

VITA  
**Erica Flapan**

Department of Mathematics  
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**Education**

BA Hamilton College 1977  
MA University of Wisconsin, Madison 1979  
Ph.D University of Wisconsin, Madison 1983

**Research Interests:** Knot theory, topology of embedded graphs, 3-manifolds, applications of topology to chemistry and molecular biology.

**Academic Positions**

1983-1985, G.C. Evans Instructor, Rice University  
1985-1986, Visiting Assistant Professor, UC Santa Barbara  
1986-1990, Assistant Professor, Pomona College  
1990-1998, Associate Professor, Pomona College  
1998-present, Professor, Pomona College  
2006-present, Lingurn H. Burkhead Professor of Mathematics

**Visiting Positions**

Fall 1987, Visiting Scholar, Université de Paris-Sud, France  
Spring 1990, Visiting Scholar, Institute for Theoretical Dynamics, UC Davis  
Spring 1996, Research Associate, Institut Henri Poincaré, France  
Fall 2000, Research Associate, Institut des Hautes Études Scientifiques, France

**Summer Positions**

1994, Instructor, Mills Summer Math Institute (for women), UC Berkeley  
2000, 2001, 2003, 2004, 2005, 2007, 2008, 2009 Instructor, Summer Math Program (for women), Carleton College  
2006, Undergraduate Instructor, Park City Math Institute  
2007, Mini-course Instructor, Canada/USA Math Camp.

**Honors, Awards, and Grants**

1981, Exxon Award for Mathematics Teaching, University of Texas at Austin  
1984, Selected “Magna Cum Laude Teacher,” Rice University  
1985-1989, ONR grant, “Topological Symmetries of Molecular Structures”  
1990, AWM-NSF Travel Grant

2000-2004, NSF CCLI grant #1020160, "Enhancing the Mathematical Understanding of Students in Chemistry"

2003, Plenary Address, American Mathematical Society meeting, University of North Carolina at Chapel Hill

2004, AWM Michler Collaborative Research Grant

2005, Irvine Foundation Distinguished Faculty Fellowship for mentoring students of color at Pomona College.

2005-present, Member, International Academy of Mathematical Chemistry.

2005, Hamilton College Medal for Achievements in Mathematics.

2005, AWM-NSF Travel Grant.

2009-2012, NSF Grant DMS-0905087 "Topological symmetries and intrinsic properties of graphs embedded in 3-space."

### **Service as a reviewer**

1992, Review Panelist, NSF Calculus and Bridge to Calculus Program

2003, External reviewer, St Olaf College, math department

2004, External reviewer, University of San Francisco, math department

2005, External reviewer, Wake Forest University, math department

2007, External reviewer, Washington and Lee University, math department.

2007, member Committee of Visitors to review NSF Division of Mathematical Sciences.

2003, 2004, 2008, Review panelist for NSF Graduate Research Fellowship Program in Mathematics

2009, Chair Review Panel for NSF Graduate Research Fellowship Program in Mathematics

### **Membership on mathematical boards and committees**

2001-2006, Spectrum Editorial Board, Mathematical Association of America

2003-2006, Budapest Semesters in Mathematics, Board of Regional Representatives

2004-2006, Mathematical Association of America, Southern California Section, Teaching Awards Committee

2006-2007, Association for Women in Mathematics, Travel Grant Committee

2007, CRAFTY (Curriculum Renewal in the First Two Years) Committee, Mathematical Association of America

2009, Search Committee to find a new North American Director for Budapest Semesters in Mathematics

### **Publications**

- (1) E. Flapan, *Necessary and sufficient conditions for certain homology spheres to have smooth  $Z_P$ -actions*, Pacific Journal of Math., Vol. 117, no. 2 (1985) 255-266.

