# David R. Nelson Publications
# 1973-June 2018

1. Chotibut, T., Nelson, D.R. and Succi, S., “Striated populations in disordered environments with advection,” Physica A: Statistical Mechanics and its Applications, **465** pp. 500-514 (2017).

2. Andrej Kosmrlj and David R. Nelson, “Statistical mechanics of thin spherical shells,” Physical Review X **7**, 011002 (2017).

3. Moshe, Michael, Suraj Shankar, Mark J. Bowick, and David R. Nelson. "Nonlinear mechanics of thin frames." *arXiv preprint arXiv:1801.08263* (2018).

4. Giometto, Andrea, David R. Nelson, and Andrew W. Murray. "Physical interactions reduce the power of natural selection in growing yeast colonies." *bioRxiv* (2018): 332700.

5. Azadi, Amir, and David R. Nelson. "Statistical mechanics of specular reflections from fluctuating membranes and interfaces." *arXiv preprint arXiv:1708.08154* (2017).

6. Duanduan Wan, David R. Nelson, and Mark J. ‘Bowick, “Thermal Stiffening of Clamped Elastic Ribbons,” Physical Review B **96** 014106 (2017)

7. Bryan T. Weinstein, Maxim O. Lavrentovich, Wolfram Mobius, Andrew W. Murray, and David R. Nelson, “Genetic Drift and Selection in Many-Allele Range Expansion,” PLoS Comput Biol **13**(12):e1005866 (2017).

8. Hidenori Tanaka, Howard A. Stone, and David R. Nelson, “Spatial Gene Drives and Pushed Genetic Waves,” PNAS **114**, 8452-8454 (2017).

9. Thiparat Chotibut and David R. Nelson, “Population Genetics with Fluctuating Population Sizes,” J Stat Phys, **167**, 777 (2017).

10. Mark Bowick, Andrej Kosmrlj, David R. Nelson, and Rastko Skepnek, “Non-Hookean Statistical Mechanics of Clamped Graphene Ribbons,” Phys. Rev. **B 95,** 104109 (2017).

11. Daniel A. Beller and David R. Nelson, “Plastic Deformation of Tubular Crystals by Dislocation Glide,” Physical Review E **94,** 0330004 (2016).

12. Ariel Amir, Naomichi Hatano, and David R. Nelson, “Non-Hermitian Localization in Biological Networks,” Physical Review E **93**, 042310 (2016).

13. Andrej Kosmrlj and David R. Nelson, “Response of Thermalized Ribbons to Pulling and Bending,” Physical Review B **93**, 125431 (2016).

14. Maxim O. Lavrentovich, Mary E. Wahl, David R. Nelson, and Andrew W. Murray, “Spatially Constrained Growth Enhances Conversational Meltdown,” Biophysical Journal **110**, 2800 (2016).

15. Thiparat Chotibut and David R. Nelson, “Evolutionary Dynamics with Fluctuating Population Sizes and Strong Mutualism,” Physical Review E **92**, 022718 (2015).

16. Maxim O. Lavrentovich and David R. Nelson, “Survival Probabilities at Spherical Frontiers,” Theoretical Population Biology **102**, 26 (2015).

17. Guangnan Meng, Jayson Paulose, David R. Nelson, Vinothan N. Manoharan, “Elastic Instability of Crystal Growing on a Curved Surface,” Science **343**, 634 (2014).

18. Andrej Kosmrlj and David R. Nelson, “Mechanical Properties of Warped Membranes,” Physical Review E **88**, 012136 (2013).

19. Wolfram Moebius, Andrew W. Murray, David R. Nelson, “How Obstacles Perturb Population Fronts and Alter Their Genetic Structure,” PLOS Computational Biology, **11**, e1004615 (2015).

20. Melanie J. I. Mueller, Beverly I. Neugeboren, David R. Nelson, and Andrew W. Murray, “Genetic Drift Opposes Mutualism During Spatial Population Expansion,” PNAS **111**, 3, 1037 (2013).

21. Nelson, David R., and Ariel Amir. "Defects on cylinders: superfluid helium films and bacterial cell walls," in Bocquet, Lydéric, David Quéré, Thomas A. Witten, and Leticia F. Cugliandolo, eds. *Soft Interfaces: Lecture Notes of the Les Houches Summer School:* Volume 98, July 2012. Vol. 98. Oxford University Press, (2017).

22. M. O. Lavrentovich and David R. Nelson, “Asymmetric Mutualism in Two- and Three-Dimensional Range Expansions,” Physical Review Letters. **112**, 138102 (2014).

23. G. M. Bruun and D. R. Nelson, “Quantum Hexatic order in two-dimensional dipolar and charged fluids,” Physical Review B **89,** 094112 (2014).

24. A. Amir, F. Babaeipourb, D. B. McIntosh, D. R. Nelson and S. Jun, “Bending forces plastically deform growing bacterial cell walls,” Proceedings of the National Academy of Sciences. **111**, 5778 (2014).

25. P. Perlekar, R. Benzi, H. J. H. Clercx, D. R. Nelson, and F. Toschi, “Spinodal Decomposition in Homogeneous and Isotropic Turbulence,” Physical Review Letters **112**, 014502 (2014).

26. E. H. Yong, D.R. Nelson, and L. Mahadevan, “Elastic platonic shells,” Physical Review Letters **111**, 177801 (2013).

27. A. Kosmrlj and D. R. Nelson, “Thermal excitations of warped membranes,” Physical Review E **89**, 022126 (2014).

28. A. Košmrlj and D.R. Nelson, “Mechanical properties of warped membranes,” Physical Review E **88**, 01236 (2013).

29. J. Paulose and D. R. Nelson, “Buckling pathways in Spherical Shells with Soft Spots,” Soft Matter **9**, 8227 (2013).

30. M. Lavrentovich, J.H. Koschwanez, and D.R. Nelson, “Nutrient shielding in clusters of cells,” Physical Review E **87**, 062703 (2013).

31. S. Pigolotti, R. Benzi, P. Perlekar, M. H. Jensen, F. Toschi, D. R. Nelson, “Growth, competition and cooperation in spatial population genetics,” Theor. Popul. Biol. **84**, 72 (2013).

32. S. S. Datta, S.-H. Kim, J. Paulose, A. Abbaspourrad, D. R. Nelson and D. A. Weitz, “Delayed Buckling and Guided Folding of Inhomogenous Capsules,” Phys. Rev. Lett. **109**, 134302 (2012).

