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• DEGREES EARNED:

B. S. - Virginia Polytechnic Institute & State University
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M. S. - North Texas State University (advisor R. W. Redding)
Denton, TX, June 1975 (Physics)
Ph.D. - Northeastern University (advisor M. T. Vaughn)
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Ph.D. thesis title: "Spontaneous Symmetry Breaking and Global Symmetries in Unified Gauge Theories"

• POSITIONS:

1980-1981 Assistant Professor (non-tenure track), Northeastern Univ., Boston MA
1981-1983 Postdoc, Univ. of North Carolina, Chapel Hill, NC
1983-1985 Postdoc, Purdue University, West Lafayette, IN
1985–present Assistant Professor, Associate Professor, Professor, Vanderbilt University, Nashville, TN

• FELLOWSHIPS, AWARDS, AND MEMBERSHIPS:

Robert A. Welch Foundation Fellow (1972-74) at North Texas State University
Research Assistant (1976-78) at Fermi National Accelerator Laboratory through Northeastern University
Department of Energy Outstanding Junior Investigator, 1986-91
Visiting Scientist, Stanford Linear Accelorator Center (SLAC), Palo Alto, CA (spring semester 1987)
SEUTRA (Southeastern Universities Theoretical Research Association) Executive Committee 1990
Member, American Physical Society (1986-)
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PPARC Visiting Fellow, University of Edinburgh, Edinburgh Scotland (3 mo. spring/summer 2002)
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Visiting Fellow of the Isaac Newton Institute, Cambridge, UK for the fall semester 2012.
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- RESEARCH:

- REFEREED JOURNAL PUBLICATIONS:

- 1. "Pion p_t and p_ℓ Distributions in High Multiplicity Interactions," M. A. Ijaz, T. W. Kephart, G .E. Moore, W. M. Sample and B. A. Munir, Nuovo Cimento A 8, 778-786 (1972).

  2."Irreducible Representations and the Commuting Elements of Non-Abelian Groups," T. W. Kephart and R. W. Redding, J. Mol. Spect. 55, 495-497 (1975).

  3. "201 GeV/c Proton-Proton Elastic Scattering at Large Momentum Transfer," J. L. Hartmann, J. Orear, J. Vrieslander, S. Conetti, C. Hojvat, D. G. Ryan, K. Shahbazian, D. G. Stairs, J. Trischuk, W. Faissler, M. Gettner, J. R. Johnson, T. Kephart, E. Pothier, D. Potter, M. Tautz, P. Baranov and S. Rusakov , Phys. Rev. Lett. 39, 975-978 (1977).

  4. "400 GeV/c Proton-Proton Elastic Scattering: Energy and Angle Dependence at High Momentum Transfer," S. Conetti, C. Hojvat, D. G. Ryan, K. Shahbazian, D. G. Stairs, J. Trischuk, W. Faissler, M. Gettner, J.R. Johnson, T. Kephart, E. Pothier, D. Potter, M. Tautz, P. Baranov, J.L. Hartmann, J. Orear, S. Rusakov and J. Vrieslander , Phys. Rev. Lett. 41, 924-926 (1978).

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  6. "Renormalization of Scalar Quartic and Yukawa Couplings in E_6," T. W. Kephart and M. T. Vaughn, Zeit. Phys. C10, 267-273 (1981).

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  8. "Exceptionally Simplc E_6 Theory," P. H. Frampton and T. W. Kephart, Phys, Rev. D25, 1459-1461 (1982).

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  10. "Dynkin Weights and Global Supersymmetry in Grand Unification," P. H. Frampton and T. W. Kephart, Phys. Rev. Lett. 48, 1237-1241 (1982).

  11. "Fractionally-Charged Particles as Evidence for Supersymmetry," P. H. Frampton and T. W. Kephart, Phys. Rev. Lett. 49, 1310-1313 (1982).

  12. "Quarkonium Hyperfine Splittings and the QCD Scale Parameter," T. W. Kephart, Y. J. Ng and H. Van Dam, Phys. Rev. D26, 3260-3263 (1982).

  13. "Cosmic E_6 Theory," T. W. Kephart, Phys. Lett. B119, 92-94 (1982).

  14. "Supersymmetric Family Unification," P. H. Frampton and T. W. Kephart, Nucl. Phys. B211, 239-268 (1983).

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23. "Solutions to Yang-Mills Field Equations in Eight Dimensions and the Last Hopf Map," B. Grossman, T. W. Kephart and J. D. Stasheff, Communications in Math. Phys. 96, 431-437 (1984); E, 100, 311 (1985).

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31. "Limitations on Heterotic Superstring Phenomenology," H. Braden, P. H. Frampton, T. W. Kephart and A. Kshirsagar, Phys. Rev. Lett. 56, 2668-2671 (1986).

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77. "$K \to \pi\nu\nu$ in the Aspon Model," A. Berera, T. W. Kephart and M. Sher, Phys. Rev. D56, 7456-7457 (1997).

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79. "$S0(8)$ and $G_2 \times G_2$ $N = 1$ Supergravities in $D = 6$," R. Holman and T. W. Kephart, Phys. Lett. B 452, 251-254 (1999).

80. "GUT Cosmic Magnetic Fields in a Warm Inflationary Universe," A.Berera, T. W. Kephart and S. D. Wick, Phys. Rev. D59, 043510.1-043510.8 (1999).

81. "The Interaction Structure and Cosmological Relevance of Mass Scales in String Motivated SUSY Theories," A. Berera and T. W. Kephart, Phys. Lett. B456, 135-140 (1999).

82. "Ubiquitous Inflaton in String-Inspired Models," A. Berera and T. W. Kephart, Phys. Rev. Lett., 83, 1084-1087 (1999).

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84. "The Constraints on $N = 1$ Supergravities and Type I Superstrings from 2-loop Chiral Anomalies," R. W. Cutler and T. W. Kephart, Phys. Lett. B 467, 73-77 (1999).

85. "A Relation between Anomaly Coefficients and the Group G_2," R. W. Cutler and T. W. Kephart, J. Math. Phys., 41, 2295-2298 (2000).

86. "Chiral Fermions and AdS/CFT Duality for Nonabelian Orbifolds," P. H. Frampton and T. W. Kephart, Phys. Lett. B 485, 403-407 (2000).

87. "Classification of Conformality Models Based on Nonabelian Orbifolds," P. H. Frampton and T. W. Kephart, Phys. Rev. D64, 086007.1-086007.33 (2001) [hep-th/0011186].