- (2) E. Flapan, *Infinitely periodic knots*, Canadian Journal of Math., Vol. 37, no.1 (1985) 17-28.
- (3) E. Flapan, *The finiteness theorem for symmetries of knots and 3-manifolds with non-trivial characteristic decompositions*, Topology and its Applications, 24 (1986) 123-131.
- (4) E. Flapan, *A prime strongly positive amphicheiral knot which is not slice*, Math. Proc. of Cambridge Philosophical Society, 100 (1986) 533-537.
- (5) E. Flapan, *Chirality of nonstandardly embedded Möbius ladders*, Graph Theory and Topology in Chemistry (Athens, Ga., 1987), Stud. Phys. Theoret. Chem., 51, Elsevier, Amsterdam, (1987) 76-81.
- (6) E. Flapan, *Rigid and non-rigid achirality*, Pacific Journal of Math., Vol. 129, No.1, (1987) 57- 66.
- (7) M. Boileau and E. Flapan, *Uniqueness of free actions of  $S^3$  respecting a knot*, Canadian Journal of Math., 39 (1987) 969-982.
- (8) E. Flapan, *Symmetries of knotted hypothetical molecular graphs*, Discrete Applied Math, 19 (1988) 157-166.
- (9) E. Flapan, *Symmetries of Möbius Ladders*, Mathematische Annalen, 283, (1989) 271-283.
- (10) E. Flapan, *Topological Techniques to Detect Molecular Chirality*, in P. Mezey, ed., New Developments in Molecular Chirality, Kluwer Academic Publishers, Netherlands (1991) 209-239.
- (11) E. Flapan and N. Weaver, *Intrinsic chirality of complete graphs*, Proc. AMS, Vol. 115, No. 1, (1992) 233-236.
- (12) E. Flapan, *Rigid and Flexible Symmetries of Embedded Graphs*, New Journal of Chemistry, 17, (1993) 645-653.
- (13) E. Flapan, *Intrinsic Chirality*, Journal of Molecular Structure (Theochem), 336 (1995) 157-164.
- (14) M. Boileau and E. Flapan, *On  $\pi$ -hyperbolic knots which are determined by their 2-fold and 4-fold cyclic branched coverings*, Topology and its Applications, 61 (1995) 229-240.
- (15) E. Flapan, *Rigidity of Graph Symmetries in the 3-Sphere*, Journal of Knot Theory and its Ramifications, 4 (1995) 373-388.
- (16) E. Flapan and N. Seeman, *A Topological Rubber Glove Obtained from a Synthetic Single Strand DNA Molecule*, Journal of the Chemical Society, Chemical Communications, (1995) 2249-2250.
- (17) E. Flapan and N. Weaver, *Intrinsic Chirality of 3-Connected Graphs*, Journal of Combinatorial Theory, Series B, Vol. 68, No. 2 (1996) 223-232.
- (18) C. Liang, K. Mislow, and E. Flapan, *Amphicheiral Links with Odd Crossing Number*, Journal of Knot Theory and its Ramifications, Vol 7, No 1 (1998) 87-91.
- (19) E. Flapan, *Knots and Graphs in Chemistry*, Chaos, Solitons, and Fractals, Vol. 9, No. 4/5 (1998) 547-560.