33. M. O. Lavrentovich, K.S. Korolev, and D.R. Nelson, “Radial Domany-Kinzel models with mutation and selection,” Physical Review E**87**, 012103 (2013).

34. A. Amir, J. Paulose and D. R. Nelson, “Theory of interacting dislocations on cylinders,” Phys. Rev. E **87**, 042314 (2013).

35. A. Amir and D. R. Nelson, “Dislocation-mediated growth of bacterial cell walls,” Proc. Natl. Acad. Sci. USA **109**, 9833 (2012).

36. D. R. Nelson, "Biophysical Dynamics in Disorderly Environments," Annual Reviews of Biophysics **41**, 371 (2012).

37. P. Perlekar ,R. Benzi, R, David R. Nelson and F. Toschi, “Statistics of population dynamics in turbulence,” Journal of Physics: Conf. Ser **318,** 092025 1-8 (2011).

38. K. S. Korolev, M. J. I. Mueller, N. Karahan, A. W. Murray, O. Hallatschek and D. R. Nelson, "Selective sweeps in growing microbial colonie,s" Physical Biology **9**, 026008 (2012).

39. Benzi, R., Jensen, M. H., Nelson, D. R., Perlekar, P., Pigolotti, S., & Toschi, F. “Population dynamics in compressible flows,” *The European Physical Journal Special Topics*, **204**, 57 (2012).

40. S. Pigolotti, R. Benzi, M. H. Jensen and D. R. Nelson, “Population Genetics in Compressible Flows,” Physical Review Letters **108**, 128102 (2012).

41. K. S. Korolev and D. R. Nelson, “Competition and cooperation in one-dimensional stepping stone models,” Physical Review Letters, **107**, 088103 (2011).

42. K. Korolev, J. Xavier, D. R. Nelson and K. Foster, “A Quantitative Test of Population Genetics Using Spatio-Genetic Patterns in Bacterial Colonies,” The American Naturalist **178**, 538 (2011).

43. Paulose, J., Vliegenthart, G. A., Gompper, G., & Nelson, D. R. “Fluctuating shells under pressure,” Proceedings of the National Academy of Sciences, **109** (48), 19551-19556 (2012).

44. E. Katifori, S. Alben, E. Cerda, D. R. Nelson and J. Dumais, “Foldable structures and the natural design of pollen grains,” Proceedings of the National Academy of Sciences **107**, 7635–7639 (2010).

45. K. Korolev, M. Avlund, O. Hallatschek and D. R. Nelson, “Genetic demixing and evolution the linear stepping stone model,” Reviews of Modern Physics **82**, 1691 (2010).

46. P. Perelkar, R. Benzi, D. R. Nelson and F. Toschi, “Population Dynamics at High Reynolds Number,” Physical Review Letters **105**, 144501 (2010).

47. F. Sausset, G. Tarjus and D. R. Nelson, “Structure and dynamics of topological defects in a glassy liquid on a negatively curved manifold,” Phys. Rev. E**81**, 031504 (2010).

48. O. Hallatschek and D. R. Nelson, “Life at the front of an expanding population,” Evolution **64**, 193 (2010).

49. M. Turner, V. Vitelli and D. R. Nelson, “Vortices in Superfluid Films on Curved Surfaces,” Reviews of Modern Physics **82**, 1301-1348 (2010).

50. J. Paulose, D. R. Nelson and J. Aizenberg, “Two-parameter sequential adsoption model applied to microfiber clustering,” Soft Matter **6**, 2421-2434 (2010).

51. R. D. Kamien, D.R. Nelson, C.D. Santangelo and V. Vitelli, “Extrinsic Curvature, Geometric Optics, and Lamellar Order on Curved Substrates,” Rev. E **80**, 051703 (2009).

52. R. Benzi and D. R. Nelson, “Fisher equation with turbulence in one dimension,” Physica D: Nonlinear Phenomena **238**, 2003 (2009).

53. B. Chakrabarti and D. R. Nelson, “Shear Unzipping of DNA,” J. Phys. Chem. B, **113**, 3831 (2009).

54. Hallatschek, O., & Nelson, D. R. “Population genetics and range expansions,” *Physics Today*, **62**, 42-47 (2009).

55. O. Hallatschek and D. R. Nelson, “Life at the front of an expanding population,” Evolution **64**, 193 (2010).

56. E. Katifori, S. Alben and D. R. Nelson, “Collapse and folding of pressurized rings in two dimensions,” Phys. Rev. E **79**, 056604 (2009).

57. M. Wanunu, B. Chakrabarti, J. Mathé, D. R. Nelson and A. Meller, “Orientation-dependent interactions of DNA with an alpha-hemolysin channel,” Phys. Rev. E **77**, 031904 (2008).

58. Z. Zeravcic,W. van Saarloos and D. R. Nelson, “Localization behavior of vibrational modes in granular packings,” Europhysics Letters **83**, 44001 (2008).

59. K. Korolev and D. R. Nelson, “Defect-mediated emulsification in two dimensions,” Phys. Rev. E **77**, 051702 (2008).

60. Lucks JB, Nelson DR, Kudla GR, Plotkin JB, “Genome landscapes and bacteriophage codon usage. PLoS computational biology,” 2008 Feb 29;4(2):e1000001 (2008).

61. O. Hallatschek, P. Hersen, S. Ramanathan and D. R. Nelson, “Genetic drift at expanding frontiers promotes gene segregation,” Proceedings of the National Academy of Sciences **104**, 19926-30 (2007).

62. M.J.Bowick, D. R. Nelson and H. Shin, “Interstitial fractionalization and spherical crystallography,” Physical Chemistry Chemical Physics **48**, 6304-6312 (2007).

63. M. Widom, J. Lidmar and D. R. Nelson, “Soft modes near the buckling transition of icosahedral shells,” Phys. Rev. E **76**, 031911, 1-11 (2007).

64. Hallatschek, O., & Nelson, D. R. “Gene surfing in expanding populations,” Theoretical Population Biology, **73** (1), 158-170 (2008).

65. A. Fernandez-Nieves, V. Vitelli, A. S. Utada, D. R. Link, M. Marquez, D. R. Nelson and D. A. Weitz, “Novel Defect Structures in Nematic Liquid Crystal Shells,” Phys. Rev. Lett. **99**, 157801, 1-4 (2007).