88. "Family Unification, Exotic States and Magnetic Monopoles," T. W. Kephart and Q. Shafi, Phys. Lett. B 520, 313-316 (2001) [hep-ph/0105237].

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135. "Conformal Completion of the Standard Model with a Fourth Generation," C. M. Ho, P. Q. Hung and T. W. Kephart, JHEP **1206**, 045 (2012); [arXiv:1102.3997 [hep-ph]].

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140. "A Classification and Analysis of Higgs-flavor Models," S. M. Barr and T. W. Kephart, Phys. Rev. D 85, 035010 (2012); arXiv:1111.0963 [hep-ph].

141. "An Explicit SU(12) Family and Flavor Unification Model with Natural Fermion Masses and Mixings," C. H. Albright, R. P. Feger and T. W. Kephart; Phys. Rev. D **86**, 015012 (2012); arXiv:1204.5471 [hep-ph].

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144. "LieART – A Mathematica Application for Lie Algebras and Representation Theory," R. Feger and T. W. Kephart, Comput. Phys. Commun. **192**, 166 (2015); arXiv:1206.6379 [math-ph].

145. "The Tight Knot Spectrum in QCD," R. V. Buniy, J. Cantarella, T. W. Kephart and E. Rawdon, Phys. Rev. D **89**, 054513 (2014); arXiv:1212.1500 [hep-ph].

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149. "Grand Unification and Exotic Fermions," R. P. Feger and T. W. Kephart, Phys. Rev. D **92**, 035005 (2015); arXiv:1505.03403 [hep-ph].

150. "Origins of Inert Higgs Doublets," T. W. Kephart and T. C. Yuan, Nucl. Phys. B **906**, 549 (2016); arXiv:1508.00673 [hep-ph].

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153. "On a Viable First Order Formulation of Relativistic Viscous Fluids and its Applications to Cosmology," M. M. Disconzi, T. W. Kephart and R. J. Scherrer, Int. J. Mod. Phys. D **26**, no. 13, 1750146 (2017) doi:10.1142/S0218271817501462 [arXiv:1510.07187 [gr-qc]].

154. "Unification of Gauge, Family, and Flavor Symmetries Illustrated in Gauged SU(12) Models," C. H. Albright, R. P. Feger and T. W. Kephart, Phys. Rev. D **93**, 075032 (2016); arXiv:1601.07523 [hep-ph].

155. "Stability Aspects of Wormholes in R^2 Gravity," J. B. Dent, D. A. Easson, T. W. Kephart and S. C. White, Int. J. Mod. Phys. D **26**, no. 10, 1750117 (2017); arXiv:1608.00589 [gr-qc].

156. "Spontaneous Breaking of Gauge Groups to Discrete Symmetries," B. L. Rachlin and T. W. Kephart, JHEP **08**, 110 (2017); arXiv:1702.08073 [hep-ph].

157. "Magnetic Monopoles and Free Fractionally Charged States at Accelerators and in Cosmic Rays," T. W. Kephart, G. K. Leontaris and Q. Shafi, JHEP **10**, 176 (2017); arXiv:1707.08067 [hep-ph].

158. "Black Hole Lasers Powered by Axion Superradiant Instabilities," J. G. Rosa and T. W. Kephart, Phys. Rev. Lett. **120**, 231102 (2018); arXiv:1709.06581 [gr-qc].

159. "LieART 2.0 – A Mathematica Application for Lie Algebras and Representation Theory," R. Feger, T. W. Kephart, and R. J. Saskowski, Computer Physics Communications **257**, 107490 (2020); arXiv:1912.10969 [hep-th], 387 pp.

160. "Photon Directional Profile from Stimulated Decay of Axion Clouds with Arbitrary Momentum Distributions," L. Chen and T. W. Kephart, Physical Review **D 101**, 103033 (2020); arXiv:2002.07885 [hep-ph].

161. "Photon Directional Profile from Stimulated Decay of Axion Clouds with Arbitrary Spatial Distributions," L. Chen and T. W. Kephart, Physical Review **D 102**, 096010 (2020); arXiv:2004.13308 [hep-ph].

162. "Gravitational Waves from a Black Hole Orbiting in a Wormhole Geometry," J. B. Dent, W. E. Gabella, K. Holley-Bockelmann, and T. W. Kephart, Physical Review **D 104**, 044030 (2021); arXiv:2007.09135 [gr-qc].

163. "Stimulated Radiation from Axion Cluster Evolution in Static Spacetimes," L. Chen and T. W. Kephart, JCAP **09**, 34 (2021); arXiv:2007.12337 [hep-ph].

164. "Superradiant Pion Clouds Around Primordial Black Holes," P. B. Ferraz, T. W. Kephart and J. G. Rosa, JCAP **07**, 026 (2022); arXiv:2004.11303 [gr-qc].

- Papers Submitted and in Preparation:

165. "Flipped Quartification," J. B. Dent, T. W. Kephart, H. Päs and T. J. Weiler, submitted to Phys Rev **D**; arXiv:2009.04443 [hep-ph].

166. "Family Unification Models with Bifundamental Matter," E. Sheridan and T. W. Kephart, arXiv: 2206.13309 [hep-ph]; submitted to Phys. Rev. **D**.

167. "Muon $g-2$ Anomaly from Vectorlike Leptons in TeV scale Trinification and E_6 models," T. Brune, T. W. Kephart and H. Päs, arXiv:2205.05566 [hep-ph], submitted to Euro. J. Phys. C.

168. "Tripartite Entanglement of Qudits," R. V. Buniy and T. W. Kephart, arXiv:22xx.xxxx [quant-ph], in preparation.

169. "Decoherence and the Class of Maximally Entangled States," R. V. Buniy R. Feger and T. W. Kephart, arXiv:22xx.xxxx [quant-ph], in preparation.

- SOME PROCEEDINGS AND BOOK CHAPTER PUBLICATIONS:
- 1. "Are we seeing Magnetic Monopole Cosmic Rays at E $\sim 10^{20}$ eV?" T.J. Weiler and T. W. Kephart, Nucl. Phys. B (Proc. Suppl.) 51B, 218-222 (1996).

  2. "A Model of Lasing Axion Clusters," T. W. Kephart and T. J. Weiler, Nucl. Phys. B (proc. suppl.), 72, 54-57 (1999).

