

References¹

1. Abou-Chacra, R., Thouless, D.J., Anderson, P.W.: A selfconsistent theory of localization. *J. Phys. C, Solid State Phys.* **6**(10), 1734 (1973). [8.5.4]
2. Acharyya, M., Chakrabarti, B.K.: Ising system in oscillating field: hysteretic response. In: Stauffer, D. (ed.) *Annual Reviews of Computational Physics*, vol. 1, p. 107. World Scientific, Singapore (1994). [7.2.3]
3. Acharyya, M., Chakrabarti, B.K.: Response of Ising systems to oscillating and pulsed fields: hysteresis, ac, and pulse susceptibility. *Phys. Rev. B* **52**, 6550–6568 (1995). [1.1, 1.3, 7.2.3]
4. Acharyya, M., Chakrabarti, B.K., Stinchcombe, R.B.: Hysteresis in Ising model in transverse field. *J. Phys. A, Math. Gen.* **27**(5), 1533 (1994). [1.1, 1.3, 7.2.3]
5. Achlioptas, D., Naor, A., Peres, Y.: Rigorous location of phase transitions in hard optimization problems. *Nature* **435**, 759–764 (2005). [8.4.1]
6. Aharonov, D., van Dam, W., Kempe, J., Landau, Z., Lloyd, S., Regev, O.: Adiabatic quantum computation is equivalent to standard quantum computation. In: *Proc. 45th FOCS*, pp. 42–51 (2004). arXiv:[quant-ph/0405098](https://arxiv.org/abs/quant-ph/0405098). [8.8]
7. Aharony, A.: Tricritical points in systems with random fields. *Phys. Rev. B* **18**, 3318–3327 (1978). [6.7.1, 6.7.2]
8. Akhiezer, I.A., Spol'nik, A.I.: *Sov. Phys., Solid State* **25**, 81 (1983). [1.3]
9. Allen, D., Azaria, P., Lecheminant, P.: A two-leg quantum Ising ladder: a bosonization study of the ANNNI model. *J. Phys. A, Math. Gen.* **34**(21), L305 (2001). [1.1, 1.3, 4.3.7]
10. Altshuler, B., Krovi, H., Roland, J.: Anderson localization makes adiabatic quantum optimization fail. *Proc. Natl. Acad. Sci.* **107**(28), 12446–12450 (2010). [1.3, 8.5.4]
11. Amara, P., Hsu, D., Straub, J.E.: Global energy minimum searches using an approximate solution of the imaginary time Schroedinger equation. *J. Phys. Chem.* **97**(25), 6715–6721 (1993). [8.1, 9.2]
12. Amico, L., Fazio, R., Osterloh, A., Vedral, V.: Entanglement in many-body systems. *Rev. Mod. Phys.* **80**, 517–576 (2008). [2.2.1]
13. Amit, D.J., Gutfreund, H., Sompolinsky, H.: Storing infinite numbers of patterns in a spin-glass model of neural networks. *Phys. Rev. Lett.* **55**, 1530–1533 (1985). [9.1.1]
14. Ancona-Torres, C., Silevitch, D.M., Aeppli, G., Rosenbaum, T.F.: Quantum and classical glass transitions in $\text{LiHo}_x\text{Y}_{1-x}\text{F}_4$. *Phys. Rev. Lett.* **101**, 057201 (2008). [1.1, 1.3]
15. Anderson, P.W.: Absence of diffusion in certain random lattices. *Phys. Rev.* **109**, 1492–1505 (1958). [8.5.4]

¹Note that numbers in the square brackets in each item show the sections where the reference is cited.

16. Anderson, P.W.: Random-phase approximation in the theory of superconductivity. *Phys. Rev.* **112**, 1900–1916 (1958). [1.1, 1.3, 10.1, 10.1.1]
17. Apolloni, B., Cesa-Bianchi, N., de Falco, D.: In: Alberverio, S., Casati, G., Cattaneo, U., Merlini, D., Moresi, R. (eds.) *Stochastic Processes, Physics and Geometry*. World Scientific, Singapore (1988). [8.1]
18. Arizmendi, C.M., Rizzo, A.H., Epele, L.N., García Canal, C.A.: Phase diagram of the ANNNI model in the Hamiltonian limit. *Z. Phys. B, Condens. Matter* **83**, 273–276 (1991). [1.3, 4.3, 4.3.7]
19. Ash, R.B.: *Information Theory*. Dover, New York (1965). [9.2.2, 9.2.4]
20. Auerbach, A.: *Interacting Fermions and Quantum Magnetism*. Springer, New York (1994). [1.3, 4.1, 4.3]
21. Banerjee, V., Dattagupta, S.: Model calculation for the susceptibility of a quantum spin glass. *Phys. Rev. B* **50**, 9942–9947 (1994). [7.1.3]
22. Banerjee, V., Dattagupta, S., Sen, P.: Hysteresis in a quantum spin model. *Phys. Rev. E* **52**, 1436–1446 (1995). [1.1, 1.3, 7.2.3]
23. Barahona, F.: On the computational complexity of Ising spin glass models. *J. Phys. A, Math. Gen.* **15**(10), 3241 (1982). [8.8]
24. Barber, M.N., Duxbury, P.M.: A quantum Hamiltonian approach to the two-dimensional axial next-nearest-neighbour Ising model. *J. Phys. A, Math. Gen.* **14**(7), L251 (1981). [1.1, 4.3]