66. C. D. Santangelo, V. Vitelli, R. D. Kamien and D. R. Nelson, “Geometric Theory of Columnar Phases on Curved Substrates,” Phys. Rev. Lett. **99**, 017801, 1 (2007).

67. Y. Kafri, D. R. Nelson and A. Polkovnikov, “Unzipping vortices in type-II supconductors,” Phys. Rev. B **76**, 144501, 1 (2007).

68. E. Katifori and D. R. Nelson, “Effects of kinked linear defects on planar flux line arrays,” Eur. Phys. J. B **59**, 319 (2007).

69. J. Mathe, A. Aksimnetiev, D. R. Nelson, K. Schulten, and A. Meller, “Orientation discrimination of single stranded DNA inside the α-hemolysin membrane channel,” PNAS **102**, 12377 (2005).

70. Y. Kafri, D.R. Nelson and A. Polkovnikov, “Unzipping flux lines from extended defects in type-II superconductors,” Europhys. Lett. **73**, 253 (2006).

71. Y. Tserkovnyak and D. R. Nelson, “Conditions for extreme sensitivity of protein diffusion in membranes to cell environments,” Proceedings of the National Academy of Sciences, PNAS **103**: 15002-15007 (2006).

72. G. Refael, W. Hofstetter and D. R. Nelson, “Transverse Meissner physics of planar superconductors with columnar pins,” Phys. Rev. B **74**, 174520, 1-20 (2006).

73. V. Vitelli, J. B. Lucks and D. R. Nelson, “Crystallography on Curved Surfaces,” Proceedings of the National Academy of Sciences **103**, 12323-12328 (2006).

74. E. Katifori and D. R. Nelson, “Vortex pinning by meandering line defects in planar superconductors,” Phys. Rev. B **73**, 214503 1-9 (2006).

75. V. Vitelli and D. R. Nelson, “Nematic Textures in Spherical Shells,” Phys. Rev. E **74**, 021711, 1-18 (2006).

76. M. J. Bowick, A. Cacciuto, D. R. Nelson and A. Travesset, “Crystalline Particle Packings on a Sphere with Long Range Power Law Potentials,” Phys. Rev. B **73**, 024115 (2006)

77. Y. Kafri and D. R. Nelson, “Sequence heterogeneity and the dynamics of molecular motors,” J. Phys.: Condens. Matter **17**, S3871-S3886 (2005).

78. J. Mathe, A. Aksimnetiev, D. R. Nelson, K. Schulten, and A. Meller, “Orientation discrimination of single stranded DNA inside the α-hemolysin membrane channel,” PNAS **102**, 12377 (2005).

79. P. Lipowsky, M.J. Bowick, J.H. Meinke, D.R. Nelson and A.R. Bausch, “Direct visualization of dislocation dynamics in grain boundary scars Direct visualization of dislocation dynamics in grain boundary scars,” Nature Matter. **4**, 407 (2005).

80. Y. Kafri, D.R. Nelson and A. Polkovnikov, “Unzipping flux lines from extended defects in type-II superconductors,” Europhys. Lett. **73**, 253 (2006).

81. M. Bowick, D. R. Nelson and A. Travesset, “Curvature-induced defect unbinding in toroidal geometries,” Phys. Rev. E **69**, 041102 (2004).

82. Y. Kafri, D.K. Lubensky and D. R. Nelson, “Dynamics of molecular motors with finite processivity on heterogeneous tracks,” Phys. Rev. E **71**, 04190 1 (2005).

83. A. Polkovnikov, Y. Kafri and D. R. Nelson, “Vortex pinning by columnar defects in planar superconductors with point disorder,” Phys. Rev. **71**, 01451 1 (2005).

84. Affleck, I., Hofstetter, W., Nelson, D. R., & Schollwöck, “U. Non-Hermitian Luttinger liquids and flux line pinning in planar superconductors,” Journal of Statistical Mechanics: Theory and Experiment, 2004 (10), P10003 (2004).

85. Nelson, David R. "Spherical crystallography: virus buckling and grain boundary scars," *arXiv preprint cond-mat/0311413* (2003).

86. J. D. Weeks, J. B. Lucks, Y. Kafri, C. Danilowicz, D. R. Nelson and M. Prentiss, “Pause point spectra in DNA constant-force unzipping,” Biophys. J. **88**, 2752 (2005).

87. Y. Kafri, D.K. Lubensky and D. R. Nelson, “Dynamics of molecular motors and polymer translocation with sequence heterogeneity,” Biophys. J. **86**, 3373 (2004).

88. Nelson DR, “Statistical physics of unzipping DNA InForces, growth and form in soft condensed matter: at the interface between physics and biology,” 2004 (pp. 65-92). Springer, Dordrecht (2004).

89. D. R. Nelson, “Vortices weave a tangled web,” Nature **430**, 839 (2004).

90. V. Vitelli and D. R. Nelson, “Defect generation and deconfinement on corrugated topographies,” Phys. Rev. E **70**, 051105 (2004).

91. M. Bowick, D. R. Nelson and A. Travesset, “Curvature-induced defect unbinding in toroidal geometries,” Phys. Rev. E **69**, 041102 (2004).

92. J. Lidmar, L. Mirny and D. R. Nelson, “Virus shapes and buckling transitions in spherical shells,” Phys. Rev. E **68**, 051910 (2003).

93. M. M. Desai and D. R. Nelson, “A quasispecies on a moving oasis,” Theoretical Population Biology **67**, 33 (2005).

94. W. Hofstetter, I. Affleck, D. R. Nelson and U. Schollwock, “Non-Hermitian Luttinger liquids and vortex physics,” Europhys. Lett. **66**, 178 (2004).

95. P. Lenz and D. R. Nelson, “Hexatic undulations in curved geometries,” Phys. Rev. E **67**, 031502 (2003).

96. C. Danilowicz, V. W. Coljee, C. Bouzigues, D. K. Lubensky, D. R. Nelson and M. Prentiss, “DNA unzipped under a constant force exhibits multiple metastable intermediates,” Prod. Natl. Acad. Sci. **100**, 1694 (2003).

97. A. R. Bausch, M. J. Bowick, A. Cacciuto, A. D. Dinsmore, M. F. Hsu, D. R. Nelson, M. G. Nikolaides, A. Travesset and D. A. Weitz, "Grain Boundary scars and spherical crystallography," Science **299**, 1716 (2003).

