase transition in bottlebrush homopolymer melts, *J. Chem. Phys.* **151**, 094901 [[link to full paper](#)]
4. Panagiotou E., Millett K. C. and Atzberger P., 2019, Topological Methods for Polymeric Materials: Characterizing the Relationship Between Polymer Entanglement and Viscoelasticity, *Polymers* ,**11** (3), 437. [[link to full paper](#)]
5. Panagiotou E., 2019, Topological entanglement and its relation to polymer material properties Knots, Low-Dimensional Topology and Applications, Knots in Hellas II, *Springer Proceedings in Mathematics and Statistics* [[link to full paper](#)]
6. Panagiotou E. and Millett K. C., 2018, Linking matrices in systems with periodic boundary conditions *J. Phys. A: Math. Theor.* **51** 225001 [[link to full paper](#)]
7. Millett K. C. and Panagiotou E., 2016, Linking in systems with one-dimensional periodic boundaries, *Algebraic Modeling of Topological and Computational Structures and Applications, PROMS.* [[link to full paper](#)]
8. Millett K. C. and Panagiotou E., 2016, Entanglement transitions in one dimensional confined flows, *Fluid Dyn. Res.* **50** 011416.[[link to full paper](#)]
9. Igram S., Millett K. C. and Panagiotou E., 2016, Resolving critical degrees of entanglement in olympic rings systems, *J. Knot Theory Ramif.* **25** 14.[[link to full paper](#)]
10. Panagiotou E. 2015, The linking number in systems with periodic boundary conditions, *J. Comp. Phys.* **300** 533-573.[[link to full paper](#)]
11. Panagiotou E. and Kröger M., 2014, Pulling force-induced elongation and alignment effects on entanglement and knotting characteristics of linear polymers in a melt *Phys. Rev. E* **90** 042602.[[link to full paper](#)]
12. Panagiotou E., Kröger M and Millett K. C., 2013, Writhe and mutual entanglement combine to give the entanglement length *Phys. Rev. E* **88** 062604.[[link to full paper](#)]
13. Panagiotou E., Millett K. C. and Lambropoulou S., 2013, Quantifying entanglement for collections of chains in models with periodic boundary conditions *Procedia IUTAM: Topological Fluid Dynamics II* **7** pp.251-260.[[link to full paper](#)]
14. Panagiotou E., Tzoumanekas C., Lambropoulou S., Millett K. C. and Theodorou D. N., 2011, A study of the entanglement in systems with periodic boundary conditions *Prog. Theor. Phys. Supplement* **191** pp.172-181.[[link to full paper](#)]

15. Panagiotou E., Millett K. C. and Lambropoulou S, 2010, The mean squared linking number and the writhe of uniform random walks in confined space *J. Phys. A:Math. Theor.* **43** 045208-30.[\[link to full paper\]](#)

WORK IN PROGRESS:

1. A topological free energy for viral glycoproteins, joint work with undergraduate student Quenisha Baldwin (in final stages of preparation)
2. A topology USER-package for LAMMPS, joint work with undergraduate student Tom Herschberg

TEACHING EXPERIENCE:

Graduate courses:

2018-2020 UTC Instructor for the courses: Numerical Linear Algebra, Numerical Methods for Partial Differential Equations, Applied Knot Theory

Undergraduate courses:

2018-2020 UTC Instructor for the courses: Calculus with Analytic Geometry II, Elementary Linear Algebra, Complex Analysis

2013-2018 UCSB Instructor for the courses: Introduction to Linear Algebra, Introduction to Group Theory, Classical Number systems, Partial Differential Equations, Introduction to complex variables I and II, Methods of Analysis, Transition to Higher Mathematics, Vector Calculus with Applications, Linear Algebra with Applications, Differential Equations, Calculus with Applications.

