

Tanmay Vachaspati

Physics Department, Arizona State University
Tempe, AZ 85287, USA
tvachasp@asu.edu; 480 965 3587

EDUCATION

Ph.D., Tufts University, 1985
M.S., Tufts University, 1982
B.Sc., Allahabad University, 1980

ACADEMIC POSITIONS

Visiting Research Professor, University of Maryland, 2016-2017
Clark Way Harrison Visiting Professor, Washington University, Spring 2015
Director, Cosmology Initiative, Arizona State University, 2010-
Professor of Physics, Arizona State University, 2010-
Member, Institute for Advanced Study, Princeton, 2007-2008
Professor of Physics, Case Western Reserve University, 1999-2010
Warren E. Rupp Associate Professor, Case Western Reserve University, 1996-1999
Rosenbaum Fellow, Isaac Newton Institute, Cambridge (UK), 1994
Assistant Professor, Tufts University, 1991-1994
Visiting Assistant Professor, Tufts University, 1989-1991
Post-doctoral Fellow, DAMTP, University of Cambridge, 1987-1989
Post-doctoral Fellow, Bartol Research Institute, University of Delaware, 1985-1987

HONORS AND DISTINCTIONS

Clark Way Harrison Visiting Professor, Washington University, 1 January - 31 May 2015
Outstanding Referee, Physical Review, 2008
Member, Institute for Advanced Study, Princeton 2007-2008
Member, Foundational Questions Institute, 2007-
Fellow, American Physical Society, 2002-
Rosenbaum Fellow, Isaac Newton Institute, 1994
First Prize, Gravity Research Foundation Essay Competition, 1987
Gold Medal, Allahabad University, 1980
National Science Talent Scholar, India, 1976

OTHER POSITIONS

Visitor, Institute for Advanced Study, 2008-2010
Visiting Scientist, Netherlands Organization for Scientific Research, 2006-2007
Visiting Professor, University of Paris VII & XI, 2005
Visiting Professor, Tata Institute of Fundamental Research, 2001

GRANTS

DOE, ~\$120K/year/investigator from 1995- as PI/co-I.
NSF, \$5K, PI, 2000; ~\$19K, US-Swiss coop. grant, co-I, 1994-96; ~\$16K/year, PI, 1992-95.
NASA, ~\$80K/year/investigator, co-I, 2004-07.
FQXi, \$14.4K, PI, 2008-2009; \$6K, PI, 2007.
NATO, US-Spain cooperative grant, co-I, 1995-97.

CLOSELY ASSOCIATED STUDENTS

Ayush Saurabh, current, ASU.
Francis Duplessis, current, ASU.
Yiyang Zhang, current, Washington University.
Jeffrey Hyde, Visiting Asst. Professor, Goucher College.
Matthew Kolopanis, ASU.
Henry Lamm, postdoc, University of Maryland.
Subir Sabharwal, working in financial sector.
Yi-Zen Chu, Associate Professor, National Central University, Taiwan.
Yifung Ng, working for industry.
Hong Liu, Professor, MIT.
Dejan Stojkovic, Professor, SUNY at Buffalo.
Levon Pogolian, Professor, Simon Fraser University.
Sourish Dutta, Instructor, Vanderbilt University.
Audrey Todhunter, graduate student at Tufts University.
Mark Meckes, Associate Professor, Case Western Reserve University.
Michael Salem, Facebook.
Manuel Barriola, Publishers Clearing House, Boston.

CLOSELY ASSOCIATED POSTDOCTORAL FELLOWS

George Zahariade, ASU.
Kohei Kamada, postdoc, APCTP, Korea.
Jessica Cook, faculty, SUNY Owsego.
Ema Dimastrogiovanni, visiting Asst. Professor, Case Western.
Borun Chowdhury, postdoc, CERN.
Andrew Long, postdoc, U.Chicago.
Soma De, postdoc, UCDavis.
Eray Sabancilar, financial engineering student, EPFL, Lausanne.
Hiroyuki Tashiro, Lecturer, Nagoya University.
Yifu Cai, faculty, USTC, Anhui, China.
James Dent, Assistant Professor, University of Lafayette, Louisiana.
Dmitry Podolsky, Postdoctoral Research Associate, Harvard Medical School.
Irit Maor, Assistant Professor, University of Lafayette, Louisiana.
Francesc Ferrer, Associate Professor, Washington University.
Dragan Huterer, Associate Professor, University of Michigan.
Arthur Lue, Technical Staff, MIT Lincoln Laboratory.
Serge Winitzki, Senior Developer, Versal Group Inc..

Mark Trodden, Professor, University of Pennsylvania.

Scott Koranda, LIGO group, University of Milwaukee.

Andrew de Laix, Development Manager, Wolfram Technologies.