25. Barber, M.N., Duxbury, P.M.: Hamiltonian studies of the two-dimensional axial next-nearest-neighbor Ising (ANNNI) model. *J. Stat. Phys.* **29**, 427–432 (1982). [3.A.2, 4.3]
26. Bardeen, J., Cooper, L.N., Schrieffer, J.R.: Theory of superconductivity. *Phys. Rev.* **108**, 1175–1204 (1957). [10.1.1]
27. Barouch, E., McCoy, B.M.: Statistical mechanics of the xy model. ii. Spin-correlation functions. *Phys. Rev. A* **3**, 786–804 (1971). [10.1.2]
28. Barouch, E., McCoy, B.M., Dresden, M.: Statistical mechanics of the XY model. i. *Phys. Rev. A* **2**, 1075–1092 (1970). [1.1, 1.3, 7.2.2, 7.2.2.1]
29. Baskaran, G., Mandal, S., Shankar, R.: Exact results for spin dynamics and fractionalization in the Kitaev model. *Phys. Rev. Lett.* **98**, 247201 (2007). [10.2.2]
30. Battaglia, D.A., Santoro, G.E., Tosatti, E.: Optimization by quantum annealing: lessons from hard satisfiability problems. *Phys. Rev. E* **71**, 066707 (2005). [8.4.1]
31. Beccaria, M., Campostrini, M., Feo, A.: Density-matrix renormalization-group study of the disorder line in the quantum axial next-nearest-neighbor Ising model. *Phys. Rev. B* **73**, 052402 (2006). [1.3, 4.3.7]
32. Beccaria, M., Campostrini, M., Feo, A.: Evidence for a floating phase of the transverse ANNNI model at high frustration. *Phys. Rev. B* **76**, 094410 (2007). [1.3, 4.3.7]
33. Belanger, D., Young, A.: The random field Ising model. *J. Magn. Magn. Mater.* **100**(1–3), 272–291 (1991). [1.3, 6.7.1, 6.7.2]
34. Benyoussef, A., Ez-Zahraouy, H.: The bond-diluted spin-1 transverse Ising model with random longitudinal field. *Phys. Status Solidi (b)* **179**(2), 521–530 (1993). [6.7.2]
35. Benyoussef, A., Ez-Zahraouy, H., Saber, M.: Magnetic properties of a transverse spin-1 Ising model with random longitudinal field. *Phys. A, Stat. Mech. Appl.* **198**(3–4), 593–605 (1993). [6.7.2]
36. Bernardi, L.W., Campbell, I.A.: Critical exponents in Ising spin glasses. *Phys. Rev. B* **56**, 5271–5275 (1997). [6.1]
37. Bhattacharya, S., Ray, P.: A diluted quantum transverse Ising model in two dimensions. *Phys. Lett. A* **101**(7), 346–348 (1984). [1.3, 5.2]
38. Bhattacharyya, S., Das, A., Dasgupta, S.: Transverse Ising chain under periodic instantaneous quenches: dynamical many-body freezing and emergence of slow solitary oscillations. *Phys. Rev. B* **86**(5), 054410 (2012). doi:[10.1103/PhysRevB.86.054410](https://doi.org/10.1103/PhysRevB.86.054410). [1.1, 1.3, 7.2.3.1]
39. Binder, K., Young, A.P.: Spin glasses: experimental facts, theoretical concepts, and open questions. *Rev. Mod. Phys.* **58**, 801–976 (1986). [6.1, 6.4, 6.5, 6.A.3]

40. Blinc, R.: On the isotopic effects in the ferroelectric behaviour of crystals with short hydrogen bonds. *J. Phys. Chem. Solids* **13**(3–4), 204–211 (1960). [1.1, 1.2, 1.3]
41. Blinc, R., Svetina, S.: Cluster approximations for order-disorder-type hydrogen-bonded ferroelectrics. i. Small clusters. *Phys. Rev.* **147**, 423–429 (1966). [1.3]
42. Blinc, R., Svetina, S.: Cluster approximations for order-disorder-type hydrogen-bonded ferroelectrics. ii. Application to KH_2PO_4 . *Phys. Rev.* **147**, 430–438 (1966). [1.3]
43. Born, M., Fock, V.: Beweis des Adiabatenatzes. *Z. Phys.* **51**, 165–180 (1928). [8.3.2]
44. Bray, A.J., Moore, M.A.: Replica theory of quantum spin glasses. *J. Phys. C, Solid State Phys.* **13**(24), L655 (1980). [6.2, 6.3, 6.A.1]
45. Bray, A.J., Moore, M.A.: Scaling theory of the random-field Ising model. *J. Phys. C, Solid State Phys.* **18**(28), L927 (1985). [6.7.1]
46. Bricmont, J., Kupiainen, A.: Lower critical dimension for the random-field Ising model. *Phys. Rev. Lett.* **59**, 1829–1832 (1987). [6.7.1]
47. Brooke, J., Bitko, D., Rosenbaum, F.T., Aeppli, G.: Quantum annealing of a disordered magnet. *Science* **284**(5415), 779–781 (1999). [8.4.2]
48. Brout, R., Müller, K., Thomas, H.: Tunnelling and collective excitations in a microscopic model of ferroelectricity. *Solid State Commun.* **4**(10), 507–510 (1966). [1.1, 1.2, 4.5, 6.7.2, 7.1.1]