2010-2011 NTUA Assistant for the courses: Calculus I, Algebra I, Algebra II, Linear Algebra and Analytic Geometry

Short courses:

22-24 May 2019 Short Course on Applied Knot Theory and Molecular Simulation, University of Cadiz, Spain

GRADUATE RESEARCH SUPERVISION:

1. 2019-2020 Evan Gildernew, MS Chemical Engineering student, UTC

2. 2020 Mandya Nagaiah, Hemanth Kumar, MS Mathematics, UTC

UNDERGRADUATE RESEARCH SUPERVISION:

1. 2020 Achok Alier, Chemical Engineering, Undergraduate Research Training Opportunity Program Scholars (URTOPS) UTC
2. 2020 Arielle Beard, Biology, URTOPS UTC
3. summer 2020 Quenisha Baldwin, Biology, Tuskegee University, REU icompbio program, UTC
4. 2019-2020 Tom Herschberg, Computer Science, UTC
5. 2014 Co-supervision of senior thesis of Spencer Igram, STEM student, UCSB
6. summer 2014, summer 2015 Co-supervision of research program of Leticia Flores, CAMP (California Alliance for Minority Participation) summer undergraduate research program at the Materials Research Laboratory UCSB

RESEARCH VISITS (funded):

22-26 April 2012 Université de Caen, France (joint work with P. Bellingeri)

19-24 February 2012 Université de Caen, France (joint work with P. Bellingeri)

INVITED LECTURES AND CONFERENCE PRESENTATIONS:

1. Women in Mathematics of Materials organized by the AWM in SIAM Annual meeting, July 09 2020 (virtual)
2. Quantum Entanglement Seminar, Organized by L. H. Kauffman, July 09 2020 (virtual)
3. Conference on Physical Knotting, Vortices and Surgery in nature, Novosibirsk State University, July 08 2020 (virtual)
4. Topology Seminar, George Washington University, March 2020
5. Joint Mathematics Meetings, Denver, January 2020

6. AMS Sectional Meeting University of California Riverside, November 2019
7. “Theoretical prediction of an isotropic to nematic phase transition in bottlebrush homopolymer melts”, International Symposium Polymers and networks via topology and entanglement, Ochanomizu University, Tokyo, Japan, August 7-9, 2019
8. “Introduction to Applied Knot Theory”, UTC, Special Colloquium Series in REU Site: Research Training for Undergraduates in Mathematical Analysis with Applications in Allied Fields, July 22, 2019
9. “The effects of polymer entanglement and chain architecture on the mechanical properties of polymers”, Workshop “Biology, Analysis, Geometry, Energies, Links: A program on low dimensional Topology, Geometry and Applications”, Institute for Mathematics and its Applications, June 24-29, 2019
10. “A study of the effects of polymer entanglement and architecture to material properties”, Workshop “The Topology of Nucleic Acids: Research at the Interface of Low-Dimensional Topology, Polymer Physics and Molecular Biology”, Banff International Research Station, Canada, March 24-29 2019
11. “The effects of polymer entanglement and architecture to material properties”, Nanomaterials Theory Institute, Oak Ridge National Laboratories February 14, 2019
12. “The effects of entanglement on polymer viscoelasticity”, Applied Mathematics Seminar, University of Tennessee, Knoxville, February 13, 2019
13. “A study of entanglement in proteins”, JMM, Baltimore, January 2019
14. “A study of the effects of entanglement and chain architecture in polymers” University of Georgia (UGA) Department of Mathematics Seminar, November 16 2018
15. “The effect of topological and geometrical constraints on polymer material properties. “ AMS Fall Southern Sectional meeting Special Session on The Geometry of Curves and Applications, November 3-4 2018
16. ““A topological model for protein folding “ AMS Fall Western Sectional meeting Special Session on Mathematical Methods for the study of the Three Dimensional Structure of Biopolymers, October 27- 28, 2018
17. “A study of entanglement in physical systems and its relation to material properties and function”, Department of Mathematics and SimCenter Seminar UTC, September 28, 2018
18. “Polymer entanglement and viscoelastic properties of material”, SIAM conference on Life Sciences, Minneapolis August 7 2018
19. “A study of the effects of polymer entanglement on mechanical properties of material”, The interplay of topology and material properties, Summer Conference on Topology and its Applications, University of Kentucky, Bowling Green, July 20, 2018