PUBLICATIONS

196. Classical Hawking Radiation, T. Vachaspati and G. Zahariade, arXiv:1803.08919 (2018).
195. Magnetic Field Transfer From A Hidden Sector, K. Kamada, Y. Tsai, and T. Vachaspati, arXiv:1803.08051 (2018).
194. Evolution of hydromagnetic turbulence from the electroweak phase transition, A. Brandenburg, T. Kahniashvili, S. Mandal, A.R. Pol, A.G. Tevzadze and T. Vachaspati, Phys. Rev. D96, 123528 (2017).
193. The Dynamo Effect in Decaying Helical Turbulence, A. Brandenburg, T. Kahniashvili, S. Mandal, A.R. Pol, A.G. Tevzadze and T. Vachaspati, PRL, submitted, arXiv:1710.01628 (2017).
192. Lunar Mass Black Holes from QCD Axion Cosmology, T. Vachaspati, arXiv:1706.03868 (2017).
191. Vacuum Topology and the Electroweak Phase Transition, Y. Zhang, F. Ferrer and T. Vachaspati, Phys. Rev. D96, 043014 (2017).
190. Monopole-antimonopole Interaction Potential, A. Saurabh and T. Vachaspati, Phys. Rev. D96, 103536 (2017).
189. Quantum Backreaction on Classical Dynamics, T. Vachaspati, Phys. Rev. D95, 125002 (2017).
188. Probing stochastic inter-galactic magnetic fields using blazar-induced gamma ray halo morphology, F. Duplessis and T. Vachaspati, JCAP 05, 005 (2017).
187. Vortex structure in superfluid color-flavor locked quark matter, M.G. Alford, S.K. Mallavarapu, T. Vachaspati and A. Windisch, conference proceedings of QCD@Work 2016, <http://arxiv.org/abs/1609.04863> (2016).
186. Creation of Magnetic Monopoles in Classical Scattering, T. Vachaspati, Phys. Rev. Lett. 117, 181601 (2016). *A PRL Highlight: <http://physics.aps.org/synopsisfor/10.1103/PhysRevLett.117.181601>*
185. Probing Intergalactic Magnetic Fields with Simulations of Electromagnetic Cascades, R.A. Batista, A. Saveliev, G. Sigl and T. Vachaspati, Phys. Rev. D94, 083005 (2016).
184. Fundamental Implications of Intergalactic Magnetic Field Observations, T. Vachaspati, Phys. Rev. D95, 063505 (2016).
183. Gravitational Waves, Gamma Ray Bursts, and Black Stars, T. Vachaspati, Int. J. Modern Phys. D Vol. 25, No. 12, 1644025 (2016).
182. Stability of superfluid vortices in dense quark matter, M.G. Alford, S.K. Mallavarapu, T. Vachaspati and A. Windisch, Phys. Rev. C93, no. 4, 045801 (2016).
181. Monopole-Antimonopole Scattering, T. Vachaspati, Phys. Rev. D93, 045008 (2016).

180. Morphology of blazar-induced gamma ray haloes due to a helical intergalactic magnetic field, A.J. Long and T. Vachaspati, JCAP 09, 065 (2015).
179. Monopoles on strings, T.W.B. Kibble and T. Vachaspati, J. Phys. G: Nucl. Part. Phys. 42, [094002](#) (2015).
178. Magnetic monopole-domain wall collisions, M. Brush, L. Pogosian and T. Vachaspati, Phys. Rev. D92, 045008 (2015).
177. Implications of a Primordial Magnetic Field for Magnetic Monopoles, Axions, and Dirac Neutrinos, A.J. Long and T. Vachaspati, Phys. Rev. D91, 103522 (2015).
176. Intergalactic magnetic field spectra from diffuse gamma rays, W. Chen, B. D. Chowdhury, F. Ferrer, H. Tashiro and T. Vachaspati, Monthly Notices of the Royal Astronomical Society, 450 (4): 3371-3380 (2015). *Featured in the media, including <https://www.ras.org.uk/news-and-press/2635-left-handed-cosmic-magnetic-field-could-explain-missing-antimatter>.*
175. Parity-odd correlators of diffuse gamma rays and intergalactic magnetic fields, H. Tashiro and T. Vachaspati, Monthly Notices of the Royal Astronomical Society 448 (4), 299-306 (2015).
174. Cosmic Strings in Hidden Sectors: 2. Cosmological and Astrophysical Signatures, A.J. Long and T. Vachaspati, JCAP 12, 040 (2014).
173. Cosmic Strings in Hidden Sectors: 1. Radiation of Standard Model Particles, A.J. Long, J.M. Hyde and T. Vachaspati, JCAP 09, 030 (2014).
172. Dark Strings and their Couplings to the Standard Model, J.M. Hyde, A.J. Long and T. Vachaspati, Phys. Rev. D89, 065031 (2014).
171. Search for CP Violation in the Gamma Ray Sky, H. Tashiro, W. Chen, F. Ferrer and T. Vachaspati, MNRAS: Letters 445 (1): L41-L45 (2014).
170. Leptogenesis and Primordial Magnetic Fields, A.J. Long, E. Sabancilar and T. Vachaspati, JCAP 02, 036 (2014).
169. Damping of Primordial Gravitational Waves from Generalized Sources, J. Dent, L.M. Krauss, S. Sabharwal and T. Vachaspati, Phys. Rev. D88, 084008 (2013).
168. CMB Faraday rotation as seen through the Milky Way, S. De, L. Pogosian and T. Vachaspati, Phys. Rev. D88, 063527 (2013).
167. Cosmological Magnetic Field Correlators from Blazar Induced Cascade, H. Tashiro and T. Vachaspati, Phys. Rev. D87, 123527 (2013).
166. Gravitational Scattering of Photons Off Cosmic Strings, Y-Z. Chu and T. Vachaspati, Phys. Rev. D87, 083512 (2013).
165. Quantum Excitations in Time-Dependent Backgrounds, M. Kolopanis and T. Vachaspati, Phys. Rev. D87, 085041 (2013).