98. M. Bowick, A. Cacciuto, D. R. Nelson and A. Travesset, "Crystalline order on a sphere and the generalized Thomson problem," Phys. Rev. Lett. **89**, 185502 (2002).

99. D. R. Nelson, "Towards a tetravalent chemistry of colloids," Nanoletters **2**, 1125 (2002).

100. Nelson D.R., "Defects and geometry in condensed matter physics," Cambridge University Press; 2002 Mar 18 (2002).

101. T. Franosch and D. R. Nelson, "Shear response of a smectic film stabilized by an external field," Phys. Rev. B **63**, 016706 (2001).

102. J. Lidmar, D. R. Nelson and D. A. Gorokhov, "Vortex wandering in a forest of splayed columnar defects," Phys. Rev. B **64**, 144512 (2001).

103. P. Lenz and D. R. Nelson, "Hexatic order and surface ripples in spherical geometries," Phys. Rev. Lett. **87**, 125703, (2001).

104. K. Kim and D. R. Nelson, "Interaction effects in non-Hermitian models of vortex physics," Phys. Rev. B **64**, 054508 (2001).

105. L. Radzihovsky, E. Frey and D. R. Nelson, "Novel phases and reentrant melting to two dimensional colloidal crystals," Phys. Rev. E **63**, 031503 (2001).

106. D. K. Lubensky and D. R. Nelson, "Single molecule statistics and the polynucleotide unzipping transition," Phys. Rev. E **65**, 03917 (2002).

107. M. J. Bowick, D. R. Nelson and Alex Travesset, "Interacting topological defects on frozen topographies," Phys. Rev. B **62**, 8738 (2000).

108. T. Franosch, S. Jain and D. R. Nelson, "Channel flow of smectic films," Phys. Rev. E **61**, 3942 (2000).

109. D. R. Nelson and V. M. Vinokur, "Bose glass scaling for superconducting vortex arrays revisited," Phys. Rev. B **61**, 5917 (2000).

110. S. Jain and D. R. Nelson, "Statistical mechanics of vacancy and interstitial strings in hexagonal columnar crystals," Phys. Rev. E **61**, 1599 (2000).

111. M. C. Marchetti and D. R. Nelson, "Vortex physics in confined geometries," Physica C **330**, 105 (2000).

112. T. Franosch and D. R. Nelson, “Population dynamics near an oasis with Time Dependent Convection,” Journal of Stat. Phys. **99**, 1021 (2000).

113. R. A. Lehrer and D. R. Nelson, “B (H) constitutive relations near Hc1 in disordered superconductors,” Physica C **331**, 317 (2000).

114. K. A. Dahmen, D. R. Nelson and N. M. Shnerb, “Life and death near a windy oasis,” J. Math. Biol. **41**, 1 (2000).

115. D. K. Lubensky and D. R. Nelson, “Pulling pinned polymers and unzipping DNA,” Phys. Rev. Lett. **85**, 1572 (2000).

116. Dahmen KA, Nelson DR, Shnerb NM, “Population dynamics and non-hermitian localization,” In Statistical mechanics of biocomplexity 1999 (pp. 124-151). Springer, Berlin, Heidelberg (1999).

117. M. C. Marchetti and D. R. Nelson, “Patterned geometries and hydrodynamics at the vortex Bose glass transition,” Phys. Rev. B **59**, 13624 (1999).

118. C. A. Bolle, V. Aksyuk, F. Pardo, P. L. Gammel, E. Zeldov, E. Bucher, R. Boie, D. J. Bishop and D. R. Nelson, “Observation of mesoscopic vortex physics using micromechanical oscillators,” Nature, Vol. **399**, 43 (1999).

119. E. Frey, D. R. Nelson and L. Radzihovsky, “Lightinduced melting of colloidal crystals in two dimensions,” Phys. Rev. Lett. **83**, 2977 (1999).

120. D. K. Lubensky and D. R. Nelson, “Driven polymer translocation through a narrow pore,” Biophysical J. **77**, 1824 (1999).

121. D. R. Nelson, “Population dynamics and Burgers' equation,” Physica A **274**, 85 (1999).

122. R. A. Lehrer and D. R. Nelson, “Vortex pinning and the nonHermitian Mott transition,” Phys. Rev. B **58**, 12385 (1998).

123. D. R. Nelson and N. M. Shnerb, “NonHermitian localization and population biology,” Phys. Rev. E **58**, 1381 (1998).

124. N. Shnerb and D. R. Nelson, “Winding numbers, complex currents, and nonHermitian localization,” Phys. Rev. Lett. **80**, 5172 (1998).

125. N. Hatano and D. R. Nelson, “Non-Hermitian Localization and Eigenfunctions,” Phys. Rev B **58**, 8384 (1998).

126. N. Hatano and D. R. Nelson, “Vortex pinning and nonHermitian quantum mechanics,” Phys. Rev. B **56**, 8651 (1997).

127. D. R. Nelson and A. Stern, “Polymer winding numbers and quantum mechanics, in Complex Behavior of Glassy Systems”, edited by M. Rubi and C. Pérez-Vicente (Springer, Berlin 1997).

128. C. Carraro and D. R. Nelson, “Pinning and sliding of tethered monolayers on disordered substrates,” Phys. Rev. E V **56**, 1 (1997).

129. Crabtree, G. W., & Nelson, D. R. “Vortex physics in high-temperature superconductors,” *Physics Today*, **50** (4), 38-45 (1997).

130. D. R. Nelson, “A new age for type-II superconductors,?” Nature **385**, 675 (1997).

131. D. Ertas and D. R. Nelson, “Irreversibility, mechanical entanglement and thermal melting in superconducting vortex crystals with point impurities,” Physica C V **272**, 79-86 (1996).

132. N. Hatano and D. R. Nelson, “Localization transitions in non-Hermitian quantum mechanics,” Phys. Rev. Lett. **77**, 570 (1996).

133. S. Jain and D. R. Nelson, “Ice-like melting of hexagonal columnar crystals,” Macromolecules **29**, 8523 (1996).

134. D. R. Nelson, “Ice-like melting of flexible line crystals,” Mol. Cryst. Liq. Cryst. **288**, 1 (1996).

135. D. R. Nelson, “Points, lines and planes: Vortex pinning in high –temperature superconductors,” Physica C **263**, 12 (1996).

136. D. R. Nelson and Radzihovsky, “Longitudinal current dissipation in Bose-glass superconductors,” Phys. Rev. B **54**, 6845 (1996).