20. "Liquid crystals with applications to biology", MCAIM-WIMM Workshop, University of Michigan, Ann Arbor, May 14-18, 2018
21. "A topological model for protein folding kinetics", AMS Spring Eastern Sectional Meeting, Special Session of Topology of Biopolymers, Northeastern University, Boston, April 22, 2018
22. "Paths to Collaboration with Scientists", Panel Discussion on behalf of the Committee on the Profession of the AMS, JMM, San Diego, January 10-13, 2018
23. "Topological Approaches for Characterizing in Polymeric Materials the Local and Global Entanglement of Polymer Chains Relevant to Viscoelastic Mechanical Responses.", Invited talk to MS Special Session on Algebraic, Discrete, Topological and Stochastic Approaches to Modeling in Mathematical Biology, I, JMM, San Diego, January 10-13, 2018
24. "Topological Methods for Polymeric Materials: Characterizing the Relationship Between Polymer Entanglement and Viscoelasticity.", Invited talk to CMO--BIRS Workshop 17w5032 The Geometry and Topology of Knotting and Entanglement in Proteins, Oaxaca, Mexico, November 5-10, 2017
25. "Topological analysis and simulation of the roles of polymer entanglements in the viscoelastic responses of complex fluids", Invited talk to Stochastic and Multi-scale Models in Mathematical Biology, Analysis and Simulations, II, Fall Western Sectional Meeting, Riverside, California, November 04 2017
26. "Topological analysis and simulation of the roles of polymer entanglements in the viscoelastic responses of complex fluids", Invited talk to Conference on Means, Methods and Results in the Statistical Mechanics of Polymeric Systems II", Fields Institute, Toronto, Canada, June 12-14, 2017
27. "Topological analysis and simulation of the roles of polymer entanglements in the viscoelastic responses of complex fluids", Invited talk to 11th Southern California Flow Physics Symposium, University of California, San Diego, April 22, 2017
28. "Quantifying entanglement in physical systems", Invited talk to Claremont College Topology Seminar, February 14, 2017
29. "Linking polymer entanglements with the viscoelastic mechanics of polymeric materials using topological analysis and computational simulations", Invited talk to Complex Fluids Design Consortium Annual Meeting, organized by Prof. G. Fredrickson, Materials Research Laboratory, UCSB, February 3, 2017
30. "Linking polymer entanglements with the viscoelastic mechanics of polymeric materials using topological analysis and computational simulations", Invited talk to AMS Special Session on Knotting in Physical Systems, in celebration of Kenneth C. Millett's 75th birthday, Fall Central Sectional Meeting University of St. Thomas (Minneapolis campus), Minneapolis, MN October 28-30, 2016

31. "A study of the entanglement in systems of curves in Periodic Boundary Conditions", Invited talk to Prof. G. Fredrickson group, Department of Chemical Engineering, UCSB, June 2016
32. "A study of the entanglement in systems of curves in Periodic Boundary Conditions", Invited talk to Prof. F. Gibou group, Department of Mechanical Engineering, UCSB, June 2016
33. "Writhe and mutual entanglement combine to give the entanglement length", Talk to SIAM Conference on Mathematical Aspects of Material Science, May 2016
34. "A study of the entanglement in systems of curves in Periodic Boundary Conditions", Invited talk to AWM Workshop: Research Talks by Recent Ph.D.s: Mathematical Modeling and High-Performance Computing for Multiscale and Multiphysics Problems, 2015 SIAM Conference on Computational Science and Engineering, March 2015
35. "Pulling force-induced elongation and alignment effects on entanglement and knotting characteristics of linear polymers in a melt", Invited talk to AMS Western Section meeting, California State University, Fullerton, Fullerton, CA, October 2015
36. "A study of the entanglement in systems of curves in Periodic Boundary Conditions", Invited talk to Thales Workshop, NTUA, Greece, August 2015
37. "Writhe and mutual entanglement combine to give the entanglement length", Invited talk to AMS Western Section meeting, San Francisco State University, San Francisco, October 2014
38. "The linking number in systems of curves with Periodic Boundary Conditions", Hypatian Seminar, (Women association), UCSB, May, 05, 2014
39. "The linking number in systems of curves with Periodic Boundary Conditions", Invited talk to SIAM Undergraduate Research Mini-symposium, University of California, Santa Barbara, May 2014
40. "The linking number in systems of curves with Periodic Boundary Conditions", Invited talk to Claremont Topology Seminar, Pomona College, January 2014
41. "Entanglement in systems of curves with Periodic Boundary Conditions", Invited talk to International Workshop "Entanglement in biology; how Nature controls the topology of proteins and DNA", Banff International Research Station, November 2013.
42. "A study of the entanglement in polymer melts", Invited talk in Seminar of Continuum Mechanics and Topology and Geometry, University of Glasgow, November 2012
43. "A study of the entanglement in polymer melts", Invited talk in Seminar of Programme Topological Dynamics in the Physical and Biological Sciences, Isaac Newton Institute for Mathematical Sciences, November 2012
44. "Measures of entanglement in Polymer Melts.", Invited talk in Seminar of Chemical Engineers, University of Patras, School of Chemical Engineers, 20 July 2012