164. Numerical Exploration of Soliton Creation, H. Lamm and T. Vachaspati, Phys. Rev. D87, 065018 (2013).
163. CMB Distortions from Damping of Acoustic Waves Produced by Cosmic Strings, H. Tashiro, E. Sabancilar and T. Vachaspati, JCAP 08, 035 (2013).
162. Primordial Magnetism in CMB B-modes, L. Pogosian, T. Vachaspati and A. Yadav, Can. J. Phys. 91, 451-454 (2013).
161. Probing Primordial Magnetism with Off-Diagonal Correlators of CMB Polarization, A. Yadav, L. Pogosian and T. Vachaspati, Phys. Rev. D86, 123009 (2012).
160. Chiral Effects and Cosmic Magnetic Fields, H. Tashiro, T. Vachaspati and A. Vilenkin, Phys. Rev. D86, 105033 (2012).
159. Radio Broadcasts from Superconducting Strings, Y. F. Cai, E. Sabancilar, D. Steer and T. Vachaspati, Phys. Rev. D86, 043521 (2012).
158. Constraints on Superconducting Cosmic Strings from Early Reionization, H. Tashiro, E. Sabancilar and T. Vachaspati, Phys. Rev. D85, 103522 (2012).
157. CMB Distortions from Superconducting Cosmic Strings, H. Tashiro, E. Sabancilar and T. Vachaspati, Phys. Rev. D85, 103522 (2012).
156. Radio Bursts from Superconducting Strings, Y.-F. Cai, E. Sabancilar and T. Vachaspati, Phys. Rev. D85, 023530 (2012).
155. Soliton Creation with a Twist, T. Vachaspati, Phys. Rev. D84, 125003 (2011).
154. Primordial Magnetism in the CMB: Exact Treatment of Faraday Rotation and WMAP7 Bounds, L. Pogosian, A.S. Yadav, Y. Ng and T. Vachaspati, Phys. Rev. D84, 043530 (2011); Erratum-ibid D84, 089903 (2011).
153. Magnetic Helicity in Sphaleron Debris, Y. Chu, J.B. Dent and T. Vachaspati, Phys. Rev. D83, 123530 (2011).
152. Seeking String Theory in the Cosmos, E.J. Copeland, L. Pogosian and T. Vachaspati, Classical and Quantum Gravity 28, 204009 (2011).
151. Light from Cosmic Strings, D. Steer and T. Vachaspati, Phys.Rev. D83, 043528 (2011).
150. Shape of Cosmic String Loops, C.J. Copi and T. Vachaspati, Phys.Rev. D83, 023529 (2011).
149. Spectra of Magnetic Fields Injected during Baryogenesis, Y. Ng and T. Vachaspati, Phys. Rev. D82, 063515 (2010).
148. Capacitor Discharge and Vacuum Resistance in Massless QED2, Y. Chu and T. Vachaspati, Phys. Rev. D81, 085020 (2010).

147. Cosmic Rays from Cosmic Strings with Condensate, T. Vachaspati, Phys. Rev D81, 043531 (2010).
146. Aharonov-Bohm Radiation, K. Jones-Smith, H. Mathur and T. Vachaspati, Phys. Rev. D81, 043503 (2010). *Featured in Nature Physics, Research Highlights, March 2010.*
145. Dark Strings, T. Vachaspati, Phys. Rev. D80, 063502 (2009).
144. Cosmology of Bifundamental Fields, T. Vachaspati, Phys. Rev. D79, 023506 (2008).
143. Formation of Non-Abelian Monopoles Connected by Strings, Y. Ng, T.W.B. Kibble and T. Vachaspati, Phys. Rev. D78, 046001 (2008).
142. Creating Kinks from Particles, S. Dutta, D.A. Steer and T. Vachaspati, Phys. Rev. Lett. 101, 121601 (2008).
141. Magnetic Fields in the Aftermath of Phase Transitions, T. Vachaspati, Phil. Trans. R. Soc. A 366, 2915 (2008).
140. Cosmic Sparks from Superconducting Strings, T. Vachaspati, Phys. Rev. Lett. 101, 141301 (2008).
139. Helical Magnetic Fields from Sphaleron Decay and Baryogenesis, C. Copi, F. Ferrer, T. Vachaspati and A. Achucarro, Phys. Rev. Lett 101, 171302 (2008).
138. Schrodinger Picture of Quantum Gravitational Collapse, T. Vachaspati, Class. Quantum Gravity 26, 215007 (2009).
137. Island Cosmology, S. Dutta and T. Vachaspati, in “Beyond the Big Bang”, ed. R. Vaas (Springer Verlag, 2008); in press.
136. Fermions on One or Fewer Kinks, Y. Chu and T. Vachaspati, Phys. Rev. D77, 025006 (2007).
135. Non-Abelian Magnetic Monopoles on S^3 , I. Maor, H. Mathur and T. Vachaspati, Phys. Rev. D76, 105013 (2007).
134. Microlensing from Cosmic Strings, K. Kuijken, X. Siemens and T. Vachaspati, MNRAS 384, 161 (2008).
133. Black Stars and Gamma Ray Bursts, T. Vachaspati, arXiv:0706.1203 (2007).
132. On Constructing Baby Universes and Black Holes, T. Vachaspati, arXiv:0705.2048 (2007).
131. Quantum Radiation from Quantum Gravitational Collapse, T. Vachaspati and D. Stojkovic, Phys. Lett. B663, 107 (2008).
130. Observation of Incipient Black Holes and the Information Loss Problem, T. Vachaspati, D. Stojkovic and L.M. Krauss, Phys. Rev. D76, 024005 (2007). *Featured in the media, including The Economist, 21 June 2007.*