49. Büttner, G., Usadel, K.D.: Replica-symmetry breaking for the Ising spin glass in a transverse field. *Phys. Rev. B* **42**, 6385–6395 (1990). [6.3, 6.5, 8.1]
50. Büttner, G., Usadel, K.D.: Stability analysis of an Ising spin glass with transverse field. *Phys. Rev. B* **41**, 428–431 (1990). [6.2, 6.5, 6.3]
51. Büttner, G., Usadel, K.D.: The exact phase diagram of the quantum XY spin glass model in a transverse field. *Z. Phys. B, Condens. Matter* **83**, 131–134 (1991). [1.3, 10.1.4]
52. Büttner, G., Kopeč, T., Usadel, K.: Phase diagrams of the quantum XY spin glass model in a transverse field. *Phys. Lett. A* **149**(5–6), 248–252 (1990). [10.1.4]
53. Buyers, W.J.L., Cowley, R.A., Paul, G.L., Cochran, W.: In: *Neutron Inelastic Scattering*, vol. 1, p. 269. International Atomic Energy Agency, Vienna (1968). [1.3]
54. Calabrese, P., Cardy, J.: Entanglement entropy and quantum field theory. *J. Stat. Mech. Theory Exp.* **2004**(06), P06002 (2004). [2.2.1]
55. Calabrese, P., Cardy, J.: Evolution of entanglement entropy in one-dimensional systems. *J. Stat. Mech. Theory Exp.* **2005**(04), P04010 (2005). [7.2.2.1]
56. Calabrese, P., Cardy, J.: Time dependence of correlation functions following a quantum quench. *Phys. Rev. Lett.* **96**, 136801 (2006). [1.1, 7.2.2.1]
57. Calabrese, P., Cardy, J.: Quantum quenches in extended systems. *J. Stat. Mech. Theory Exp.* **2007**(06), P06008 (2007). [7.2.2.1]
58. Caneva, T., Fazio, R., Santoro, G.E.: Adiabatic quantum dynamics of a random Ising chain across its quantum critical point. *Phys. Rev. B* **76**, 144427 (2007). [1.3, 8.5.2, 8.6]
59. Cardy, J.L.: Random-field effects in site-disordered Ising antiferromagnets. *Phys. Rev. B* **29**, 505–507 (1984). [6.7.1]
60. Černý, V.: Thermodynamical approach to the traveling salesman problem: an efficient simulation algorithm. *J. Optim. Theory Appl.* **45**, 41–51 (1985). [8.1]
61. Cesare, L.D., Lukierska-Walasek, K., Rabuffo, I., Walasek, K.: On the p -spin interaction transverse Ising spin-glass model without replicas. *Phys. A, Stat. Mech. Appl.* **214**(4), 499–510 (1995). [1.3, 6.6]
62. Chakrabarti, B.K.: Critical behavior of the Ising spin-glass models in a transverse field. *Phys. Rev. B* **24**, 4062–4064 (1981). [1.1, 1.3, 6.2, 6.4, 6.8]
63. Chakrabarti, B.K., Acharyya, M.: Dynamic transitions and hysteresis. *Rev. Mod. Phys.* **71**, 847–859 (1999). [7.2.3.1]
64. Chakrabarti, B.K., Dasgupta, P.K.: Modelling neural networks. *Phys. A, Stat. Mech. Appl.* **186**, 33–48 (1992). [9.1.1]
65. Chakrabarti, B.K., Dutta, A., Sen, P.: *Quantum Ising Phases and Transitions in Transverse Ising Models*. Springer, Berlin (1995). [9.2]

66. Chandra, A.K., Dasgupta, S.: Floating phase in a 2D ANNNI model. *J. Phys. A, Math. Theor.* **40**(24), 6251 (2007). [1.1, 4.3.7]
67. Chandra, A.K., Dasgupta, S.: Floating phase in the one-dimensional transverse axial next-nearest-neighbor Ising model. *Phys. Rev. E* **75**, 021105 (2007). [1.1, 1.3, 4.3.7]
68. Chandra, A.K., Dasgupta, S.: Spin-spin correlation in some excited states of the transverse Ising model. *J. Phys. A, Math. Theor.* **40**(20), 5231 (2007). [1.1, 4.3.7]
69. Chandra, A.K., Das, A., Chakrabarti, B.K.: *Quantum Quenching, Annealing and Computation*. Lecture Notes in Physics, vol. 802. Springer, Berlin (2010). [7.2.2, 8.1]
70. Chandra, A.K., Inoue, J.i., Chakrabarti, B.K.: Quantum phase transition in a disordered long-range transverse Ising antiferromagnet. *Phys. Rev. E* **81**, 021101 (2010). [6.3]
71. Chandra, P., Douçot, B.: Possible spin-liquid state at large s for the frustrated square Heisenberg lattice. *Phys. Rev. B* **38**, 9335–9338 (1988). [4.3]
72. Chayes, L., Crawford, N., Ioffe, D., Levit, A.: The phase diagram of the quantum Curie-Weiss model. *J. Stat. Phys.* **133**, 131–149 (2008). [3.4.1]
73. Chen, H.D., Nussinov, Z.: Exact results of the Kitaev model on a hexagonal lattice: spin states, string and brane correlators, and anyonic excitations. *J. Phys. A, Math. Theor.* **41**(7), 075001 (2008). [10.2.1]