- (20) E. Flapan, *Topological Rubber Gloves*, Journal of Mathematical Chemistry, Vol 23 (1998) 31-49.
- (21) E. Flapan and B. Forcum, *Intrinsic Chirality of Triple-Layered Naphthalenophane and Related Graphs*, Journal of Mathematical Chemistry, Vol. 24 (1998) 379-388.
- (22) E. Flapan, *A Knot Theoretic Approach to Molecular Chirality*, in J.-P. Sauvage and C. Dietrich- Buchecker eds., *Molecular Topology: Catenanes, Rotaxanes, and Knots*, Wiley-VCH, Weinheim, Germany, (1999).
- (23) G. Rapenne, J. Crassous, L. E. Echegoyen, L. Echegoyen, E. Flapan, F. Diederich, *Regioselective One-Step Synthesis and Topological Chirality of trans-3, trans-3, trans-3 and e,e,e [60]Fullerene-Cyclotrimeratrylene Tris-Adducts. Discussion on a Topological Meso Form*, Helvetica Chimica Acta, Vol. 83 (2000), 1209–1223.
- (24) E. Flapan, R. Naimi, J. Pommersheim, *Intrinsically Triple Linked Complete Graphs*, Topology and its Applications, Vol. 115, (2001) 239-246.
- (25) E. Flapan, J. Foisy, R. Naimi, J. Pommersheim, *Intrinsically n-linked Graphs*, Journal of Knot Theory and its Ramifications, Vol. 10, (2001) 1143-1154.
- (26) E. Flapan, D. L. Li, *2-Colorings of Graphs which are Intrinsically Asymmetric in  $S^3$* , Math. Proc. of Cambridge Philosophical Society, Vol 132, (2002) 267-280.
- (27) E. Flapan, *Intrinsic Knotting and Linking of Complete Graphs*, Algebraic and Geometric Topology, Vol 2, (2002) 371-380.
- (28) E. Flapan, R. Naimi, J. Pommersheim, H. Tamvakis, *Topological Symmetry Groups of Embedded Graphs in the 3-sphere*, Commentarii Mathematici Helvetici, Vol 80, (2005) 317-354.
- (29) E. Flapan, R. Naimi, H. Tamvakis, *Topological Symmetry Groups of Complete Graphs in the 3-Sphere*, Journal of the London Mathematical Society, Vol 73, (2006) 237-251.
- (30) E. Flapan, H. Howards, D. Lawrence, B. Mellor, *Intrinsic Linking and Knotting in Arbitrary 3-Manifolds*, Algebraic and Geometric Topology, Vol. 6, (2006) 1025-1035.
- (31) D. Buck and E. Flapan, *A model of DNA Knotting and Linking*, Knot Theory for Scientific Objects, ed. A. Kawauchi, Proceedings of the International Workshop on Knot Theory for Scientific Objects: OCAMI Studies Vol 1(1), (2007) 75–83.
- (32) D. Buck and E. Flapan, *A Topological characterization of knots and links arising from site-specific recombination*, Journal of Physics A: Mathematical and Theoretical, Vol. 40, (2007) 12377-12395.
- (33) D. Buck and E. Flapan, *Predicting Knot or Catenane Type of Site-Specific Recombination Products*, Journal of Molecular Biology, Vol 374, (2007) 1186-1199.

- (34) E. Flapan and R. Naimi, *The Y-triangle move does not preserve intrinsic knottedness*, Vol. 45 (1) Osaka Journal of Mathematics (2008) 107–111.
- (35) E. Flapan, B. Mellor, and R. Naimi, *Intrinsic Linking and Knotting are Arbitrarily Complex*, Fundamenta Mathematicae, Vol 201 (2008), 131-148.
- (36) E. Flapan and H. Howards, *Every graph has an embedding in  $S^3$  containing no non-hyperbolic knot*, Proc. AMS, Vol 137 (2009) 4275-4285.
- (37) E. Flapan, *Topological Chirality and Symmetries of Non-rigid Molecules*, in D. Buck and E. Flapan, editors, Applications of Knot theory, Proceedings of Symposia in Applied Mathematics, American Mathematical Society (2009).

**Books:**

- (1) E. Flapan, *When Topology Meets Chemistry*, Cambridge University Press and the Mathematical Association of America (2000).
- (2) E. Flapan and D. Buck, eds, *Applications of Knot Theory*, Proceedings of Symposia in Applied Mathematics, American Mathematical Society (2009).
- (3) J. Pommersheim, T. Marks, E. Flapan *Number Theory: A Mythical Approach*, Wiley, to appear.

**Invited research talks:**

- (1) Spring 1983, American Mathematical Society, Special Session on Low Dimensional Topology, University of Oklahoma at Norman
- (2) Fall 1983, Topology Conference, University of Southwestern Louisiana
- (3) Spring 1984, American Mathematical Society Meeting, Special Session on Low Dimensional Topology, University of Virginia
- (4) Summer 1984, Topology Seminar, Cambridge University, UK
- (5) Fall 1984, Topology Conference in Honor of R.H. Bing, Southwest Texas State University
- (6) Spring 1985, Topology Conference, Special Session on Topological Chemistry, Florida State University at Tallahassee
- (7) Spring 1985, Colloquium, Rice University, Houston
- (8) Summer 1985, Topology Seminar and Colloquium, Université de Genève, Switzerland
- (9) Fall 1985, Colloquium, University of California at Santa Barbara
- (10) Spring 1986, Colloquium, Oberlin College, Ohio
- (11) Summer 1986, Canadian Chemical Conference, University of Saskatchewan
- (12) Spring 1987, Colloquium, Claremont Colleges, California
- (13) Spring 1987, Conference on Graph Theory and Topology in Chemistry, University of Georgia at Athens
- (14) Summer 1987, Southern California Topology Colloquium, UCLA