129. Light Superconducting Strings in the Galaxy, F. Ferrer and T. Vachaspati, proceedings of the NASA workshop on "From Quantum to Cosmos: Fundamental Physics Research in Space", Washington, D.C. May 22-24 (2006); *Int. J. Mod. Phys. D16*, 2392-2405 (2008).
128. Domain walls and fermion scattering in Grand Unified models, D.A. Steer and T. Vachaspati, *Phys. Rev. D73*, 105021 (2006)
127. Intercommutation of semilocal strings, P. Laguna, R. Matzner, V. Natchu and T. Vachaspati, *Phys. Rev. Lett. 98*, 041602 (2007).
126. Zero modes on domain walls in an external magnetic field, F. Ferrer, H. Mathur, T. Vachaspati and G. Starkman, *Phys. Rev. D74*, 025012 (2006).
125. On the detection of magnetic helicity, T. Kahniashvili and T. Vachaspati, *Phys. Rev. D73*, 063507 (2005).
124. 511 KeV photons from superconducting cosmic strings, F. Ferrer and T. Vachaspati, *Phys. Rev. Lett. 95*, 261302 (2005).
123. Islands in the Lambda-sea: An alternative cosmological model, S. Dutta and T. Vachaspati, *Phys. Rev. D71*, 083507 (2005).
122. Distribution of singularities in the cosmic microwave background polarization, D. Huterer and T. Vachaspati, *Phys. Rev. D72*, 043004 (2005).
121. Spontaneous formation of domain wall lattices in two spatial dimensions, N.D. Antunes and T. Vachaspati, *Phys. Rev. D70*, 063516 (2004).
120. Cosmic problems for condensed matter experiment, T. Vachaspati, *Journal of Low Temperature Physics* 136, Nos. 5/6 (2004).
119. Topology in the little Higgs models, M. Trodden and T. Vachaspati, *Phys. Rev. D70*, 065008 (2004).
118. Forecasting cosmic doomsday from cmb/lss cross-correlations, J. Garriga, L. Pogosian and T. Vachaspati, *Phys. Rev. D69*, 063511 (2003).
117. Reconstruction of field theory from excitation spectra of defects, T. Vachaspati, *Phys. Rev. D69*, 043510 (2004).
116. Formation of domain wall lattices, N.D. Antunes, L. Pogosian and T. Vachaspati, *Phys. Rev. D69*, 043513 (2004).
115. Eternal inflation and energy conditions in de Sitter spacetime, T. Vachaspati, in the proceedings of the U.C. Davis meeting on Cosmic Inflation (2003); astro-ph/0305439.
114. The bubbling universe, T. Vachaspati, (essay awarded Honorable mention by the Gravity Research Foundation), *Int. J. Mod. Phys. D12*, 1783 (2003).

113. Gravitational lensing by cosmic strings in the era of wide-field surveys, D. Huterer and T. Vachaspati, Phys. Rev. D68, 041301 (2003).
112. Topological properties of the Cosmic Microwave Background polarization map, T. Vachaspati and A. Lue, Phys. Rev. D67, 121302(R) (2003).
111. Symmetries within domain walls, T. Vachaspati, Phys. Rev. D67, 125002 (2003).
110. A post-WMAP perspective on inflation, A. Lue, G. Starkman and T. Vachaspati, astro-ph/0303268 (2003).
109. Domain wall solutions, T. Vachaspati, lectures at “Patterns of symmetry breaking”, NATO Advanced Study Institute, Cracow, 2002; hep-th/0211109.
108. Domain wall lattices, L. Pogosian and T. Vachaspati, Phys. Rev. D67, 065012 (2003).
107. Signatures of primordial helicity in the CMBR, L. Pogosian, T. Vachaspati and S. Winitzki, proceedings of ICHEP02, Amsterdam, July 24-31, 2002, Elsevier Science BV; astro-ph/0210039.
106. Triplication of SU(5) monopoles, L. Pogosian, D.A. Steer and T. Vachaspati, Phys. Rev. Lett. 90, 061801 (2003).
105. Bound states in bottomless potentials, T. Vachaspati, Phys. Rev. A66, 014104 (2002).
104. Band structure in classical field theory, M. Salem and T. Vachaspati, Phys. Rev. D66, 025003 (2002).
103. Signatures of kinetic and magnetic helicity in the CMBR, L. Pogosian, T. Vachaspati and S. Winitzki, Phys. Rev. D65, 083502 (2002).
102. Primordial magnetic fields and CP violation in the sky, T. Vachaspati, in proceedings of the COSMO-01 workshop, Rovaniemi, Finland (2001); astro-ph/0111124.
101. Space of kink solutions in SU(5) x Z₂, L. Pogosian and T. Vachaspati, Phys. Rev. D64, 105023 (2001).
100. Zero modes of fermions with a general mass matrix, G. Starkman, D. Stojkovic and T. Vachaspati, Phys. Rev. D65, 065003 (2002).
99. Class of Kinks in SU(N) x Z₂, T. Vachaspati, Phys. Rev. D63, 105010 (2001).
98. Lectures on Cosmic Topological Defects, T. Vachaspati, in the proceedings of the 2000 summer school on cosmology, ICTP, Trieste; hep-ph/0101270 (2001).
97. Estimate of the Primordial Magnetic Field Helicity, T. Vachaspati, Phys. Rev. Lett. 87, 251302 (2001).