137. T. Chou and D. R. Nelson, “Dislocation-mediated melting near isostructural critical points,” Phys. Rev. E **53**, 2560 (1996).

138. M.W. Deem and D. R. Nelson, “Free energies of isolated five-and sevenfold disclinations in hexatic membranes,” Phys. Rev. E **53**, 2551 (1996).

139. U. C. Täuber and D. R. Nelson, “Interactions and pinning energies in the Bose glass phase of vortices in superconductors,” Phys. Rev. B **52**, 16106 (1995).

140. R. D. Kamien and D. R. Nelson, “Defects in chiral columnar phases: Tilt-grain boundaries and iterated moiré maps,” Phys. Rev. E **53**, 650 (1996).

141. D. R. Nelson, “Vortex lattice melts like ice,” Nature **375**, **356** (1995).

142. L. Balents and D. R. Nelson, “Quantum smectic and supersolid order in helium films and vortex arrays,” Phys. Rev. B **52**, 12951 (1995).

143. M. C. Marchetti and D. R. Nelson, “Theory of double-sided flux decorations,” Phys. Rev. B **52**, 7720, (1995).

144. D. R. Nelson, “Boson physics and vortex pinning via splayed columnar defects in superconductors, in Advances in Superconductivity - VII”, edited by H. Hayakawa and Y. Enomoto (Springer, Berlin 1996).

145. D. R. Nelson, “Statistical mechanics of directed polymers,” edited by, M. Baus et. al., in Observation, Prediction and Simulation of Phase Transitions in Complex Fluids, (Kluwer Academic Publisher Dodrefcht, 1995).

146. R. D. Kamien and D. R. Nelson, “Polymer braids and iterated moiré maps,” Proceedings of Symposia in Pure Mathematics **60**, 261 (1997).

147. R. D. Kamien and D. R. Nelson, “Iterated moiré maps and braiding of chiral polymer crystals,” Phys. Rev. Lett. **74**, 2499 (1995).

148. U. C. Tauber, H. Dai, D. R. Nelson and C. M. Lieber, “Coulomb gap and correlated vortex pinning in superconductors,” Phys. Rev. Lett. **74**, 5132 (1995).

149. E. Frey, D. R. Nelson and D. S. Fisher, “Interstitials, vacancies and supersolid order in vortex crystals,” Phys. Rev. B **49**, 9723 (1994).

150. T. Chou and D. R. Nelson, “Surface wave scattering at nonuniform fluid interfaces,” J. Chem. Phys. **101**, 9022 (1994).

151. L. Balents and D. R. Nelson, “Fluctuations and intrinsic pinning in layered superconductors,” Phys. Rev. Lett. **73**, 2618 (1994).

152. P. LeDoussal and D. R. Nelson, “Towards engineering of splayed columnar defects in type-II superconductors,” Physica C **232**, 69 (1994).

153. D. R. Nelson, “Pinning, fluctuations and melting of superconducting vortex arrays,” edited by N. Bontemps et. al., in The Vortex State, (Kluwer Academic Publishers, 1994).

154. R. D. Kamien, P. LeDoussal and D. R. Nelson, “Rotational invariance and the theory of directed nematic polymers,” Phys. Rev. E **48**, 4116 (1993).

155. T. Chou and D. R. Nelson, “Buckling instabilities of a confined colloid crystal layer,” Phys. Rev. E **48**, 4611 (1993).

156. T. Hwa, P. LeDoussal, D. R. Nelson and V. Vinokur, “Flux pinning and forced vortex entanglement by splayed columnar defects,” Phys. Rev. Lett. **71**, 3545 (1993).

157. D. R. Nelson, “Vortex line fluctuations in superconductors from elementary quantum mechanics,” in Phase Transitions and Relaxation in Systems with competing length scales, edited by T. Riste and D. Sherrington, (Kluwer, Dodrecht, 1993).

158. C. Carraro and D. R. Nelson, “Grain-boundary buckling and spin-glass models of disorder in membranes,” Phys. Rev. E **48**, 3082 (1993).

159. D. R. Nelson and V. M. Vinokur, “Boson localization and correlated pinning of superconducting vortex arrays,” Phys. Rev. **48**, 13060 (1993).

160. M. C. Marchetti and D. R. Nelson, “Translational correlations in vortex arrays at a free surface,” Phys. Rev. B **47**, 12214 (1993).

161. T. Chou and D. R. Nelson, “Buckling of a confined colloidal crystal,” MRS Proceeding **230**, 305 (1992).

162. T. Hwa, D. R. Nelson and V. M. Vinokur, “Flux-line pinning by competing disorders,” Phys. Rev. B **48**, 1167 (1993).

163. D. R. Nelson and L. Radzihovsky, “Grain boundary instabilities and buckling in partially polymerized membranes,” Phys. Rev. A **46**, 7474 (1992).

164. R. D. Kamien and D. R. Nelson, “Directed polymer melts and quantum critical phenomena,” J.Stat. Phys. **71**, 23 (1993).

165. J. Katz and D. R. Nelson, “Minimum energy configurations of isotropic ferromagnetic shells,” J. Magnetism and Magnetic Materials **118**, 47 (1993).

166. R. D. Kamien, P. LeDoussal and D. R. Nelson, “Theory of directed polymer melts,” Phys. Rev. A **45**, 8727 (1992).

167. D. R. Nelson and V. M. Vinokur, “Boson localization and pinning by correlated disorder in high temperature superconductors,” Phys. Rev. Lett. **68**, 2398 (1992).

168. E. Frey and D. R. Nelson, “Dynamics of flat membranes and flickering in red blood cells,” J. Phys. I France 1, 1715 (1991).

169. D. R. Nelson and L. Radzihovsky, “Statistical mechanics of randomly polymerized membranes,” Phys. Rev. A **44**, 3525 (1991).

170. D. R. Nelson and L. Radzihovsky, “Polymerized membranes with quenched random internal disorder,” Europhys. Lett. **16**, 79 (1991).

171. D. R. Nelson, “Correlations and transport in vortex liquids,” Proc. Los Alamos Symposium on Phenomenology and Applications of High-temperature superconductors, edited by K. Bedell et. al. (J. Wiley, New York, 1992).

172. D. R. Nelson, “Line liquids,” Physica A **77**, 220 (1991).

173. P. LeDoussal and D. R. Nelson, “Statistical Mechanics of directed polymer melts,” Europhys. Lett.**15**, 161 (1991).