- (15) Fall 1987, Topology Conference, Mathematisches Forschungsinstitut, Oberwolfach, Germany
- (16) Spring 1988, Plenary Address, Mathematical Association of America, Southern California Section, Pepperdine University, Malibu
- (17) Spring 1988, Colloquium, University of Iowa at Iowa City
- (18) Spring 1989, Colloquium, University of California at Davis
- (19) Spring 1989, Colloquium, California State University at Northridge
- (20) Spring 1990, Conference on Mathematical Approaches to DNA, Santa Fe
- (21) Spring 1990, Colloquium, Institute for Theoretical Dynamics, University of California at Davis
- (22) Fall 1991, Conference on Topological Chemistry, Zentrum für Interdisziplinäre Forschung, Bielefeld, Germany
- (23) Fall 1991, American Mathematical Society, Special Session on Low Dimensional Topology, University of California at Santa Barbara
- (24) Fall 1991, Colloquium, Colorado College, Colorado Springs
- (25) Summer 1992, Joint US-Israel Workshop on Geometric Topology, Technion, Haifa
- (26) Fall 1992, Conference on Mathematics and Molecular Biology, Santa Fe
- (27) Spring 1994, Colloquium, University of Redlands, California
- (28) Spring 1995, American Mathematical Society, Special session on Scientific Applications of Geometry and Topology, Orlando
- (29) Summer 1995, Workshop on Topology and Molecular Biology, Université Paul Sabatier, Toulouse, France
- (30) Spring 1996, Seven lectures on Topological Stereochemistry, Institut Henri Poincaré, Paris
- (31) Spring 1996, Colloquium, Université de Genève, Switzerland
- (32) Fall 1996, Colloquium, Claremont Colleges
- (33) Spring 1997, Plenary address, Mathematical Association of America, Southern California section, Occidental College, Los Angeles
- (34) Spring 1997, 7th International Conference on Mathematical Chemistry, Girona, Spain
- (35) Spring 1997, Symposium on Geometric Topology, PhD Centennial Conference, University of Wisconsin at Madison
- (36) Spring 1997, Colloquium, California State University at Northridge
- (37) Spring 1998, First Indo-US Workshop on Mathematical Chemistry, Santiniketan, India
- (38) Spring 1998, American Mathematical Society, Special Session on geometry and topology of 3-manifolds, University of California at Davis
- (39) Summer 1998, Colloquium, California State University at Long Beach
- (40) Fall 1998, Colloquium, California State University at San Bernardino
- (41) Fall 1998, American Mathematical Society, Special session on Topology of 3-manifolds, Wake Forest University, Winston-Salem, North Carolina

- (42) Spring 1999, American Mathematical Society, Special session on Symmetries of knots and 3-manifolds, University of Nevada at Las Vegas
- (43) Fall 1999, American Mathematical Society, Special session on Topology of DNA, University of Texas at Austin
- (44) Fall 2000, Symposium on Biological Chirality, Szeged, Hungary
- (45) Fall 2000, Colloquium and Topology Seminar, Peking University, Beijing, China
- (46) Spring 2001, Plenary Address, Mathematical Association of America, Southern California section, California State University at Fullerton
- (47) Spring 2001, American Mathematical Society, Special Session on Topology of Links, University of Nevada at Las Vegas
- (48) Spring 2001, Mathematics Colloquium, Claremont Colleges, California
- (49) Spring 2001, Topology seminar, Department of Mathematics, University of California at Riverside
- (50) Fall 2001, Distinguished Scientists Lecture Series, Santa Monica College, California
- (51) Fall 2001, Topology Seminar and Colloquium, Ball State University, Muncie, Indiana
- (52) Fall 2001, Colloquium, California Polytechnic State University, San Luis Obispo
- (53) Fall 2001, Topology Seminar, Johns Hopkins University, Baltimore
- (54) Spring 2002, American Mathematical Society, Special Session on Low Dimensional Topology, San Diego
- (55) Fall 2002, Colloquium, Occidental College, Los Angeles
- (56) Spring 2003, Two Plenary Addresses, Mathematical Association of America, Indiana section, Butler University, Indianapolis
- (57) Spring 2003, Plenary Address, Mathematical Association of America, Metropolitan New York section, La Guardia Community College, Long Island City
- (58) Fall 2003, Plenary Address, American Mathematical Society meeting, University of North Carolina at Chapel Hill
- (59) Fall 2003, American Mathematical Society, Special Session on Mathematical Molecular Biology, University of North Carolina at Chapel Hill
- (60) Fall 2003, NSF Workshop on Reticular Chemistry, San Diego
- (61) Spring 2004, Plenary Address, Mathematical Association of America, Joint Meetings, Phoenix
- (62) Spring 2004, American Mathematical Society, Special Session on Low Dimensional Topology, Joint Meetings, Phoenix
- (63) Summer 2004, International Workshop on Knots and Links in a Spatial Graph, Waseda University, Tokyo, Japan