74. Cherng, R.W., Levitov, L.S.: Entropy and correlation functions of a driven quantum spin chain. *Phys. Rev. A* **73**, 043614 (2006). [10.1.2]
75. Choi, V.: Different adiabatic quantum optimization algorithms for the NP-complete exact cover problem. *Proc. Natl. Acad. Sci.* **108**(7), 19–20 (2011). [8.5.4]
76. Chowdhury, D.: *Spin Glass and Other Frustrated Systems*. World Scientific, Singapore (1986). [6.1, 6.5, 6.A.3]
77. Christe, P., Henkel, M.: *Introduction to Conformal Invariance and Applications to Critical Phenomena*. Lecture Notes in Physics Monographs, vol. M 16, pp. 122–136. Springer, Heidelberg (1993). Chapter 10. [2.A.2]
78. Cincio, L., Dziarmaga, J., Rams, M.M., Zurek, W.H.: Entropy of entanglement and correlations induced by a quench: dynamics of a quantum phase transition in the quantum Ising model. *Phys. Rev. A* **75**, 052321 (2007). [7.2.2]
79. Clay Mathematics Institute: Millennium problems. <http://www.claymath.org/millennium/>. [8.2]
80. Cochran, W.: Dynamical, scattering and dielectric properties of ferroelectric crystals. *Adv. Phys.* **18**(72), 157–192 (1969). [1.3]
81. Coldea, R., Tennant, D.A., Wheeler, E.M., Wawrzynska, E., Prabhakaran, D., Telling, M., Habicht, K., Smeibidl, P., Kiefer, K.: Quantum criticality in an Ising chain: experimental evidence for emergent E8 symmetry. *Science* **327**(5962), 177–180 (2010). [1.3, 2.6]
82. Continentino, M.A.: Quantum scaling in many-body systems. *Phys. Rep.* **239**(3), 179–213 (1994). [1.1, 1.3, 3.5]
83. Cooke, A., Edmonds, D., Finn, C., Wolf, W.: *J. Phys. Soc. Jpn. Suppl. B-1* **17**, 481 (1962). [1.3]
84. Cooke, A., Ellis, C., Gehring, K., Leask, M., Martin, D., Wanklyn, B., Wells, M., White, R.: Observation of a magnetically controllable Jahn Teller distortion in dysprosium vanadate at low temperatures. *Solid State Commun.* **8**(9), 689–692 (1970). [1.3]
85. Cooke, A., Martin, D., Wells, M.: The specific heat of dysprosium vanadate. *Solid State Commun.* **9**(9), 519–522 (1971). [1.3]
86. Cooke, A., Swithenby, S., Wells, M.: The properties of thulium vanadate—an example of molecular field behaviour. *Solid State Commun.* **10**(3), 265–268 (1972). [1.3]
87. Coolen, A.C.C., Ruijgrok, T.W.: Image evolution in Hopfield networks. *Phys. Rev. A* **38**, 4253–4255 (1988). [9.1.2]
88. Cooper, B.R., Vogt, O.: Singlet ground state magnetism. *J. Phys., Colloq.* **32**, C1-958–C1-965 (1971). [1.3]
89. Courtens, E.: Vogel-Fulcher scaling of the susceptibility in a mixed-crystal proton glass. *Phys. Rev. Lett.* **52**, 69–72 (1984). [1.3]

90. Crisanti, A., Rieger, H.: Random-bond Ising chain in a transverse magnetic field: a finite-size scaling analysis. *J. Stat. Phys.* **77**, 1087–1098 (1994). [6.4]
91. Damski, B., Zurek, W.H.: Adiabatic-impulse approximation for avoided level crossings: from phase-transition dynamics to Landau-Zener evolutions and back again. *Phys. Rev. A* **73**, 063405 (2006). [7.2.2, 7.A.2]
92. Das, A.: Exotic freezing of response in a quantum many-body system. *Phys. Rev. B* **82**, 172402 (2010). [1.1, 1.3, 7.2.3.1]
93. Das, A., Chakrabarti, B.K.: *Quantum Annealing and Related Optimization Methods*. Lecture Notes in Physics, vol. 679. Springer, Berlin (2005). [1.3, 8.1, 9.2]
94. Das, A., Chakrabarti, B.K.: Colloquium: quantum annealing and analog quantum computation. *Rev. Mod. Phys.* **80**, 1061–1081 (2008). [8.1]
95. Das, A., Chakrabarti, B.K., Stinchcombe, R.B.: Quantum annealing in a kinetically constrained system. *Phys. Rev. E* **72**(2), 026701 (2005). doi:[10.1103/PhysRevE.72.026701](https://doi.org/10.1103/PhysRevE.72.026701). [8.1]
96. Dattagupta, S., Tadić, B., Pirc, R., Blinc, R.: Tunneling in proton glasses: stochastic theory of NMR line shape. *Phys. Rev. B* **44**, 4387–4396 (1991). [1.3]
97. de Almeida, J.R.L., Thouless, D.J.: Stability of the Sherrington-Kirkpatrick solution of a spin glass model. *J. Phys. A, Math. Gen.* **11**(5), 983 (1978). [9.1.1]