96. Neutrino Zero Modes on Electroweak Strings, G. Starkman, D. Stojkovic and T. Vachaspati, Phys. Rev. D63, 085011 (2001).
95. Spin and Dualization of SU(5) Dyons, T. Vachaspati and D.A. Steer, Phys. Rev. D63, 085008 (2001).
94. Domain Walls in SU(5), L. Pogosian and T. Vachaspati, Phys. Rev. D62, 123506 (2000).
93. Interaction of Magnetic Monopoles and Domain Walls, L. Pogosian and T. Vachaspati, Phys. Rev. D62, 105005 (2000).
92. What is the homogeneity of our Universe telling us?, M. Trodden and T. Vachaspati, (essay awarded Honorable Mention by the Gravity Research Foundation), Mod. Phys. Lett. A14, 1661-1665 (1999).
91. Cosmic Microwave Background Anisotropy from Wiggly Strings, L. Pogosian and T. Vachaspati, Phys. Rev. D60, 083504 (1999).
90. Formation, Interaction and Observation of Topological Defects, T. Vachaspati, lectures given in Les Houches, in "Topological Defects and the Non-Equilibrium Dynamics of Symmetry Breaking Phase Transitions", eds. Y. M. Bunkov and H. Godfrin, Kluwer Academic Publishers, (2000).
89. Remarks on Inflation, T. Vachaspati, published in the proceedings of COSMO-98, ed. D. O. Caldwell (American Institute of Physics, New York, 1999).
88. Observation of Cosmic Acceleration and Determining the Fate of the Universe, G. Starkman, M. Trodden and T. Vachaspati, Phys. Rev. Lett. 83, 1510 (1999).
87. Causality and Cosmic Inflation, T. Vachaspati and M. Trodden, Phys. Rev. D61, 023502 (1999).
86. Creation and Structure of Baby Universes in Monopole Collisions, A. Borde, M. Trodden and T. Vachaspati, Phys. Rev. D59, 043513 (1999).
85. On Random Bubble Lattices, A. A. de Laix and T. Vachaspati, Phys. Rev. D59, 045017 (1999).
84. Topological Inflation with Multiple Winding, A. A. de Laix, M. Trodden and T. Vachaspati, Phys. Rev. D57, 7186 (1998).
83. Semilocal and Electroweak Strings, A. Achucarro and T. Vachaspati, Phys. Rep. 327, 347 (1999).
82. Z_3 Strings and their Interactions, J. Heo and T. Vachaspati, Phys. Rev. D58, 065011 (1998).
81. Flow instability in $^3\text{He-A}$ as analog of generation of hypermagnetic field in early Universe, M. Krusius T. Vachaspati and G. Volovik, cond-mat/9802005 (1998).
80. Topological Defects in the Cosmos and Lab, T. Vachaspati, Contemporary Physics 39, No. 4 (1998).

79. Topological Defects: Fossils from the Early Universe, T. Vachaspati, proceedings of the 1997 RESCEU Symposium, University of Tokyo, eds. K. Sato, T. Yanagida and T. Shiromizu (1998).
78. Formation of Topological Defects, T. Vachaspati, hep-ph/9710292, published in the ICTP 1997 Summer School Lectures on Cosmology.
77. On a Dual Standard Model, T. Vachaspati, in “Solitons: Properties, Dynamics, Interactions, Applications”, eds. R. McKenzie, M. Paranjape and W. Zakrewski, Springer-Verlag, New York (1997).
76. Sweeping Away the Monopole Problem, G. Dvali, H. Liu and T. Vachaspati, Phys. Rev. Lett. 80, 2281 (1998).
75. Relaxing the Geodesic Rule in Defect Formation Algorithms, L. Pogosian and T. Vachaspati, Phys. Lett. B423, 45 (1997).
74. Field configurations with half-integer angular momentum in purely bosonic theories without topological charge, T. Vachaspati, Phys. Lett. B427, 323 (1998).
73. Gravitational Lensing Signature of Long Cosmic Strings, A.A. de Laix, L.M. Krauss and T. Vachaspati, Phys. Rev. Lett. 79, 1968 (1997).
72. Comment on ‘Constraints on the Strength of Primordial B Fields from Big Bang Nucleosynthesis Reexamined’, P.J. Kernan, G.D. Starkman and T. Vachaspati, Phys. Rev. D56, 3766 (1997).
71. Momentum creation by vortices in superfluid He-3 as a model of primordial baryogenesis, T.D.C. Bevan, A.J. Manninen, J.B. Cook, J.R. Hook, H.E. Hall, T. Vachaspati and G.E. Volovik, Nature 386, 689 (1997).
70. Family Replication in the Dual Standard Model, H. Liu, G.D. Starkman and T. Vachaspati, Phys. Rev. Lett. 78, 1223 (1997).
69. Gravitational Lensing by Cosmic String Loops, A.A. de Laix and T. Vachaspati, Phys. Rev. D54, 4780 (1996).
68. SU(5) Monopoles and the Dual Standard Model, H. Liu and T. Vachaspati, Phys. Rev. D56, 1300 (1997).
67. Galactic Cosmic Strings as Sources of Primary Antiprotons, G.D. Starkman and T. Vachaspati, Phys. Rev. D53, 6711 (1996).
66. Perturbed Electroweak Strings and Fermion Zero Modes, H. Liu and T. Vachaspati, Nucl. Phys. B470, 176 (1996).
65. Aspects of He-3 and the Standard Electroweak Model, G.E. Volovik and T. Vachaspati, Int. J. Mod. Phys. B10 471-521 (1996).
64. Big Bang Nucleosynthesis Constraints on Primordial Magnetic Fields, P.J. Kernan, G.D. Starkman and T. Vachaspati, Phys. Rev. D54, 7207 (1996).