  3. "Signature studies of cosmic magnetic monopoles," S. D. Wick, T. W. Kephart and T. J. Weiler, AIP Conf. Proc. **579**, 43-52 (2001) [arXiv:astro-ph/0102002].

  4. "Non-Associative Loops for Holger Bech Nielsen", P. H. Frampton, S. L. Glashow, T. W. Kephart and R. M. Rohm, Holger Bech Nielsen Festschrift, Bled Workshops in Physics, 2, 56-63 (2001) [hep-th/0111292].

  5. "Glueballs and the universal energy spectrum of tight knots and links," R. V. Buniy and T. W. Kephart, Int. J. Mod. Phys. A **20**, 1252-1259 (2005) Coral Gables Conference (2003) [hep-ph/0408027].

  6. "Universal Energy Spectrum for Tight Knots and Links in Physics," R. V. Buniy and T. W. Kephart, chapter 3 of "Physical and Numerical Models in Knot Theory," ed. J. A. Calvo, K. C. Millett, E. J. Rawdon and A. Stasiak, "Series on Knots and Everything," volume 36, p45-p54, World Scientific(2005), [hep-ph/0408025].

  7. "Knot energies and the glueball spectrum," T. W. Kephart and R. V. Buniy, *Prepared for 10th International Symposium on Particles, Strings and Cosmology (PASCOS 04 and Pran Nath Fest), Boston, Massachusetts, 16-22 Aug 2004*

  8. "Extension of monster moonshine to c = 24k conformal field theories," M. Jankiewicz and T. W. Kephart, the proceedings of 4th International Symposium on Quantum Theory and Symmetries (QTS-4) and 6th International Workshop on Lie Theory and Its Applications in Physics (LT-6), Varna, Bulgaria, 15-21 Aug 2005. [hep-th/0510178].

  9. "Modular invariants and Fischer-Griess monster," M. Jankiewicz and T. W. Kephart, proceedings of 26th International Colloquium on Group Theoretical Methods in Physics (ICGTMP26), New York City, New York, 26-30 Jun 2006; arXiv:math-ph/0608001.

  10. "Knots and Links in Physical Systems," Roman V. Buniy and Martha J. Holmes and Thomas W. Kephart, proceedings of the workshop on knots and soft-matter physics, Yukawa Institute of Theoretical Physics, August 2008, Kyoto, Japan, published in Bussei Kenkyu (**92**, 107 (2009)) arXiv:0809.4073

  11. "Knots and Links in Physical Systems," Proc. Quantum Theory and Symmetry 6, University of Kentucky, Lexington, KY, July (2009)

  12. "Solving the cosmological constant problem by embedding," R. V. Buniy and T. W. Kephart, MIAMI'09, Fort Lauderdale, FL. (2009): https://cgc.physics.miami.edu/Miami2009/Kephart.pdf

  13. "A_5 and I' Models of Four Generations ," C. S. Chen, T. W. Kephart and T. C. Yuan, MIAMI'11, Fort Lauderdale, FL. (2011): https://cgc.physics.miami.edu/Miami2011/Kephart.pdf

  14. "An Explicit SU(12) Family and Flavor Unification Model," C. H. Albright, R. P. Feger and T. W. Kephart, CETUP Workshop, Lead, SD (2012).

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  16. "Generalized Helicity and Beltrami Fields," Roman V. Buniy and Thomas W. Kephart, to appear in the proceedings of the Workshop on "Tangled Magnetic Fields in Astro- and Plasma Physics," International Centre for Mathematical Sciences, Edinburgh, October 2012, published in J. Phys. Conf. Ser. 544 (2014); DOI: 10.1088/1742-6596/544/1/011002

17. “Higher Order Topological Phase: Generalizations of the Aharonov-Bohm and Josephson Effects,” Roman V. Buniy and Thomas W. Kephart, to appear in the proceedings of the Workshop on “Tangled Magnetic Fields in Astro- and Plasma Physics,” held at the International Centre for Mathematical Sciences, Edinburgh, October 2012, published in J. Phys. Conf. Ser. 544 (2014); DOI: 10.1088/1742-6596/544/1/011002

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19. “The Beltrami Equation and its Generalizations,” R. V. Buniy and T. W. Kephart, MIAMI’13, Fort Lauderdale, FL. (2013): https://cgc.physics.miami.edu/Miami2013/Kephart.pdf

20. “The Spectrum of Tightly Knotted Flux Tubes in QCD,” Roman V. Buniy, Jason Cantarella, Thomas W. Kephart and Eric J. Rawdon, to appear in the proceedings of Workshop on ”Quantized Flux in Tightly Knotted and Linked Systems,” 3-7 December 2012, at the Isaac Newton Institute for Mathematical Sciences, (Cambridge, UK), published in J. Phys. Conf. Ser. 544 (2014); DOI: 10.1088/1742-6596/544/1/011002

21. “Higher Order Topological Invariants from the Chern-Simons Action,” Roman V. Buniy and Thomas W. Kephart, to appear in the proceedings of Workshop on ”Quantized Flux in Tightly Knotted and Linked Systems,” 3-7 December 2012, at the Isaac Newton Institute for Mathematical Sciences, (Cambridge, UK), published in J. Phys. Conf. Ser. 544 (2014); DOI: 10.1088/1742-6596/544/1/011002

22. “Spontaneous Breaking of Gauge Groups to Discrete Symmetries,” T. W. Kephart and B. Rachlin, MIAMI’17, Fort Lauderdale, FL. (2017): https://cgc.physics.miami.edu/Miami2017/Kephart2017.pdf

23. “ Gauged Flavor Models,” T. W. Kephart and B. Rachlin, MIAMI’18, Fort Lauderdale, FL. (2018): https://cgc.physics.miami.edu/Miami2018/Kephart2018.pdf

- LECTURES, COLLOQUIA, SEMINARS and CONFERENCE TALKS:

MAY 1986 "Global Gauge Anomalies in Even Dimensions," International Center for Theoretical Physics (ICTP), Trieste, Italy
JUNE 1986 "Global Anomalies in Gauge and Supergravity Theories," European Center for Nuclear Research (CERN), Geneva, Switzerland
NOV 1987 "Axion Decay into Cosmic Background Radiation and Axion Clusters," University of Alabama, Tuscaloosa, AL
MAY 1988 "Continuous and Lattice Instantons," McGill University, Montreal, Canada
AUG 1988 "Lattice Instantons," Banff Summer Institute in Elementary Particle Physics, Banff, Alberta, Canada
APR 1989 "Topological Charge on a Lattice," ICTP, Trieste, Italy
MAY 1989 "Discrete Hopf Maps," Chalmers Technical Institute, Goteborg, Sweden
MAY 1989 "Lattice Topology," Niels Bohr Institute/NORDITA, Copenhagen, Denmark
AUG 1989 "Discrete Systems with Topological Charge," Institute of Advanced Study, Dublin, Ireland
MAY 1990 "Axion Clusters and Cosmic Voids," Physics Department,University of North Carolina, Chapel Hill, NC
MAY 1990 "Lattice Instantons and Discrete Fibre Bundles," University of North Carolina at Chapel Hill, NC
JULY 1990 "Cosmic Voids from Detonating Axion Clusters," Snowmass Summer Workshop, Snowmass Village, CO
JAN. 1991 "Aspon Phenomenology", SAHEP Theory Conference, Gulf Shores, AL
AUG 1991 "Correcting the Cosmological Redshift Formula," Particles and Fields '91 (APS) conference, University of British Columbia, Vancouver, B.C., Canada
OCT 1991 "Cosmic Dispersion and Redshift," Fermilab, Batavia, IL
OCT 1991 "Cosmological Redshift at Large Wavelengths," Northwestern University, Evanston, IL
JAN 1992 "Large Wavelength Cosmology," Second SAHEP Theory Conference, Gulf Shores, AL
AUG 1992 "Gravity and the Strong CP Problem," Summer School in Particle Physics and Cosmology, ICTP Trieste, Italy
JAN 1993 "Quantum Field Theory, Wormholes, and the Horizon Problem," University of Florida, Gainesville, FL
DEC 1993 "A Gauged Model Solution to the Strong CP Problem," Cornelius Lanczos International Conference, NC State, Raleigh, NC
MAR 1994 "Cosmological Wormholes and the Horizon Problem," University of North Carolina at Chapel Hill, Chapel Hill, NC
Mar 1994 "Particle Physics and Cosmology," Wake Forest Univ., Winston Salem, NC
OCT 1994 "Discrete Family Unification ," Sussex University, Brighton, UK
DEC 1994 "Minimal Family Symmetry and the Top Quark," University of North
Carolina, Chapel Hill, NC
MAR 1995 "Black Holes, Wormholes, and Cosmology," Case Western University, Cleveland, OH
FEB 1996 "Are We Seeing Magnetic Monopole Cosmic Rays at $E \gtrsim 10^{20} eV$?" at Dark Matter '96 Conference, UCLA, Santa Monica, CA
AUG 1996 "Magnetic Monopole Cosmic Rays at $E \gtrsim 10^{20} eV$," DPF'96: The Minneapolis Meeting, University of Minnesota, Minneapolis, MN
FEB 1998 "Lasing Axion Clusters," 5th Axion Workshop, University of Florida, Gainesville, FL.
OCT 1999 "Stringy Warm Inflation," University of North Carolina, Chapel Hill, NC
OCT 1999 "The Universe" Berea College, Berea, KY
DEC 1999 "Magnetic Monopole Cosmic Rays," Orbis Scientiae'99, Fort Lauderdale, FL
JUL 2000 "Cosmic Rays, Cosmic Magnetic Fields, and Magnetic Monopoles," NATO Advanced study Insti-

tute, Cascais, Portugal
AUG 2000 ”Signatures of Magnetic Monopoles as Cosmic Rays,” American Physical Society Divisional of Particles and Fields Meeting, DPF2000, Ohio State University, Columbus, OH
DEC 2000 “The Standard Model from Orbifolded AdS/CFT Duality,” Orbis Scientiae’00, Fort Lauderdale, FL
MAY 2001 “Signatures of Cosmic Magnetic Monopoles,” Bartol Research Center, University of Delaware, Newark, DE
APRIL 2001 “Family Unification in AdS/CFT Models,” PASCOS 2001, University of North Carolina, Chapel Hill, NC
SEPT 2001 “Families and Phenomenology from AdS/CFT,” Bartol Research Center, University of Delaware, Newark, DE
DEC 2001 “Models with Bifundamental Matter,” Coral Gables Conference 2001, Fort Lauderdale, FL
JAN 2002 “Monopoles,” Colloquium at University of North Carolina, Chapel Hill, NC
MAY 2002 “Monopoles as Cosmic Rays,” University of Glasgow, Glasgow, UK
JUNE 2002 “Monopoles as Cosmic Rays,” University of Newcastle upon Tyne, Newcastle upon Tyne, UK
MAY-JUNE 2002 ”From Strings to the Standard Model,” series of four one hour lectures at the University of Edinburgh, Edinburgh, UK
JUNE 2002 “Magnetic Monopoles as Cosmic Rays Primaries,” Imperial College, London, UK
JUNE 2002 “Signatures of Monopoles as Cosmic Rays Primaries,” Royal Observatory, Edinburgh, UK
JULY 2002 ”Phenomenology from AdS/CFT,” University of Würzburg, Würzburg, Germany
DEC 2002 “A Model of Glueballs,” Univ. of North Carolina, Chapel Hill, NC
MAY 2003 “Tight flux tubes and the glueball spectrum,” PHENO 2003, Univ. of Wisconsin, Madison, WI
NOV 2003 “Distorting the CMB,” Univ. of North Carolina, Chapel Hill, NC
DEC 2003 ”Tight Knots and Physics,” Coral Gables Conference 2003, Fort Lauderdale, FL
FEB 2004 “Applications of Knot Theory,” Math Dept. Vanderbilt U. Nashville, TN
MAR 2004 ”Tight Knots, Glueballs and Physics,” Oklahoma State University, Stillwater, OK
MAR 2004 “Magnetic Monopoles: Where are they Hiding?,” Oklahoma State University, Stillwater, OK
MAY 2004 “Universal Energy Spectrum–Glueballs,” Syracuse University, Syracuse, NY
AUG 2004 “Tight Knots and Glueballs,”, PASCOS 2004, Northeastern University, Boston, MA
NOV 2004 “A Universal Energy Spectrum from Knot Energies: Glueballs and Other Examples,” Ohio State, Columbus, OH
NOV 2004 “Tight Knots and Links: a Universal Energy Spectrum for Physical Systems,” American Mathematical Society, Fall Eastern Section Meeting (no. 1002), University of Pittsburgh, Pittsburgh, PA
NOV 2004 “Tight Knots and Physical Systems,” Duquesne University, Pittsburgh, PA
MAY 2005 “Glueballs and the universal energy spectrum of tight knots and links,” Tufts University, Boston, MA
NOV 2005 “The Eccentric Universe,” University of North Carolina, Chapel Hill, NC
NOV 2005 “Glueballs as tightly knotted/linked QCD flux tubes,” William & Mary University, Williamsburg, VA
DEC 2005 “Density Perturbations in an Eccentric Universe,” MIAMI’05, Key Biscayne, FL
AUG 2006 “The Quest for Magnetic Monopoles,” Colloquium at University of Tennessee, Knoxville, TN
SEPT 2006 “Transformations among large c CFTs,”, VAUGHNFEST, Northeastern University, Boston, MA
OCT 2006 “Tight Knots and Physics, ” American Mathematical Society, Fall Eastern Section Meeting, University of Cincinnati, Cincinnati, OH
DEC 2006 “Higher order topological invariants from the Chern-Simons action,” MIAMI’06, Fort Lauderdale, FL
APR 2007 “Knots, Links and Physical Systems,” Western Kentucky University, Bowling Green, KY
AUG 2007 ‘Generalizing the Aharonov-Bohm Effect,” Univ. of North Carolina, Chapel Hill, NC