98. de Gennes, P.G.: Collective motions of hydrogen bonds. *Solid State Commun.* **1**(6), 132–137 (1963). [1.1, 1.2, 1.3]
99. Deng, S., Ortiz, G., Viola, L.: Dynamical non-ergodic scaling in continuous finite-order quantum phase transitions. *Europhys. Lett.* **84**(6), 67008 (2008). [10.1.2]
100. Deng, S., Ortiz, G., Viola, L.: Anomalous nonergodic scaling in adiabatic multicritical quantum quenches. *Phys. Rev. B* **80**, 241109 (2009). [10.1.2]
101. Deng, S., Ortiz, G., Viola, L.: Dynamical critical scaling and effective thermalization in quantum quenches: role of the initial state. *Phys. Rev. B* **83**, 094304 (2011). [10.1.2]
102. Derian, R., Gendiar, A., Nishino, T.: Modulation of local magnetization in two-dimensional axial-next-nearest-neighbor Ising model. *J. Phys. Soc. Jpn.* **75**(11), 114001 (2006). [1.1, 4.3.7]
103. Derrida, B.: Random-energy model: limit of a family of disordered models. *Phys. Rev. Lett.* **45**, 79–82 (1980). [3.4.2, 6.6, 8.5.3.2]
104. Derrida, B.: Random-energy model: an exactly solvable model of disordered systems. *Phys. Rev. B* **24**, 2613–2626 (1981). [6.6, 8.5.3.2]
105. Dhar, D., Barma, M.: Effect of disorder on relaxation in the one-dimensional Glauber model. *J. Stat. Phys.* **22**, 259–277 (1980). [8.6]
106. Divakaran, U., Dutta, A., Sen, D.: Quenching along a gapless line: a different exponent for defect density. *Phys. Rev. B* **78**, 144301 (2008). [10.1.2]
107. Divakaran, U., Mukherjee, V., Dutta, A., Sen, D.: Defect production due to quenching through a multicritical point. *J. Stat. Mech. Theory Exp.* **2009**(02), P02007 (2009). [10.1.2]
108. Dobrosavljević, V., Stratt, R.M.: Mean-field theory of the proton glass. *Phys. Rev. B* **36**, 8484–8496 (1987). [6.3]
109. Dobrosavljević, V., Thirumalai, D.: $1/p$ expansion for a p -spin interaction spin-glass model in a transverse field. *J. Phys. A, Math. Gen.* **23**(15), L767 (1990). [6.6, 8.5.3.2]
110. dos Santos, R.R., Stinchcombe, R.B.: Finite size scaling and crossover phenomena: the XY chain in a transverse field at zero temperature. *J. Phys. A, Math. Gen.* **14**(10), 2741 (1981). [10.1.2]
111. dos Santos, R.R., Sneddon, L., Stinchcombe, R.B.: The 2D transverse Ising model at $t = 0$: a finite-size rescaling transformation approach. *J. Phys. A, Math. Gen.* **14**(12), 3329 (1981). [3.6.1]
112. dos Santos, R.R., dos Santos, R.Z., Kischinhevsky, M.: Transverse Ising spin-glass model. *Phys. Rev. B* **31**, 4694–4697 (1985). [6.2]
113. Drell, S.D., Weinstein, M., Yankielowicz, S.: Quantum field theories on a lattice: variational methods for arbitrary coupling strengths and the Ising model in a transverse magnetic field. *Phys. Rev. D* **16**, 1769–1781 (1977). [2.4]

114. Drzewiński, A., Dekeyser, R.: Renormalization of the anisotropic linear XY model. *Phys. Rev. B* **51**, 15218–15228 (1995). [2.4.1]
115. Dutta, A., Sen, D.: Gapless line for the anisotropic Heisenberg spin- $\frac{1}{2}$ chain in a magnetic field and the quantum axial next-nearest-neighbor Ising chain. *Phys. Rev. B* **67**, 094435 (2003). [1.1, 1.3, 4.3.7]
116. Dutta, A., Chakrabarti, B.K., Stinchcombe, R.B.: Phase transitions in the random field Ising model in the presence of a transverse field. *J. Phys. A, Math. Gen.* **29**(17), 5285 (1996). [6.7.2]
117. Duxbury, P.M., Barber, M.N.: Hamiltonian studies of the two-dimensional axial next-nearest neighbour Ising (ANNNI) model. ii. Finite-lattice mass gap calculations. *J. Phys. A, Math. Gen.* **15**(10), 3219 (1982). [4.3]
118. Dziarmaga, J.: Dynamics of a quantum phase transition: exact solution of the quantum Ising model. *Phys. Rev. Lett.* **95**, 245701 (2005). [1.1, 1.3, 7.2.2]
119. Dziarmaga, J.: Dynamics of a quantum phase transition in the random Ising model: logarithmic dependence of the defect density on the transition rate. *Phys. Rev. B* **74**, 064416 (2006). [1.3, 8.6]
120. Dziarmaga, J.: Dynamics of a quantum phase transition and relaxation to a steady state. *Adv. Phys.* **59**(6), 1063–1189 (2010). [7.2.2]