63. An Attempt to Construct the Standard Model with Monopoles, T. Vachaspati, Phys. Rev. Lett. 76, 188 (1996).
62. Topological Incarnations of Electroweak Defects, T.W. Kephart and T. Vachaspati, Phys. Lett. B388, 481 (1996).
61. Defect Production in Slow First Order Phase Transitions, J. Borrill, T.W.B. Kibble, T. Vachaspati and A. Vilenkin, Phys. Rev. D52, 1934 (1995).
60. Electroweak Strings, Zero Modes and Baryon Number, T. Vachaspati, in the Proceedings of "Trends in Astrophysics", Stockholm, eds. L. Bergstrom, P. Carlson, P.O. Hulth and H. Snellman, Nucl. Phys. B, Proceedings Supplement Section (Elsevier Science, 1995).
59. Zero Modes on Linked Strings, J. Garriga and T. Vachaspati, Nucl. Phys. B438, 161 (1995).
58. Electroweak Strings and Monopoles, T. Vachaspati, in the Proceedings of the International Conference on High Energy Physics '94, Glasgow, Scotland (1994).
57. Electroweak Strings, Sphalerons and Magnetic Fields, T. Vachaspati, in the Proceedings of the NATO Workshop on "Electroweak Physics and the Early Universe", Sintra, Portugal (1994); Series B: Physics Vol. 338, Plenum Press, New York (1994).
56. Electroweak Dyons, T. Vachaspati, Nucl. Phys. B439, 79 (1995).
55. Topological Defects in Cosmology, T. Vachaspati, ICTP Series in Theoretical Physics - Volume 10, 1993 Summer School in High Energy Physics and Cosmology, eds. E. Gava et. al., World Scientific, 1994.
54. Electroweak String Configurations with Baryon Number, T. Vachaspati and G. B. Field, Phys. Rev. Lett. 73, 373 (1994); Errata 74, 1258 (1995).
53. Production of Vortices by Scattering Particles, T. Vachaspati, Phys. Rev. D49, R4985 (1994).
52. Embedded Defects, M. Barriola, T. Vachaspati and M. Bucher, Phys. Rev. D50, 2819 (1994).
51. Peculiar Velocities and Microwave Background Anisotropies from Cosmic Strings, L. Perivolaropoulos and T. Vachaspati, Astrophys. J. Lett. 423, L77 (1994).
50. Electroweak Strings: A Progress Report, T. Vachaspati, in proceedings of "Texas/ PASCOS 92: Relativistic Astrophysics and Particle Cosmology" (Ann. N. Y. Acad. Sci. Vol. 688, 1993).
49. Bound States Can Stabilize Electroweak Strings, T. Vachaspati and R. Watkins, Phys. Lett. B318, 163 (1993).
48. Do Circular Loops of Global Strings Form Black Holes?, J. Fort and T. Vachaspati, Phys. Lett. B311, 41 (1993).
47. Electroweak Strings: An Overview, T. Vachaspati, in "Proceedings of the XXVI International Conference on High Energy Physics, Dallas, Texas, 1992" (AIP, New York).

46. Detailed Stability Analysis of Electroweak Z-Strings, M. James, L. Perivolaropoulos and T. Vachaspati, Nucl. Phys. B395, 534 (1993).
45. Wiggly Cosmic Strings, Neutrinos and Large-Scale Structure, T. Vachaspati, in Neutrino 92, Proceedings of the 15th International Conference on Neutrino Physics and Astrophysics, Granada, Spain, Nuclear Physics B (Proc. Suppl.) 31 (1993).
44. Generalized Semilocal Theories and Higher Hopf Maps', M. Hindmarsh, R. Holman, T. Kephart and T. Vachaspati, Nucl. Phys. B404, 794 (1993).
43. Metastable Strings in Realistic Models, R. Holman, S. Hsu, T. Vachaspati and R. Watkins, Phys. Rev. D46, 5352 (1992).
42. A New Class of Defects, T. Vachaspati and M. Barriola, Phys. Rev. Lett. 69, 1867 (1992).
41. On the Stability of Electroweak Strings, M. James, L. Perivolaropoulos and T. Vachaspati, Phys. Rev. D46, R5232 (1992).
40. Dynamical Simulations of Semilocal Strings, A. Achucarro, K. Kuijken, L. Perivolaropoulos and T. Vachaspati, Nucl. Phys. B388, 45 (1992).
39. Electroweak Strings, T. Vachaspati, Nucl. Phys. B397, 648 (1993).
38. Vortex Solutions in the Weinberg-Salam Model, T. Vachaspati, Phys. Rev. Lett. 68, 1977 (1992); 69, 216(E) (1992).
37. The Structure of Wiggly Cosmic String Wakes, T. Vachaspati, Phys. Rev. D45, 3487 (1992).
36. Distribution of Peculiar Velocities from Cosmic Strings, T. Vachaspati, Phys. Lett. B282, 305 (1992).
35. Cosmic Strings and the Large-Scale Structure of the Universe, T. Vachaspati, in the "Proceedings of the Second International Symposium on Particles, Strings and Cosmology" (World Scientific, 1992).
34. Semilocal Cosmic Strings, T. Vachaspati and A. Achucarro, Phys. Rev. D44, 3067 (1991).
33. Magnetic Fields from Cosmological Phase Transitions, T. Vachaspati, Phys. Lett. B265, 258 (1991).
32. Large-Scale Structure from Wiggly Cosmic Strings, T. Vachaspati and A. Vilenkin, Phys. Rev. Lett. 67, 1057 (1991).
31. The Formation of Topological Defects, T. Vachaspati, Phys. Rev. D44, 3723 (1991).
30. Quantum State of a Nucleating Bubble, T. Vachaspati and A. Vilenkin, Phys. Rev. D43, 3846 (1991).