SEPT 2007 ”Generalizing the Aharonov-Bohm Effect to New Topologies,” Bartol Research Center, University of Delaware, Newark, DE
NOV 2007 ”Generalizing the Aharonov-Bohm Effect: Higher Order Contributions to the Topological Phase,” Special Session on Physical Knot and Links, American Mathematical Society, Section Meeting AMS 1033, Middle Tennessee State University, Murfreesboro, TN
MAR 2008 “’Beyond the Aharonov-Bohm Effect: Higher Order Contributions to the Topological Phase,” colloquium University of Kansas, Lawrence, KS
AUG 2008 “Knots and Links in Physical Systems,” Workshop on knots and soft-matter physics, Yukawa Institute of Theoretical Physics, Kyoto University, Kyoto, Japan
MAR 2009 “Knots and Links in Physical Systems,” University of North Carolina, Chapel Hill, NC
JULY 2009 “Knots and Links in Physical Systems,” Quantum Theory and Symmetry 6, University of Kentucky, Lexington, KY
DEC 2009 “Solving the cosmological constant problem by embedding,” MIAMI’09, Fort Lauderdale, FL
MAR 2010 “T' Flavor Symmetry,” Arizona State University, Tempe, AZ
APR 2010 “Physical Knots,” American Mathematical Society, Section Meeting, AMS1058, Macalester College, St. Paul, MN
APR 2010 “Higher order topological quantum phase,” St. Thomas University St. Paul, MN
MAY 2010 “Glueballs and Tight Knots,” Academia Sinica, Nangang, Taiwan
MAY 2010 “Higher Order Phases in Quantum System,” National Central University, Jhongli City, Taiwan
MAY 2010 “A T' Flavor Model,” National Taiwan University, Taipei, Taiwan
MAY 2010 “The Eccentric Universe,” National Tsing Hua University, Hsinchu,Taiwan
July 2010 “Knots and Glueballs,” Technische Universität Dortmund, Dortmund, Germany
July 2010 “Conformal Models and the Fourth Family,” 22nd Rencontres de Blois, Blois, France
July 2011 “The tight knot spectrum in QCD,” Centro di Ricerca Matematica Ennio De Giorgi, Scuola Normale Superiore, Pisa, Italy
DEC 2011 “Flavor Symmetry for Four Generations of Quarks and Leptons,” MIAMI’11, Fort Lauderdale, FL
OCT 2012 “The Tight Knot Spectrum in QCD,” University of Edinburgh, UK
OCT 2012 “Higher Order Topological Phase: Generalizations of the Aharonov-Bohm Effect,” Tangled Magnetic Fields in Astro- and Plasma Physics, Isaac Newton Institute Workshop, TOD program, International Centre for Mathematical Sciences, Edinburgh, UK
NOV 2012 “Glueballs as Tight Knots,” Isaac Newton Institute, Cambridge, UK
DEC 2012 “The spectrum of tightly knotted flux tubes in QCD,” Tangled Quantized Flux in Tightly Knotted and Linked Systems, Isaac Newton Institute Workshop, TOD program, Cambridge, UK
DEC 2012 “Knotted flux tubes in QCD,” MIAMI’12, Fort Lauderdale, FL
MAY 2013 “Helicity Conservation and Beltrami Fields,” Technische Universität Dortmund, Dortmund, Germany
JULY 2013 “Minimal Family Symmetry,” FLASY13, Niigata, Japan
JULY 2013 “Generalized Helicity Conservation and Beltrami Fields,” Academia Sinica, Nangang, Taiwan
DEC 2013 “Generalized Helicity Conservation and Beltrami Fields,” MIAMI’13, Fort Lauderdale, FL
MAR 2014 “Helicity Conservation and Beltrami Fields,” Simon Fraser University, Brunaby, BC, Canada
OCT 2014 “Computer Assisted Model Building,” University of Florida, Gainesville, FL
May 2015 “Computer Assisted BSM Model Building with LieART,” Arnowitt Memorial Symposium, Texas A&M University, College Station, TX
May 2017 “Spontaneous Breaking of Gauge Groups to Discrete Symmetries,” University of Delaware, Newark, DE
DEC 2017 “Spontaneous Breaking of Gauge Groups to Nonabelian Discrete Symmetries,” MIAMI’17, Fort Lauderdale, FL

July 2018 “Overview of Vanderbilt Scientific Research,” CERTEMA Laboratory, Grosseto Province, Italy
July 2018 “Knots, Inflation and the Dimensionality of Spacetime,” Marcel Grossman Conference (MG15), Rome, Italy
DEC 2019 “’LieART 2.0,” MIAMI’19, Fort Lauderdale, FL
JAN 2020 “Stimulated Decay of non Spherical Axion Stars,” Remnants of the Big Bang at ASU, Tempe, AZ
April 2020. “Anti-chirp–the Gravitational Waves from Wormholes,” seminar at ASU, Tempe, AZ
NOV 2022 “Jack Ng Fest: Holographic Foam Cosmology,” colloquium UNC Chapel Hill, Chapel Hill, NC

• TEACHING:

- RECENT SENIOR THESIS STUDENTS SUPERVISED:

  Z. Bednarke, “Relativistic Beltrami Fluids,” (B.S. spring 2017) now grad student at U. Washington

  R. Saskowski, “LieART 2.0–An Improved Way to Compute Branching Rules,” (B.S. spring 2019), now grad student at U. Michigan

  E. Sheridan, “Mapping the Terrain of Small Bifundamental Theories,” (B.S. spring 2022), now grad student at Cornell U.

- PH.D. STUDENTS SUPERVISED:

Timothy Ferris (Ph.D., 1991) Professor, Cumberland University
Laszlo Forizs (Ph.D., 1997) Lecturer, Dharmagate Buddhist University, Budapest
Robert Cutler (Ph.D., 1998) Professor, Edison State College, Fort Myers, FL (deceased)
Stuart Wick (Ph.D. 1999) Visiting Assistant Professor of Physics, North Central College, Naperville, IL
Marcin Jankiewicz (Ph.D. 2007) MRI Research Officer and Lecturer, University of Cape Town
Martha Holmes (Ph.D. 2009) medical imaging postdoc, University of Cape Town
Bradley Rechlin (Ph.D. 2019) Financial Big Data, Franklin TN
Liang Chen (Ph.D. 2022)
Michael Padgett, 2022–

As of January 2009 have served on 41 Physics and 11 Mathematics Ph. D. qualifying committees and have served on 40 Physics and 9 Mathematics Ph. D. dissertation committees at Vanderbilt.

- POSTDOCTORAL FELLOWS MENTORED and present position:

T. C. Yuan (1986-1989) now Research Fellow, Academia Sinica, Taipei, Taiwan
David Hochberg (1989-1992) now staff scientist at Inst. Nac. de Tec. Aeroespacial (LAEFF), Madrid, Spain
Marco Dias (1992-1994) now Professor, Universidad Catolica de Chile, Santiago, Chile
Tonnis ter Veldhuis (1993-1996) now Professor and Chair, Phys. Dept. Macalester College, Minneapolis-St. Paul, MN
Arjun Berera (1996-1999) now Professor, Phys. Dept. University of Edinburgh, UK
Robert Cutler (1998-1999) Professor, Edison State College, Fort Myers, FL (deceased)
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Heinrich Päs (2000-2001) now Professor, Dortmund Technical University, Dortmund Germany
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James Dent (2006-2009) now Assistant Professor, Sam Houston State, Huntsville, TX
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John Kehayias (2014–16) now pursuing a carrier in photography and writing, NYC, NY.

- Lecture Courses:

Fall 1980 Lectures and recitations in introductory physics for Bachelor of Engineering Technology majors at Northeastern University (text: Physics for Engineers, Mulligan)
Spring 1981 Lectures and recitations in introductory physics for Science and Engineering students at Northeastern University (text: Fundamentals of Physics, Halliday and Resnick)
Fall 1985, Spring 1986 Lectures in graduate quantum mechanics at Vanderbilt University (text: Quantum Mechanics, A. Messiah)
Fall 1986 Lectures in introductory non-calculus physics for premed and life science students at Vanderbilt University (text: General Physics, D.C. Giancoli)
Fall 1987, 1988 Lectures in introductory physics for science and 1989, 1990, 1992, engineering majors (text: Physics for Scientists and Engineers, Serway) 1997, 1998
Spring 1988 Lectures in graduate quantum mechanics at Vanderbilt University (text: Quantum Mechanics, A.S. Davydov)
Spring 1990, Lectures in graduate quantum mechanics at Vanderbilt Uiversity,(texts: Principles of Quantum Mechanics, R. Shankar, and Lectures on Quantum Mechanics, G. Baym)
Fall 1999, Spring 2000, fall 2002, and spring 2010 Lectures in graduate quantum mechanics at Vanderbilt Uiversity,(text: Principles of Quantum Mechanics 2nd ed., R. Shankar)
Fall 1993 General relativity and cosmology for graduate students at Vanderbilt University (text: The Early Universe, E. Kolb and M. Turner)
Spring 1991 (Undergraduate) Statistical Mechanics at Vanderbilt University (text: Fundamentals of Statistical Mechanics, D. Walecka from notes by F. Block)
Spring 2002 Lectures in Statistical Mechanics, (text: Statistical Mechanics, Pathria)
Fall 1991 Lectures on Quantum Field Theory at Vanderbilt & Spring 1992 University. Texts: Gauge Field Theories, P.H. Frampton and Field Theory, a Modern Primar, P. Ramond, Quantum Field Theory, F. Mandel and G. Shaw
Spring & Fall 1993, Fall 1995 & Spring 1996 Texts: Quantum Field Theory, S. Weinberg; Quantum Field Theory: A Modern Intro., M. Kaku
Spring 1995 Introductory physics for science and engineering majors. Text: Halliday and Resnick.
Spring 1998 General relativity and cosmology for graduate students. (Text: Structure Formation in the Universe, T. Padmanabhan).
Fall 2000 General relativity for graduate students. (Text: General Relativity, R. Wald)
Spring 2001 Cosmology for graduate students. (Text:The Early Universe, E. Kolb and M. Turner)
Spring 2004 General relativity and cosmology for graduate students. (Texts: Moderm Cosmology, S. Dodelson).
Fall 2004, Fall 2005, Spring 2006, Fall 2006, Fall 2007, Fall 2009, Fall 2013, Spring 2014, Spring 2015 and Fall 2015, Electromagnetism for junior and senior undergraduates. (Text: Introduction to Electrodynamics, D. J. Griffiths)
Spring 2007. Modern Physics for undergraduates(Text Crane)
Fall 2010. Quantum Field Theory, (Text: F. Mandel and G. Shaw 2^{nd} ed.)
Fall 2011 Grad. General relativity (Text: General Relativity, Hobson, et al.)
Spring 2012 Grad. Cosmology (Text: General Relativity, Hobson, et al.)
Spring 2013 Grad. Quantum Field Theory, (Text: Peskin and Schroeder)