174. M. C. Marchetti and D. R. Nelson, “Dynamics of flux-line liquids in high-Tc superconductors,” Physica C **174**, 40 (1991).

175. F. F. Abraham and D. R. Nelson, “Fluctuations in the flat phase of polymerized membranes,” J. Phys. France **51**, 2653 (1990).

176. F. F. Abraham and D. R.Nelson, “Diffraction from polymerized membranes,” Science **249**, 393 (1990).

177. D. R. Nelson and P. LeDoussal, “Correlations in flux liquids with weak disorder,” Phys. Rev. B **42**, 10113 (1990).

178. M. C. Marchetti and D. R. Nelson, “Hydrodynamics of flux liquids,” Phys. Rev. B **42**, 9938 (1990).

179. C. Zheng, R. Hoffman and D. R. Nelson, “A helical face-sharing tetrahedron chain with an irrational twist: Stella Quadrangula and related matters,” J. Am. Chem. Soc. **112**, 3784 (1990).

180. M. C. Marchetti and D. R. Nelson, “Dislocation loops and bond-orientational order in the Abrikosov flux line lattice,” Phys. Rev. B **41**, 1910 (1990).

181. Nelson D.R., “Melted flux liquids in high-Tc superconductors,” Physica C: Superconductivity. 1989 Dec 1;162:1156-61 (1989).

182. D. R Nelson, “Statistical mechanics of flux lines high-Tc super-conductors,” J of Statistical Physics **57**, 511 (1989).

183. S. Chakravarty, B. I. Halperin and D. R. Nelson, “The two-dimensional Heisenberg antiferromagnet at low temperatures,” Phys. Rev. B **39**, 2344 (1989).

184. D. R. Nelson, Theory of the crumpling transition, contribution to “Statistical mechanics of membranes and interfaces,” edited by D. Nelson, T. Piran and S. Weinberg, (World Scientific, New Jersey, 1989).

185. D. R. Nelson, Statistical mechanics of membranes and interfaces, contribution to "Statistical mechanics of membranes interfaces," edited by D. Nelson, T. Piran and S. Weinberg, (World Scientific, New Jersey, 1989).

186. J. V. Selinger and D. R. Nelson, "Theory of hexatic-to-hexatic transitions," Phys. Rev. Lett. **61**, 416 (1988).

187. D.R. Nelson an P. Steinhardt, Comment on "Icosahedral Ordering in the Lennard-Jones Liquid and Glass," Phys. Rev. Lett. **62**, 978 (1989)

188. D. R. Nelson and S. Seung, "Theory of melted flux liquids," Phys. Rev. B **39**, 9153 (1989).

189. J. Selinger and D. R. Nelson, "Theory of transitions among tilted hexatic phases in liquid crystals," Phys. Rev. A **39**, 3135 (1989).

190. D. R. Nelson, "Vortex entanglement in high-Tc superconductors," Phys. Rev. Lett. **60**, 1973 (1988).

191. S. Chakravarty, B. I. Halperin and D. R. Nelson, "Low-temperature behavior of two-dimensional quantum antiferromagnets," Phys. Rev. Lett. **60**, 1057 (1988)

192. M. Paczuski, M. Kardar and D. R. Nelson, "Landau theory of the crumpling transition," Phys. Rev. Lett. **60**, 2638 (1988).

193. M. Kardar and D. R. Nelson, "Statistical mechanics of self-avoiding tethered manifolds," Phys. Rev. A **38** (1988).

194. S. Seung and D. R. Nelson, "Defects in flexible membranes with crystalline order," Phys.Rev. A **38**, 1055 (1988).

195. D. R. Nelson and F. Spaepen, "Polytetrahedral order in condensed matter," Solid State Physics vol. **42** (Academic Press, New York 1989).

196. J. Selinger and D. R. Nelson, "Density functional theory of nematic and smectic-A order near surfaces," Phys. Rev. A **37**, 1736 (1988).

197. M. Jaric and D. R. Nelson, "Diffuse scattering from quasicrystals,' Phys. Rev. B **37**, 4458 (1988).

198. Y. Kantor and D. R. Nelson, "Phase transitions in flexible polymeric surfaces," Phys. Rev.A **36**, 4020 (1987).

199. Y. Kantor and D. R Nelson, "Crumpling transition in polymerized membranes," Phys. Rev.Lett. **56**, 2774 (1987).

200. L. Peliti and D. R. Nelson, “Elasticity of crystalline and hexatic membranes,” in Physics of Amphiphillic Films, edited by D. Langevin and J. Meunier (Springer-Verlag).

201. Kardar, M., & Nelson, D. R., “ε expansions for crumpled manifolds,” *Physical Review Letters*, **58** (13), 1289 (1987).

202. D. R. Nelson and L. Peliti, “Fluctuations in membranes with crystalline and hexatic order,” Journal de Physique **48**, 1085 (1987).

203. Y. Kantor, M. Kardar and D. R. Nelson, “Tethered surfaces: Statics and dynamics,” Phys. Rev. A **35**, 3056 (1987).

204. Y. Kantor , M. Kardar and D. R. Nelson, “Statistical mechanics of tethered surfaces,” Phys. Rev. Lett. **57**, 791 (1986).

205. Nelson, D. R., “Quasicrystals,” *Scientific American*, **255** (2), 42-51 (1986).

206. Selinger, J. V., & Nelson, D. R., “Polytope models of metallic glasses: S-band electronic properties,” *MRS Online Proceedings Library Archive*, ***57*** (1985).

207. J. A. Aronovitz and D. R. Nelson, “Universal features of polymer shapes,” Journal de Physique **47**, 1445 (1986).

208. M. Kardar and D. R. Nelson, “Commensurate-incommensurate transitions with quenched random impurities,” Phys. Rev. Lett. **55**, 1157 (1985).

209. S. Sachdev and D. R. Nelson, “Order in metallic glasses and icosahedral crystals,” Phys. Rev.B **32**, 4592 (1985).

210. D. R. Nelson and S. Sachdev, “Icosahedral order in undercooled liquids and metallic glasses,” in Amorphous Metals and Semiconductors, edited by P. Haasen and R. Jaffe. (Pergamon, New York, 1986).

211. D. R. Nelson and B. I. Halperin, “Pentagonal and icosahedral order in rapidly cooled metals,” Science **229**, 4710 (1985).