- (64) Summer 2004, Plenary Address, Japan Topology Symposium, Yamagata City, Japan.
- (65) Fall 2004, Colloquium, California State University at Long Beach
- (66) Fall 2004, Natural Sciences Colloquium, University of Michigan at Dearborn
- (67) Fall 2004, Mathematics Colloquium, University of Michigan at Dearborn
- (68) Fall 2004, Colloquium, Reed College, Portland, Oregon
- (69) Fall 2004, Colloquium, Occidental College, Los Angeles
- (70) Fall 2004, Featured Speaker (2 talks), Pi Mu Epsilon Regional Undergraduate Math Conference, St Norbert College, De Pere, Wisconsin
- (71) Fall 2004, Colloquium, California Polytechnic State University at Pomona
- (72) Fall 2004, Colloquium, Bay Area Mathematical Adventures, Santa Clara University, Santa Clara, California.
- (73) Spring 2005, Colloquium and Faculty Seminar talks, Northern Arizona University, Flagstaff.
- (74) Spring 2005, Colloquium, Sonoma State University, Sonoma, California.
- (75) Spring 2005, Colloquium, Santa Clara University, Santa Clara, California.
- (76) Fall 2005, Colloquium, Hamilton College Science Center Dedication Ceremony, Clinton, NY.
- (77) Fall 2005, Women in Mathematics Lecture Series, USC, Los Angeles.
- (78) Spring 2006, Colloquium, California State University at Los Angeles.
- (79) Spring 2006, International Workshop on Knot Theory for Scientific Objects, Osaka City University, Japan.
- (80) Fall 2006, American Mathematical Society, Special Session on Physical Knotting and Linking, Cincinnati, Ohio.
- (81) Fall 2006, Colloquium, California State University, Long Beach.
- (82) Spring 2007, Chemistry/Mathematics Colloquium, San Jose State University.
- (83) Spring 2007, Plenary Address, Mathematical Association of America, Northern California, Nevada, and Hawaii section.
- (84) Spring 2007, Plenary Address, Society for Industrial and Applied Mathematics, Southeastern Atlantic Seaboard meeting.
- (85) Spring 2007, Workshop on Mathematics of Knotting and Linking in Polymer Physics and Molecular Biology, Banff International Research Station, Banff, Canada.
- (86) Fall 2007, American Mathematical Society, Special Session on Physical Knots and Links, Southeastern section, Murfreesboro, Tennessee.
- (87) Spring 2008, American Mathematical Society Short course co-organizer and lecturer.
- (88) Spring 2008, Hypatian Math Seminar, UCSB

- (89) Spring 2008, Math Colloquium, EDGE (Enhancing Diversity in Graduate Education) summer program, Pomona College.
- (90) Fall 2008, American Mathematical Society and Shanghai Mathematical Society, Special Session on Biomathematics, Shanghai, China.
- (91) Spring 2009, Colloquium, Allegheny College.
- (92) Spring 2009, Keynote Speaker, Hudson River Undergraduate Mathematics Conference, Union College.
- (93) Summer 2009, two lectures, Abdus Salam International Centre for Theoretical Physics.