Fall 2014 Graduate particle physics, (Text: Introduction to Particle Physics, P. Pal)
Spring 2016 General relativity and cosmology for graduate students. (Texts: The Early Universe, E. Kolb and M. Turner; General Relativity, Hobson, et al.; Structure Formation in the Universe, T. Padmanabhan).
Fall 2016 and Fall 2017. Undergraduate quantum mechanics, part 1, (Text: A Modern Approach to Quantum Mechanics, J. S. Townsend).
Spring 2017. Modern Physics, part 2, (Modern Physics for Scientists and Engineers, S. Thornton and A. Rex).
Spring 2018. Particle Physics for undergraduates (Text D. Griffiths)
Fall 2018 General relativity and cosmology for graduate students. (Text: General Relativity: An Introduction for Physicists, M. P. Hobson, G. P. Efstathiou and A. N. Lasenby)
Fall 2019. Introductory physics for science and engineering students, (text: "University Physics with Modern Physics," 15th ed. H. D. Young and R.A. Freedman)
Spring 2020 Graduate quantum mechanics, part 2 (text: "Principles of Quantum Mechanics," R. Shankar)
Spring 2021. Electromagnetism for junior and senior undergraduates. (Text: Introduction to Electrodynamics, D. J. Griffiths)
Spring 2010, 2011 and Fall 2022. Particle Physics for graduate students(Text G. Kane)

- SHORT-TERM APPOINTMENTS AND VISITS:

1982 - Aspen Center for Physics, Aspen, Colorado (August, 3 weeks)
1983 - Summer Workshop in Particle Physics; VPI & SU (August, 1 week)
1983 - Lewes Center for Physics, Lewes, Delaware (July, 2 weeks)
1984 - Lewes Center for Physics (July, 3 weeks)
1984 - Aspen Center for Physics (June, 3 weeks)
1984 - University of North Carolina/Chapel Hill (May, 1 week)
1985 - Aspen Center for Physics (August, 3 weeks)
1985 - Scottish Universities Summer School; Edinburgh, Scotland (July, 3 weeks)
1986 - International Center for Theoretical Physics (ICTP); Trieste, Italy (May, 4 weeks)
1986 - European Center for Nuclear Research (CERN); Geneva, Switzerland (June 3 weeks)
1986 - Superstring Workshop; ICTP, Trieste (August, 3 weeks)
1987 - Stanford Linear Accelator Center (SLAC), Palo Alto, California visiting scientist (Feb.–May, 4 months)
1987 - Aspen Center for Physics (June, 3 weeks)
1987 - High Energy Physics and Cosmology Workshop; ICTP, Trieste (July, 5 weeks)
1987 - Cargese Summer School; Cargese, Corsica (August, 3 weeks)
1988 - NATO Workshop on Superstrings and Conformal Field Theory; Montreal, Canada (June, 3 weeks)
1988 - Snowmass Workshop; Snowmass, Colorado (June/July, 3 weeks)
1988 - Aspen Center for Physics (July, 3 weeks)
1988 - Banff Particle Physics Workshop; Banff, Alberta Canada (August, 2 weeks)
1989 - ICTP, Trieste (April, 3 weeks; June/July, 2 months)
1989 - Chalmers Technical Institute, Goteborg, Sweden (April, 1 week)
1989 - NORDITA/Niels Bohr Institute, Copenhagen, Denmark (May, 4 weeks)
1989 - Institute of Advanced Study, Dublin, Ireland (August, 3 weeks)
1990 - Institute of Field Physics, Department of Physics and Astronomy, University of North Carolina at Chapel Hill (May, 2 weeks)
1990 - Aspen Center for Physics (June, 2 weeks)
1990 - Department of Physics, University of California at Santa Cruz (June, 2 weeks)
1990 - Snowmass Summer Workshop, Snowmass Village Colorado (July, 3 weeks)

1991 - Aspen Center for Physics (June, 3 weeks)
1992 - Institute for Theoretical Physics at Santa Barbara, University of California, Santa Barbara, CA (May, 4 weeks)
1992 - Aspen Center for Physics (June, 4 weeks)
1992 - ICTP Trieste (July, 1 week)
1993 - Aspen Center for Physics (June, 4 weeks)
1993 - Fermilab, Batavia, IL (July, 3 weeks)
1994 - Aspen Center for Physics (June, 4 weeks)
1994 - Snowmass DPF Workshop, Snowmass Village, CO (July, 2 weeks)
1994 - Isaac Newton Institute, Univ. of Cambridge, Cambridge, UK (Oct., 4 weeks)
1994 - Institute of Field Physics, Department of Physics & Astronomy, University of North Carolina at Chapel Hill (Feb.-April, 3 months) and (Nov., 1 month)
1995 - Aspen Center for Physics (June, 5 weeks)
1995 - INT, Seattle, WA (Aug., 3 weeks)
1996 - Aspen Center for Physics (June, 3 weeks)
1996 - Snowmass 96 DPF Workshop, Snowmass Village, CO (July, 2 weeks)
1997 - Aspen Center for Physics (June, 3 weeks)
1997 - Benasque Center for Physics (July, 3 weeks)
1998 - Aspen Center for Physics (June, 3 weeks)
1999 - Aspen Center for Physics (June, 3 weeks)
2000 - Aspen Center for Physics (June, 3 weeks)
2000 - NATO Advanced Study Institute, Cascais, Portugal (July, 3 weeks)
2001 - Aspen Center for Physics (June, 4 weeks);
2001 - Bartol Institute, U. of Delaware, Newark, DE (Sept., 2 weeks)
2002 - University of Edinburgh, Edinburgh, UK, PPARC Visiting Fellow (June-July, 2 months)
2003 - Aspen Center for Physics (June, 4 weeks)
2004 - Aspen Center for Physics (June, 3 weeks)
2005 - Aspen Center for Physics (June, 2 weeks)
2006 - Aspen Center for Physics (June, 3 weeks)
2007 - PIMS, Banff International Research Station (May, 1 week)
2007 - Aspen Center for Physics (June, 3 weeks)
2008 - Aspen Center for Physics (June, 4 weeks)
2008 - Yukawa Institute of Theoretical Physics, Kyoto, Japan (July, 1 week)
2009 - Aspen Center for Physics (July, 2 weeks)
2010 - National Taiwan University and Academia Sinica (May, 3 weeks)
2010 - Aspen Center for Physics (July, 2 weeks)
2011 - Aspen Center for Physics (July, 3 weeks)
2011 - Centro di Ricerca Matematica Ennio De Giorgi, Scuola Normale Superiore, Pisa, Italy (July, 1 week)
2012 - Visiting Fellow of the Isaac Newton Institute, Univ. of Cambridge, Cambridge, UK (July-December, 5 months)
2013 - Gambrinus Fellow at TU Dortmund, Dortmund, Germany (May, 2 weeks)
2013 - Academia Sinica, Taipei, Taiwan (July, 3 weeks)
2015 - Aspen Center for Physics (June, 3 weeks)
2018 - Vanderbilt/Polizia di Stato effort, Rome, Italy (July 2 weeks)
2022 - Aspen Center for Physics (June, 2 weeks)