45. "The linking number in systems with Periodic Boundary Conditions.", Talk for Mini-course, Organizer Professor: A. Beliakova, Department of Mathematics, University of Zurich, April 2012
46. "A study of entanglement in Polymer Melts.", Invited talk in Seminar of Applied Mathematics and Mechanics (*seminar given in french*), Université de Caen, February 2012
47. "The Gauss linking integral and its application to the study of entanglement in polymers.", Seminar to students of the course: Introduction to Knot Theory, Swiss Federal Institute of Technology ETH Zurich, November 2011
48. "A study of the entanglement in polymer melts", Invited short talk to International Workshop "Polymer Dynamics: Entanglements and Architectures", Centro Congressi "Villa Orlandi", Capri, 26-29 July 2011 .
49. "A study of the linking number in systems with periodic boundary conditions" Invited short talk to International Conference "Knots and Links: From Form to Function", Centro di Ricerca Matematica Ennio de Giorgi, Pisa, 2-8 July 2011
50. "A study of the entanglement in systems with periodic boundary conditions", Invited short talk to International Workshop "Numerical Knots: Models and Simulations", Centro di Ricerca Matematica Ennio de Giorgi, Pisa, 8-9 June 2011
51. "The linking number of polymer chains in systems with periodic boundary conditions", Invited 40' talk to International Conference "Statistical Physics and Topology of Polymers with Ramifications to Structure of DNA and Proteins", Kyoto University, Japan, August 2010.
52. "The linking number and the writhe of uniform random walks and polygons in confined spaces", Invited short talk to International Conference "Conference on Knots and other entanglements in Biopolymers, Advanced School and Conference on Knot Theory", International Center of Theoretical Physics, Trieste, May 2009
53. "Topological methods for measuring the entanglement in polymers", Invited short talk to International Conference "Conference on Knots and other entanglements in Biopolymers, Topological and Geometrical Aspects of DNA, RNA and Protein Structures", International Center of Theoretical Physics, Trieste, September 2008

POSTER PRESENTATIONS:

1. "The effects of entanglement on the mechanical properties of polymers", Mathematical fluids, materials and biology, University of Michigan, 13-15 June, 2019