29. Analytical Approximations to the Self-similar Global Texture Metric, M. Barriola and T. Vachaspati, *Phys. Rev. D*43, 2726 (1991).
28. Strong Gravity of a Self-similar Global Texture, M. Barriola and T. Vachaspati, *Phys. Rev. D*43, 1056 (1991).
27. Cosmic String Traveling Waves, D. Garfinkle and T. Vachaspati, *Phys. Rev. D*42, 1960 (1990).
26. Effects of the Image Universe on Cosmic Strings, T. Vachaspati, C. J. Hogan and M. Rees, *Phys. Lett. B*242, 29 (1990).
25. Travelling Waves on Domain Walls and Cosmic Strings, Vachaspati and T. Vachaspati, *Phys. Lett. B*238, 41 (1990).
24. The Formation of Pregalactic Objects from White-Noise Density Perturbations, R. J. Scherrer and T. Vachaspati, *Astrophys. J.* 361, 338 (1990).
23. The Non-Relativistic Coulomb Problem on a Cone, G.W. Gibbons, F. Ruiz-Ruiz and T. Vachaspati, *Comm. Math. Phys.* 127, 295 (1990).
22. On the Vilenkin Boundary Condition Proposal in Anisotropic Universes, J. Louko and T. Vachaspati, *Phys. Lett. B*223, 21 (1989).
21. de Sitter Invariant States from Quantum Cosmology, T. Vachaspati, *Phys. Lett. B*217, 228 (1989).
20. Cosmic String Loop Self-Intersections and Intercommuting, T. Vachaspati, *Phys. Rev. D*39, 1768 (1989).
19. Global String Dynamics, T. Vachaspati, Rapport D'activite Scientifique du C.E.C.A.M. 1988, Institut d' Astrophysique, Paris.
18. Topological Approach to Self-Intersections and Intercommuting, T. Vachaspati in "Cosmic Strings: The Current Status", proceedings of the 1988 Yale Workshop (World Scientific Press).
17. Self-Intersections of Closed Curves and Cosmic Strings, T. Vachaspati in "Developments in Theoretical Physics", Volume 1: TPSC Lectures 1988, eds. S. M. Roy, V. C. Sahni and M. Barma (Oxford and IBH Publishing Co.).
16. On the Uniqueness of the Tunnelling Wave-function of the Universe, T. Vachaspati and A. Vilenkin, *Phys. Rev. D*37, 898 (1988).
15. Fields due to Kinky, Cuspless, Cosmic Loops, D. Garfinkle and T. Vachaspati, *Phys. Rev. D*37, 257 (1988).
14. The Gravity of Cosmic Loops, (essay awarded the first prize by the Gravity Research Foundation), T. Vachaspati, *Gen. Rel. and Grav.* 19, 1053 (1987).
13. Notes on Superconducting Cosmic Strings, M. Aryal, A. Vilenkin and T. Vachaspati, *Phys. Lett. B*194, 25 (1987).

12. Radiation from Kinky, Cuspless, Cosmic Loops, D. Garfinkle and T. Vachaspati, Phys. Rev. D36, 2229 (1987).
11. Electromagnetic Radiation from Superconducting Cosmic Loops, T. Vachaspati and A. Vilenkin, Phys. Rev. Lett. 58, 1041 (1987).
10. Radiation of Goldstone Bosons from Global Strings, A. Vilenkin and T. Vachaspati, Phys. Rev. D35, 1138 (1987).
9. The Gravity of Cosmic Loops, T. Vachaspati, Phys. Rev. D35, 1767 (1987).
8. Evolution of Cosmic Networks, T. Vachaspati and A. Vilenkin, Phys. Rev. D35, 1131 (1987).
7. Cosmic Strings and the Large-Scale Structure of the Universe, T. Vachaspati, Phys. Rev. Lett. 57, 1655 (1986).
6. Cosmic String Networks, M. Aryal, A. E. Everett, A. Vilenkin and T. Vachaspati, Phys. Rev. D34, 434(1986).
5. Gravitational Effects of Cosmic Strings, T. Vachaspati, Nucl. Phys. B277, 593 (1986).
4. Gravitational Radiation from Strings, T. Vachaspati and A. Vilenkin, Phys. Rev. D31, 3052 (1985).
3. Monopole Annihilation and Causality, T. Vachaspati, A. E. Everett and A. Vilenkin, Phys. Rev. D31, 1925 (1985).
2. Radiation from Vacuum Strings and Walls, T. Vachaspati, A.E. Everett and A. Vilenkin, Phys. Rev. D30, 2046 (1984).
1. Formation and Evolution of Cosmic Strings, T. Vachaspati and A. Vilenkin, Phys. Rev. D30, 2036 (1984).

BOOKS

1. The Formation and Evolution of Cosmic Strings, eds. G.W. Gibbons, S.W. Hawking and T. Vachaspati, Cambridge University Press (1990).
2. Kinks and domain walls: an introduction to classical and quantum solitons, T. Vachaspati, Cambridge University Press (2006).

WEB PUBLICATIONS

Cosmic Strings, T. Vachaspati, L. Pogosian, and D. Steer, Scholarpedia, 10(2):31682 (2015).
[arXiv:1506.04039](https://arxiv.org/abs/1506.04039); http://www.scholarpedia.org/article/Cosmic_strings.