212. D. R. Nelson and S. Sachdev, “Incommensurate icosahedral density waves in rapidly cooled metals,” Phys. Rev. B **32**, 689 (1985).

213. E. Brézin, D. R. Nelson and A. Thiaville, “Fluctuation effects near Hc2 in type -II superconductors,” Phys. Rev. B **31**, 7124 (1985).

214. S. Sachdev and D. R. Nelson, “Statistical mechanics of pentagonal and icosahedral order in dense liquids,” Phys. Rev. B **32**, 1480 (1985).

215. S. Sachdev and D. R. Nelson, “Theory of the structure factor of metallic glasses,” Phys. Rev. Lett. **57**, 1947 (1984).

216. D. R. Nelson, “The structure and statistical mechanics of glass,” in Applications of Field Theory to Statistical Mechanics edited by T. Garrido (Springer, Berlin, 1985).

217. S. Sachdev and D. R. Nelson, “Crystalline and fluid order on a random topography,” J. Phys. C.: Solid State Phys. **17**, 5473 (1984).

218. D. R. Nelson and M. Widom, “Symmetry, Landau theory, and polytope models of glass,” Nucl. Phys. B **240**, (FS12), 113 (1984).

219. D. R. Nelson, “Orientational ordering in 2- and 3-dimensional systems,” J. Non-cryst. solids **61** & **62**, 475 (1984).

220. J. Aronovitz and D. R. Nelson, “Anomalous diffusion in steady flow through a porous medium,” Phys. Rev. A **30**, 1948 (1984).

221. J. Aronovitz and D. R. Nelson, “Turbulence in phase-separating binary mixtures,” Phys. Rev. A **29**, 2012 (1984).

222. M. Rubinstein and D. R. Nelson, “Dense-packed arrays on surfaces of constant negative curvature,” Phys. Rev. B **28**, 6377 (1983).

223. D. R. Nelson, “Order, frustration, and defects in liquids and glasses,” Phys. Rev. B **28**, 5515 (1983).

224. D. R. Nelson, “Liquids and glasses in spaces of incommensurate curvature,” Phys. Rev. Lett. **50**, 982 (1983).

225. P. Steinhardt and D. R. Nelson and M. Ronchetti, “Bond orientational order in liquids and glasses,” Phys. Rev. B **28**, 784 (1983).

226. D. R. Nelson, “Order, frustration, and two-dimensional glass”, in Topological order in condensed matter edited by F. Yonezawa and T. Ninomiya (Springer, Berlin, 1983).

227. D. R. Nelson, “Reentrant melting in solid films with quenched random impurities, Phys.Rev.,” B **27**, 2902 (1983).

228. M. Rubinstein, B. Shraiman and D. R. Nelson, “Two-dimensional XY magnets with random Dzyaloshinskii-Moriya interactions,” Phys. Rev. B **27**, 1800 (1983).

229. T. Halsey and D. R. Nelson, “Nematic-to-smectic-A transitions with planar director fluctuations,” Phys. Rev. A **26**, 2840 (1982).

230. M. Rubinstein and D. R. Nelson, “Order and deterministic chaos in hard disk arrays,” Phys. Rev. B **26**, 6254 (1982).

231. D. R. Nelson, Laplacian roughening models and two-dimensional melting, Phys. Rev. B **26**, 269 (1982).

232. D. R. Nelson, Defect mediated phase transitions, in “Phase Transitions and Critical Phenomena, Vol. **7**,” edited by C. Domb and J. Lebowitz (Academic New York, 1983).

233. D. R. Nelson, M. Rubinstein and F. Spaepen, “Order in two-dimensional binary random arrays,” Phil. Mag. A **46**, 105 (1982).

234. Steinhardt PJ, Nelson D.R., Ronchetti M., “Icosahedral bond orientational order in supercooled liquids,” Physical Review Letters. 1981 Nov 2;47(18):1297 (1981).

235. D. R. Nelson and R. Ruiz, “Anomalous mixing times in turbulent binary mixtures at high Prandtl number,” Phys. Rev. B **26**, 269 (1982).

236. D. R. Nelson and R. Ruiz, “Turbulence in binary fluid mixtures,” Phys. Rev. A **23**, 3224 (1981).

237. D. R. Nelson and J. Toner, “Bond orientational order, dislocation loops, and melting of solids and smectic-A liquid crystals,” Phys. Rev. B **24**, 363 (1981).

238. D. R. Nelson, “Two dimensional superfluidity and melting,” in Fundamental Problems in Statistical Mechanics V, edited by E.G.D. Cohen (North-Holland, Amsterdam, 1980).

239. J.Toner and D. R.Nelson, “Smectic, cholesteric, and Rayleigh-Benard order in two dimensions,’ Phys. Rev. B **23**, 316 (1981).

240. D. R Nelson and R. Bruinsma, “Bond orientational order in smectic liquid crystals,” Phys. Rev. B **23**, 402 (1981).

241. D. R. Nelson and B. I. Halperin, “Melting and liquid crystals in two dimensions,” in Proc. Of the second USA-USSR Symposium of Light Scattering in Condensed Matter, edited by J. L. Birman, H. Z. Cummins, and K. K. Rebane. (Plenum, New York 1979).

242. D. R. Nelson and B. I. Halperin, “Solid and fluid phases in smectic layers with tilted molecules,” Phys. Rev. B **21**, 5312 (1980).

243. A. Zippelius, B. I. Halperin and D. R. Nelson, “Dynamics of two-dimensional melting,” Phys. Rev. B **22**, 2514 (1980).

244. P. C. Hohenberg, B. I. Halperin and D. R. Nelson, “Deviations from dynamic scaling at the superfluid transition in two and three dimensions,” Phys. Rev. B **22**, 2373 (1980).

245. P. C. Hohenberg and D. R. Nelson, “Early stages of spinodal decomposition in superfluid He 3 - He 4 mixtures,” Phys. Rev. B **20**, 2665 (1979).

246. V. Ambegaokar, B. I. Halperin, D. R. Nelson and E. D. Siggia, “Dynamics of superfluid films,” Phys. Rev. B **21**, 1806 (1980).

247. D. R. Nelson and B. I. Halperin, “Resistive transition in Superconducting Films, J. Low Temp.,” Phys. **36**, 599 (1979).

248. a. A. N. Berker and D. R. Nelson, “Two-dimensional XY magnets with annealed non-magnetic impurities,” J. Applied Phys. **50**, 1799 (1979).

b. A. N. Berker and D. R. Nelson, “Superfluidity and phase separation in helium,” Phys. Rev. B **19**, 2488 (1979).