121. Edwards, S.F., Anderson, P.W.: Theory of spin glasses. *J. Phys. F, Met. Phys.* **5**(5), 965 (1975). [6.1]
122. Elliott, R.J.: Phenomenological discussion of magnetic ordering in the heavy rare-earth metals. *Phys. Rev.* **124**, 346–353 (1961). [4.1]
123. Elliott, R.J.: In: Balkanski, M. (ed.) *Proc. of the Second Int. Conf. Light Scattering in Solids*. Flammarion Sciences, Paris (1971). [1.3]
124. Elliott, R.J., Parkinson, J.B.: Theory of spin-phonon coupling in concentrated paramagnetic salts and its effect on thermal conductivity. *Proc. Phys. Soc.* **92**(4), 1024 (1967). [1.3]
125. Elliott, R.J., Wood, C.: The Ising model with a transverse field. i. High temperature expansion. *J. Phys. C, Solid State Phys.* **4**(15), 2359 (1971). [3.3]
126. Elliott, R.J., Pfeuty, P., Wood, C.: Ising model with a transverse field. *Phys. Rev. Lett.* **25**, 443–446 (1970). [1.1, 3.1, 3.2]
127. Elliott, R.J., Gehring, G.A., Malozemoff, A.P., Smith, S.R.P., Staude, W.S., Tyte, R.N.: Theory of co-operative Jahn-Teller distortions in $DyVO_4$ and $TbVO_4$ (phase transitions). *J. Phys. C, Solid State Phys.* **4**(9), 179 (1971). [1.3]
128. Ellis, C.J., Gehring, K.A., Leask, M.J.M., White, R.L.: Spectroscopic properties of dysprosium vanadate. *J. Phys., Colloq.* **32**, C1-1024–C1-1025 (1971). [1.3]
129. Emery, V.J., Noguera, C.: Critical properties of a spin-(1/2) chain with competing interactions. *Phys. Rev. Lett.* **60**, 631–634 (1988). [4.3]
130. Farhi, E., Goldstone, J., Gutmann, S., Sipser, M.: Quantum computation by adiabatic evolution. [arXiv:quant-ph/0001106](https://arxiv.org/abs/quant-ph/0001106) (2000). [1.1, 1.3, 8.1]
131. Farhi, E., Goldstone, J., Gutmann, S., Lapan, J., Lundgren, A., Preda, D.: A quantum adiabatic evolution algorithm applied to random instances of an NP-complete problem. *Science* **292**(5516), 472–475 (2001). [8.4.1]
132. Farhi, E., Goldstone, J., Gosset, D., Gutmann, S., Meyer, H.B., Shor, P.: Quantum adiabatic algorithms, small gaps, and different paths. [arXiv:0909.4766](https://arxiv.org/abs/0909.4766) [quant-ph] (2009). [8.5.4]
133. Fedorov, Y.V., Shender, E.F.: Quantum spin glasses in the Ising model with a transverse field. *JETP Lett.* **43**, 681 (1986). [6.3]
134. Feynman, R.: Simulating physics with computers. *Int. J. Theor. Phys.* **21**, 467–488 (1982). [8.1]
135. Finnila, A., Gomez, M., Sebenik, C., Stenson, C., Doll, J.: Quantum annealing: a new method for minimizing multidimensional functions. *Chem. Phys. Lett.* **219**(5–6), 343–348 (1994). [8.1, 9.2]
136. Fischer, K.H., Hertz, J.A.: *Spin Glasses*. Cambridge University Press, Cambridge (1991). [6.1, 6.5, 6.A.3]

137. Fisher, D.S.: Scaling and critical slowing down in random-field Ising systems. *Phys. Rev. Lett.* **56**, 416–419 (1986). [6.7.1]
138. Fisher, D.S.: Random transverse field Ising spin chains. *Phys. Rev. Lett.* **69**, 534–537 (1992). [1.3, 5.3, 8.5.2]
139. Fisher, D.S.: Critical behavior of random transverse-field Ising spin chains. *Phys. Rev. B* **51**, 6411–6461 (1995). [1.3, 5.3, 8.5.2]
140. Fisher, D.S.: Phase transitions and singularities in random quantum systems. *Phys. A, Stat. Mech. Appl.* **263**(1–4), 222–233 (1999). [1.3, 5.3]
141. Fisher, D.S., Young, A.P.: Distributions of gaps and end-to-end correlations in random transverse-field Ising spin chains. *Phys. Rev. B* **58**, 9131–9141 (1998). [1.3, 5.3]
142. Fisher, M.E.: Perpendicular susceptibility of the Ising model. *J. Math. Phys.* **4**(1), 124–135 (1963). [1.1]
143. Fisher, M.E., Barber, M.N.: Scaling theory for finite-size effects in the critical region. *Phys. Rev. Lett.* **28**, 1516–1519 (1972). See also Barber, M.N.: In: Domb, C., Lebowitz, J.L. (eds.) *Phase Transition and Critical Phenomena*, vol. 8, p. 146. Academic Press, San Diego (1983). [2.3.1]
144. Fisher, M.E., Hartwig, R.E.: Toeplitz determinants: some applications, theorems, and conjectures. *Adv. Chem. Phys.* **15**, 333–353 (1968). [2.A.3]
145. Fisher, M.E., Selke, W.: Infinitely many commensurate phases in a simple Ising model. *Phys. Rev. Lett.* **44**, 1502–1505 (1980). [4.2]