2. “Topological analysis and simulation of the roles of polymer entanglements in the viscoelastic responses of complex fluids”, SOCAMS (Southern California Applied Mathematics Symposium), UC Irvine, June 3 2017
3. “Viscoelastic mechanics of polymer entanglements linking molecular and bulk scales using topological analysis and computational simulations”, SOCAMS 2016, Claremont Colleges, June 04 2016
4. “The linking number in systems with periodic boundary conditions”, International Workshop “Tangled Magnetic Fields in Astro- and Plasma Physics”, ICMS, Edinburg, 15-19 October 2012
5. “Measuring entanglement in collection of open and closed macromolecules”, International Workshop “Topological Aspects of DNA Function and Protein Folding”, Isaac Newton Institute for Mathematical Sciences, Cambridge, 3-7 September 2012 (poster)
6. “A study of the entanglement in systems with periodic boundary conditions”, International Workshop “Knots and Links: From Form to Function”, Centro di Ricerca Matematica Ennio de Giorgi, Pisa, 2-8 July 2011 (invited short talk and poster)
7. “The linking number in systems with periodic boundary conditions”, International Conference “Swiss Knots, Knot Theory and Algebra”, sponsored by the Institute of Mathematics of the University of Zurich, Lake Thun, 23-27 May 2011
8. “Topological methods for measuring the entanglement in polymers”, Conference on Knots and other entanglements in Biopolymers, Topological and Geometrical Aspects of DNA, RNA and Protein Structures, International Center of Theoretical Physics, Trieste, September 2008.

SEMINARS AND POSTGRADUATE COURSES:

2013-2016 Topology seminar, Department of Mathematics, University of California, Santa Barbara

2011-2012 ETH Polymer Physics seminar, Organizer Professor H. C. Öttinger, Swiss Federal Institute of Technology ETH Zurich

2011 Molecular Simulation Course for Graduate Students, Professor D. N. Theodorou, National Technical University of Athens

2008-2011 Computational Materials Science and Engineering Group Seminar, Organizer Professor D. N. Theodorou, National Technical University of Athens

2005-2006 Algebra seminar for students, Organizer Professor S. Lambropoulou, National Technical University of Athens

SCHOOLS ATTENDED:

Winter Braids III, School on braids and low dimensional topology, Institut Fourier, 17-20 December 2012 (invited short talk)

Winter Braids II, School on algebraic and topological aspects of braid groups, University of Caen, 12-15 December 2011 (invited short talk)

Conference on Knots and other entanglements in Biopolymers, Advanced School and Conference on Knot Theory, International Center of Theoretical Physics, Trieste, May 2009 (invited short talk)

1-5 September 2006 Summer School on Mathematical Modelling, National Technical University of Athens

ORGANIZATION OF CONFERENCES and MEETINGS:

1. 5 day workshop Novel Mathematical Methods in Material Science: Applications to Biomaterials (21w5232) BIRS, Banff, Canada (main organizer)
2. (Virtual) Workshop on Applied Knot Theory, University of Tennessee at Chattanooga, Chattanooga, TN, October 09, 2020 (main organizer).
3. (Virtual) Special Session on Applied Knot Theory at the AMS Fall Southeastern Sectional Meeting, University of Tennessee at Chattanooga, Chattanooga, TN, October 10-11, 2020 (main organizer).
4. (Virtual) Special Session on Advances in the Modeling and Computations of Fluid Flows and Fluid-Structure Interactions at the AMS Fall Southeastern Sectional Meeting, University of Tennessee at Chattanooga, Chattanooga, TN, October 10-11, 2020. (co-organizer)
5. Seminar of Advanced Modeling and Simulation, SimCenter, UTC (2020-2021).

MEMBERSHIPS:

1. Member and Leader of the Advanced Modeling and Simulation Thrust of the SimCenter (since July 2020)
2. Member of the faculty senate, UTC (since July 2020)
3. Member of graduate faculty committee UTC (2019-2021)

REFEREEING AND REVIEWING:

Referee for: J. Physics Letters A, J. Progress of Theoretical Physics, J. Physics A: Mathematical and General.

Reviewer for: Zentralblatt MATH

UNDERGRADUATE RESEARCH TRAINING: National Observatory of Athens, Topic: A method for computing the complementary error function, November 2004

AWARDS:

- “Exceeds expectations” UTC annual review 2019 and awarded again in 2020.
- New grants person award, UTC, 2019
- “Thomaidio award 2010 for publications supporting research”, NTUA

COMPUTATIONAL SKILLS: Python, Fortran, Perl, LAMMPS, VMD, Mathematica, Matlab, LaTeX, Microsoft Office, Linux

LANGUAGES:

Greek: fluent (first language)

English: fluent (TOEFL, First Certificate in English)

French: fluent (Diplôme approfondi de langue française)