249. D. R. Nelson and B. I. Halperin, “Dislocation mediated melting in two dimensions,” Phys. Rev. B **19**, 2457 (1979).

250. D. R. Nelson, “Superfluidity and the two dimensional XY model,” Phys. Rep. **49**, 255 (1979).

251. J. H. Chen, T. C. Lubensky and D. R. Nelson, “Crossover near fluctuation-induced first-order phase transitions in superconductors,” Phys. Rev. B **11**, 4274 (1978).

252. Halperin, B. I., & Nelson, D. R., “Theory of two-dimensional melting,” *Physical Review Letters*, **41**(2), 121 (1978).

253. D. R. Nelson, “A study of melting in two dimensions,” Phys. Rev. B **18**, 2318 (1978).

254. D. R. Nelson, “Dynamics of XY spins far from equilibrium,” J. Applied Phys. **49**, 3, 2142 (1978).

255. D. R. Nelson, V. Ambegaokar, B. I. Halperin, and E. D. Siggia, “Dissipation in two dimensional superfluids,” Phys. Rev. Lett. **40**, 783 (1978).

256. D. R. Nelson and J. M. Kosterlitz, “Universal jump in the superfluid density of two dimensional superfluids,” Phys. Rev. Lett. **39**, 1201 (1977).

257. D. R. Nelson, “Recent developments in phase transitions and critical phenomena,” Nature **269**, 379 (1977).

258. D. R. Nelson and D. S Fisher, “Dynamics of classical XY spins in one and two dimensions,” Phys. Rev. B **16**, 4945 (1977).

259. J. José, L. P. Kadanoff, S. K. Kirkpatrick, and D. R. Nelson, “Renormalization, vortices and symmetry-breaking perturbations in the two-dimensional planar model,” Phys. Rev. B **16**, 1217 (1977).

260. D. S. Fisher D. R. Nelson, “Low temperature recursion relations and high temperature series expansions,” Phys. Rev. B **16**, 2300 (1977).

261. D. R. Nelson and R. A. Pelcovits, “Momentum-shell recursion relations, anisotropic spins, and liquid crystals in 2 + ? ? dimensions,” Phys. Rev. B **16**, 2191 (1977).

262. E. Siggia and D. R. Nelson, “Tricritical dynamics near four dimensions,” Phys. Rev. B **15**, 1427 (1977).

263. D. Forster, D. R. Nelson and M. J. Stephen, “Large distance and long time properties of a randomly stirred fluid,” Phys. Rev. A **16**, 732 (1977).

264. R. A. Pelcovits and D. R. Nelson, “Bicritical Pionts in 2 + ? ? dimensions,” Phys. Lett. A **57**, 23 (1976).

265. D. Forster, D. R. Nelson and M. J. Stephen, “Long time tails and the large-eddy behavior of a randomly stirred fluid,” Phys. Rev. Lett. **36**, 867 (1976).

266. D. R. Nelson, “Two point correlations near four dimensions,” Phys. Rev. B **14**, 1123 (1976).

267. D. R. Nelson, Scaling functions for multicritical phenomena, “A.I.P. Conf. Proc.,” No. **29**, 1976, Magnetism and Magnetic Materials, 450 (1975).

268. E, Domany, D. R. Nelson and M. E. Fisher, “Equations of state for bicritical points II: Ising-like ordered phases,” Phys. Rev. B **15**, 3493 (1977).

269. E. Domany and D. R. Nelson, “Equations of state for bicritical points I: Calculations in the disordered phase,” Phys. Rev. B **13**, 236 (1976).

270. D. R. Nelson, “Coexistence curve singularities in isotropic ferromagnets,” Phys. Rev. B **13**, 2222 (1976).

271. J. Rudnick and D. R. Nelson, “Equations of state and renormalization group recursion relations,” Phys. Rev. B **13**, 2208 (1976).

272. D. R. Nelson and J. Rudnick, “Equations of state for tricritical points,” Phys. Rev. Lett. **35**, 178 (1975).

273. P. Leiderer, D. R. Nelson, D. R. Watts and W. W. Webb, “Tricritical slowing down of superfluid dynamics in He3 - He4 mixtures,” Phys., Rev. Lett. **34**, 1080 (1975).

274. M. E. Fisher and D. R. Nelson, “Universality of magnetic tricritical points,” Phys. Rev. B **12**, 263 (1974).

275. a. A. D. Bruce, J. M. Kosterlitz and D. R. Nelson, “Renormalization group calculation of Heisenberg to dipolar crossover scaling functions, “A.I.P Conf. Proc 24 (1975), Magnetism and Magnetic Materials **321**, (1974).

b. A. D. Bruce, J. M. Kosterlitz and D. R. Nelson, “Crossover scaling for dipolar systems,” J. Phys. C **9,** 825 (1976).

276. a. D. R. Nelson, “Crossover scaling functions and renormalization group trajectory integrals,” A.I. P. Conf. Proc. 24 (1975), Magnetism and Magnetic Materials **312** (1974).

b. D. R. Nelson, “Crossover scaling functions and renormalization group trajectory integrals,” Phys. Rev. B **11**, 3504 (1975).

277. J. M. Kosterlitz, D. R. Nelson, and M. E. Fisher, “Bicritcal and tetracritical points in anisotropic antiferromagnets,” Phys. Rev. B **13**, 412 (1976).

278. M. E. Fisher, J. M. Kosterlitz and D. R. Nelson, “Renormalization group analysis of bicritical and tetracritical points,” Phys. Rev. Lett. **33**, 813 (1974).

279. D. R.Nelson and M. E. Fisher, “Spin flop, supersolids, and bicritical and tetracritical points,” Phys. Rev. Lett. **32**, 1350 (1974).

280. D. R. Nelson and M. E. Fisher, “Renormalization group analysis of metamagnetic tricritical behavior,” Phys. Rev. B **11**, 1030 (1975).

281. a. D. R. Nelson and M. E. Fisher, “Exact renormalization for one-dimensional spin systems,” A.I.P. Conf. Proc. No. **18**, 1974, Magnetism and Magnetic Materials, 888 (1973).

b. D. R. Nelson and M. E. Fisher, “Soluble renormalization groups and scaling for low dimensional Ising systems,” Annals of Physics **91**, 226 (1975).