146. Fisher, M.P.A., Weichman, P.B., Grinstein, G., Fisher, D.S.: Boson localization and the superfluid-insulator transition. *Phys. Rev. B* **40**, 546–570 (1989). [1.1]
147. Fishman, S., Aharony, A.: Random field effects in disordered anisotropic antiferromagnets. *J. Phys. C, Solid State Phys.* **12**(18), 729 (1979). [6.7.1]
148. Fletcher, J., Sheard, F.: The anomalous Schottky heat capacity of cerium ethylsulphate. *Solid State Commun.* **9**(16), 1403–1406 (1971). [1.3]
149. Fradkin, E., Susskind, L.: Order and disorder in gauge systems and magnets. *Phys. Rev. D* **17**, 2637–2658 (1978). [5.2]
150. Friedman, Z.: Critical exponents for the three-dimensional Ising model from the real-space renormalization group in two dimensions. *Phys. Rev. Lett.* **36**, 1326–1328 (1976). [3.6.1]
151. Friedman, Z.: Ising model with a transverse field in two dimensions: phase diagram and critical properties from a real-space renormalization group. *Phys. Rev. B* **17**, 1429–1432 (1978). [3.6.1]
152. Garel, T., Pfeuty, P.: Commensurability effects on the critical behaviour of systems with helical ordering. *J. Phys. C, Solid State Phys.* **9**(10), L245 (1976). [4.3]
153. Garey, M.R., Johnson, D.S.: *Computers and Intractability: A Guide to the Theory of NP-Completeness*. Freeman, New York (1979). [8.2]
154. Gehring, K., Malozemoff, A., Staude, W., Tyte, R.: Observation of magnetically controllable distortion in TbVO_4 by optical spectroscopy. *Solid State Commun.* **9**(9), 511–514 (1971). [1.3]
155. Geman, S., Geman, D.: Stochastic relaxation, Gibbs distributions, and the Bayesian restoration of images. *IEEE Trans. Pattern Anal. Mach. Intell.* **PAMI-6**(6), 721–741 (1984). [8.1, 8.7.2, 8.A.3, 9.2, 9.2.1]
156. Glauber, R.J.: Time-dependent statistics of the Ising model. *J. Math. Phys.* **4**(2), 294–307 (1963). [7.1.3, 8.6]
157. Gofman, M., Adler, J., Aharony, A., Harris, A.B., Schwartz, M.: Evidence for two exponent scaling in the random field Ising model. *Phys. Rev. Lett.* **71**, 1569–1572 (1993). [6.7.1]
158. Goldschmidt, Y.Y.: Solvable model of the quantum spin glass in a transverse field. *Phys. Rev. B* **41**, 4858–4861 (1990). [1.3, 6.6, 8.5.3.2, 9.2]
159. Goldschmidt, Y.Y., Lai, P.Y.: Ising spin glass in a transverse field: replica-symmetry-breaking solution. *Phys. Rev. Lett.* **64**, 2467–2470 (1990). [1.3, 6.2, 6.3, 8.1]
160. Greiner, M., Mandel, O., Esslinger, T., Hänsch, T.W., Bloch, I.: Quantum phase transition from a superfluid to a Mott insulator in a gas of ultracold atoms. *Nature* **415**, 39–44 (2002). [7.2.2, 7.2.2.2]

161. Griffiths, R.B.: Nonanalytic behavior above the critical point in a random Ising ferromagnet. *Phys. Rev. Lett.* **23**, 17–19 (1969). [5.3]
162. Gross, D., Mezard, M.: The simplest spin glass. *Nucl. Phys. B* **240**(4), 431–452 (1984). [6.6]
163. Guo, M., Bhatt, R.N., Huse, D.A.: Quantum critical behavior of a three-dimensional Ising spin glass in a transverse magnetic field. *Phys. Rev. Lett.* **72**, 4137–4140 (1994). [1.3, 6.2, 6.5, 6.4]
164. Guo, M., Bhatt, R.N., Huse, D.A.: Quantum Griffiths singularities in the transverse-field Ising spin glass. *Phys. Rev. B* **54**, 3336–3342 (1996). [6.2]
165. Hallberg, K., Gagliano, E., Balseiro, C.: Finite-size study of a spin-1/2 Heisenberg chain with competing interactions: phase diagram and critical behavior. *Phys. Rev. B* **41**, 9474–9479 (1990). [4.3]
166. Hamer, C.J., Barber, M.N.: Finite-lattice methods in quantum Hamiltonian field theory. i. O(2) and O(3) Heisenberg models. *J. Phys. A, Math. Gen.* **14**(1), 259 (1981). [1.3, 4.3]
167. Hamer, C.J., Barber, M.N.: Finite-lattice methods in quantum Hamiltonian field theory. i. The Ising model. *J. Phys. A, Math. Gen.* **14**(1), 241 (1981). [1.3, 2.3.1, 4.3]
168. Harley, R., Hayes, W., Smith, S.: Raman study of phase transitions in rare earth vanadates. *Solid State Commun.* **9**(9), 515–517 (1971). [1.3]