IN PROGRESS (April 2018)

1. Classical Hawking Evaporation, D. Garfinkle, T. Vachaspati and G. Zahariade.
2. Magnetic Field Production at a First Order Electroweak Phase Transition, F. Ferrer, T. Vachaspati and Y. Zhang.
3. Creation of Strings from Particles, A. Saurabh and T. Vachaspati.
4. Particle Radiation from Cosmic String Loops, D. Matsunami, L. Pogosian and T. Vachaspati.

TEACHING

Undergraduate courses:

Introductory physics for engineers (freshman).
Introductory physics for non-engineering students (freshman).
Modern Physics (sophomores).
Mathematical methods (sophomores).
Quantum mechanics I (juniors).
Quantum mechanics II (juniors).
ElectroMagnetism (juniors).

Graduate courses:

General Relativity
Cosmology.
Quantum Mechanics.
Quantum field theory I.
Quantum field theory II.
Advanced classical mechanics.
Statistical mechanics.
Special Topics: Topological Defects.

RECENT CONFERENCES (2010-)

Invited speaker, “CosPa 2017”, Kyoto University, December 10-15, 2017.
Invited speaker, “Topological Science Symposium”, Keio University, Tokyo, November 22-23, 2017.
Invited speaker, “Cosmic Strings”, Sao Carlos, Brazil, February 15-18, 2016.
Invited speaker, PACIFIC 2015, Moorea, French Polynesia, September 12-19, 2015.
Invited speaker, “Cosmological Magnetic Fields”, NORDITA, Sweden, June 22-26, 2015.
Invited speaker, “Cosmological Frontiers in Fundamental Physics”, Perimeter Institute, July 8-11, 2013.
Invited speaker, “Quantized Flux in Tightly Knotted and Linked Systems”, Isaac Newton Institute, December 3-7, 2012.
Invited speaker, “Cosmic Strings”, McGill University, October 26-28, 2012.
Invited speaker, “Workshop on P and CP Violation”, Brookhaven National Lab, June 25, 2012.
Invited Lecturer, “Prospects in Theoretical Physics”, Institute for Advanced Study, July, 2011.
Plenary speaker, “Primordial Magnetism”, ASU, April 2011.

RECENT INVITED SEMINARS:

Simon Fraser University; APS April Meeting; Harvard-Smithsonian Center for Astrophysics; Joint Cosmology Seminar, Tufts University; University of Pennsylvania; Institute for Advanced Study, Princeton; University of Delaware; Georgia Tech.; ASU; Keio University; Nagoya University.

CONFERENCES CO-ORGANIZED

“Origin, Evolution, and Signatures of Cosmological Magnetic Fields”, NORDITA, Stockholm, June 15 – July 10, 2015.
“ASU-Tufts Workshop on Cosmic Strings”, ASU, February 3-5, 2014.
“Is Our Universe Necessary?”, Origins Project workshop, ASU, January 31-February 2, 2014.
“Matters of Gravity”, ASU, January 25, 2013.
“Quantized Flux in Tightly Knotted and Linked Systems”, Isaac Newton Institute, Cambridge, December 3-7, 2012.
“Coming Opportunities in Physical Cosmology”, ASU, January 25-27, 2012.
“Primordial Magnetism”, ASU, March 30-April 2, 2011.
“Strings and Cosmology”, APC Paris, December 10-14, 2007.
“Confronting Gravity”, St. Thomas, March 16-21, 2006.
“Future of Cosmology”, Cleveland, October 10-12, 2003.
“Galactic and Cosmological Magnetic Fields”, Aspen, 1997.
“Great Lakes Cosmology Workshop”, Cleveland, 1995.
“Formation and Evolution of Cosmic Strings”, Cambridge, 1989.

PROFESSIONAL SERVICE

Fermi Cycle-10 Review Panel (2017).
Canadian Research Chair Reviewer (2017).
DOE Early Career Review Panel (2015).
Reviewer for Imperial College, London, and University of Nottingham Research Fellowship Scheme (2013).
Member, NSF site-review panel for Physics Frontier Center (2005).
Referee – Physical Review Letters, Physical Review D, Physics Letters B, Classical and Quantum Gravity, Journal of Cosmology and Astrophysics, JHEP, International Journal of Modern Physics, Astronomy and Astrophysics.
Reviewer – NSF, DOE, PPARC (UK), OTKA (Hungary), Foundation for Fundamental Research on Matter (Netherlands), ETH Zurich Research Commission.

ADMINISTRATION/UNIVERSITY SERVICE

University Senate, ASU, 2013-2014; 2016.
College Senate, ASU, 2013-2014; 2016.
Director, Cosmology Initiative, ASU, 2010-
Member, university (CWRU) curriculum committee (3 years).
Freshman advisor at CWRU (3 years).
Participant, service learning seminars and program at CWRU.

DEPARTMENT SERVICE (ASU)

Personnel Committee
Budget and Policy Committee
Graduate Exam Committee
Graduate Program Committee
Observational Cosmology Search Committee
Experimental Cosmology Search Committee

COMMUNITY SERVICE

Special Awards Judge, Intel Science Fair, 15 May 2013.
Science Circle lecture, 19 February 2013.
Public talks at the Spirit of the Senses, Phoenix, 2010-
Co-host, Matter of Origins, Dance Exchange, 11 April 2011.
Developed and implemented service learning component for senior project (Case) in partnership with local inner city high school.