• SERVICE:

• RECENT COMMITTEES:

Astrophysics search Committee (2003-2004)
Condensed Matter Theory search Committee (2004-2005)
Physics Department Library Representative (1987–)
Astrophysics search Committee (2006-2007)
Undergraduate program committee (2006-2008, 2014–)
Numerous Vanderbilt Ph.D. committees in the Physics Department and the Math Department (ongoing)
Outside member of Ph.D. committee Physics Dept. at U. of Delaware (Jason Lee-Ph.D. Fall 2007)
Biophysics search Committee (2008-2009)
Chair Phys/Astro Colloquium Committee (2011-2012)
Outside member of Ph.D. committee Physics Dept. at UNC, Chapel Hill (David Eby, 2012–2013)
Colloquium Committee (2015–2016)
Departmental Planning Committee (2017–2018)
Dept. of Phys. and Astro., Climate Committee, chair (2019–2020)

• CONFERENCE CO-ORGANIZER/ADVISOR FOR:

–Frontiers in Contemporary Physics II, 2001 (Nashville, TN)
–"The Launching of la Belle Epoque of High Energy Physics and Cosmology, A Festschrift for Paul Frampton in his 60th Year and Memorial Tributes to Behram Kursunoglu," Coral Gables 2003 (Fort Lauderdale, FL)
–"Celebrating 40 years of quarks, cosmology, CP-violation, and physics conferences in greater Miami," Miami 2004 (Key Biscayne, FL)
–Frontiers in Contemporary Physics III, 2005 (Nashville, TN)
–"Celebrating a century of physics in the Einstein era," Miami 2005 (Key Biscayne, FL)
–"Celebrating 35 years of supersymmetry, supergravity, superstrings, and all that," Miami 2006 (Fort Lauderdale, FL)
–"Celebrating ten years of AdS/CFT," Miami 2007 (Fort Lauderdale, FL)
–"Topical conference on elementary particles, astrophysics, and cosmology" Miami 2008 (Fort Lauderdale, FL)
–Miami 2009 (Fort Lauderdale, FL)
–Miami 2010 (Fort Lauderdale, FL)
–Miami 2011 (Fort Lauderdale, FL)
–"Topological Dynamics in the Physical and Biological Sciences," co-organizer, five month program for July–December, 2012 at the Isaac Newton Institute for Mathematical Sciences, (Cambridge, UK)
–International Advisory Board for FLASY12, Workshop on Flavor Symmetries Dortmund, June 2012
–Scientific advisor "Tangled Magnetic Fields in Astro- and Plasma Physics," ICMS, Edinburgh, October 2012
–Chair International Scientific Committee for Workshop on "Quantized Flux in Tightly Knotted and Linked Systems," 3-7 December 2012, at the Isaac Newton Institute for Mathematical Sciences, (Cambridge, UK)
–Miami 2012 (Fort Lauderdale, FL)
–International Advisory Board for FLASY13, Workshop on Flavor Symmetries, (Niigata, Japan) July 2013
–Miami 2013 (Fort Lauderdale, FL)
–International Advisory Board for FLASY14, Workshop on Flavor Symmetries, (University of Sussex, Brighton, UK) June 2014
–Miami 2014: Topical conference on elementary particles, astrophys and cosmology (Fort Lauderdale, FL)

–International Advisory Board for FLASY15, Workshop on Flavor Symmetries, (Manzanillo, Colima, Mexico) July 2015
–Miami 2015: A topical conference on elementary particles, astrophysics, and cosmology (Fort Lauderdale, FL)
–International Advisory Board for FLASY16, Workshop on Flavor Symmetries, (Valparaiso/Chile) September July 2016
–Miami 2016: A topical conference on elementary particles, astrophysics, and cosmology (Fort Lauderdale, FL)
–The Great American Solar Eclipse Physics Conference, (University of Missouri) August 2017
–Miami 2017: A topical conference on elementary particles, astrophysics, and cosmology (Fort Lauderdale, FL)
–International Advisory Board for FLASY18, Workshop on Flavor Symmetries, (University of Basel, Basel Switzerland) July 2018
–Miami 2018: A topical conference on elementary particles, astrophysics, and cosmology (Fort Lauderdale, FL)
–Miami 2019: A topical conference on elementary particles, astrophysics, and cosmology (Fort Lauderdale, FL)
–MIAMI 2020 (Fort Lauderdale, FL) Dec 2020
–MIAMI 2021 (Fort Lauderdale, FL) Dec 2021
–International Advisory Board for FLASY22, Workshop on Flavor Symmetries, (University of Lisbon, Lisbon, Portugal) June 2022
–MIAMI 2022 (Fort Lauderdale, FL) Dec 2022

- REVIEWING and EDITING:

Proceeding of combined workshops on: "Tangled Magnetic Fields in Astro- and Plasma Physics," 15-19 October 2012, Edinburgh, UK and "Quantized Flux in Tightly Knotted and Linked Systems," 3-7 December 2012, Cambridge, UK, H. Keith Moffatt (ed.) and Thomas W. Kephart (ed.), Published in J. Phys. Conf. Ser. 544 (2014); DOI: 10.1088/1742-6596/544/1/011002

- PATENT:

"Method and system for identification of genetic information from a polynucleotide sequence," T. W. Kephart and R. W. Cutler, US Patent 6,094,626

- REFEREED FOR:

Journals:

Physical Review Letters
Reviews of Modern Physics
Physical Review B
Physical Review D
Physics Letters A
Physics Letters B
Annalen der Physik
Astroparticle Physics
Astrophysical Journal Letters
European Journal of Physics C.
Journal of Cosmology and Astrophysics
Journal of High Energy Physics
Classical and Quantum Gravity
Modern Physics Letters A
Journal of Mathematical Physics
Journal of Knot Theory and Its Ramifications
Computer Physics Communications
Journal of Physics G

Funding Agents:

US Department of Energy
US National Science Foundation
Swiss National Science Foundation
National Science Foundation of Chile

- EXTERNAL REVIEWER:

University of Miami Graduate Physics Program (2013)