169. Harris, A.B.: Effect of random defects on the critical behaviour of Ising models. *J. Phys. C, Solid State Phys.* **7**(9), 1671 (1974). [1.3, 5.2]
170. Harris, A.B.: Upper bounds for the transition temperatures of generalized Ising models. *J. Phys. C, Solid State Phys.* **7**(17), 3082 (1974). [1.3, 5.2]
171. Harris, A.B., Micheletti, C., Yeomans, J.M.: Quantum fluctuations in the axial next-nearest-neighbor Ising model. *Phys. Rev. Lett.* **74**, 3045–3048 (1995). [1.3, 4.4]
172. Heims, S.P.: Master equation for Ising model. *Phys. Rev.* **138**, A587–A590 (1965). [7.1.3]
173. Hertz, J.A.: Quantum critical phenomena. *Phys. Rev. B* **14**, 1165–1184 (1976). [1.1, 3.5]
174. Hikichi, T., Suzuki, S., Sengupta, K.: Slow quench dynamics of the Kitaev model: anisotropic critical point and effect of disorder. *Phys. Rev. B* **82**, 174305 (2010). [1.3, 10.2.3]
175. Hirsch, J.E., Mazenko, G.F.: Renormalization-group transformation for quantum lattice systems at zero temperature. *Phys. Rev. B* **19**, 2656–2663 (1979). [2.4.1]
176. Holzhey, C., Larsen, F., Wilczek, F.: Geometric and renormalized entropy in conformal field theory. *Nucl. Phys. B* **424**(3), 443–467 (1994). [2.2.1]
177. Hopf, E.: An inequality for positive linear integral operators. *Indiana Univ. Math. J.* **12**, 683–692 (1963). [8.7.1, 8.A.1]
178. Hopfield, J.: Neural networks and physical systems with emergent collective computational abilities. *Proc. Natl. Acad. Sci. USA* **79**(8), 2554–2558 (1982). [9.1]
179. Hopfield, J.J., Tank, D.W.: “Neural” computation of decisions in optimization problems. *Biol. Cybern.* **52**, 141–152 (1985). [8.2]
180. Horn, R.A., Johnson, C.R.: *Matrix Analysis*. Cambridge University Press, Cambridge (1985). [8.A.1, 8.A.2]
181. Hornreich, R.M., Liebmann, R., Schuster, H.G., Selke, W.: Lifshitz points in Ising systems. *Z. Phys. B, Condens. Matter* **35**, 91–97 (1979). [4.2]
182. Houdayer, J., Hartmann, A.K.: Low-temperature behavior of two-dimensional Gaussian Ising spin glasses. *Phys. Rev. B* **70**, 014418 (2004). [6.1]
183. Hu, B.: The classical Ising model: a quantum renormalization group approach. *Phys. Lett. A* **71**(1), 83–86 (1979). [2.4.1, 4.3]
184. Hu, B.: Introduction to real-space renormalization-group methods in critical and chaotic phenomena. *Phys. Rep.* **91**(5), 233–295 (1982). [2.4.1]
185. Huse, D.A., Fisher, D.S.: Residual energies after slow cooling of disordered systems. *Phys. Rev. Lett.* **57**, 2203–2206 (1986). [8.8]
186. Husimi, K.: *Proc. Int. Conf. Theor. Phys.*, 531 (1953). [3.4.1]
187. Igarashi, J.i., Tonegawa, T.: Excitation spectrum of a spin-1/2 chain with competing interactions. *Phys. Rev. B* **40**, 756–759 (1989). [4.3]
188. Iglói, F., Monthus, C.: Strong disorder RG approach of random systems. *Phys. Rep.* **412**(5–6), 277–431 (2005). [1.3, 5.1, 8.5.2]

189. Ikegami, T., Miyashita, S., Rieger, H.: Griffiths-McCoy singularities in the transverse field Ising model on the randomly diluted square lattice. *J. Phys. Soc. Jpn.* **67**(8), 2671–2677 (1998). [9]
190. Inoue, J.: Application of the quantum spin glass theory to image restoration. *Phys. Rev. E* **63**, 046114 (2001). [1.3, 9.2, 9.2.4]
191. Inoue, J.: In: Das, A., Chakrabarti B.K. (eds.) *Quantum Annealing and Related Optimization Methods*, p. 259. Springer, Berlin (2005). [1.3, 9.2]
192. Inoue, J.: Pattern-recalling processes in quantum Hopfield networks far from saturation. *J. Phys. Conf. Ser.* **297**(1), 012012 (2011). [1.1, 1.3, 9.1.2]
193. Inoue, J., Tanaka, K.: Dynamics of the maximum marginal likelihood hyperparameter estimation in image restoration: gradient descent versus expectation and maximization algorithm. *Phys. Rev. E* **65**, 016125 (2001). [9.2, 9.2.4]
194. Inoue, J., Saika, Y., Okada, M.: Quantum mean-field decoding algorithm for error-correcting codes. *J. Phys. Conf. Ser.* **143**(1), 012019 (2009). [9.2.5]
195. Ishii, H., Yamamoto, T.: Effect of a transverse field on the spin glass freezing in the Sherrington-Kirkpatrick model. *J. Phys. C, Solid State Phys.* **18**(33), 6225 (1985). [1.3, 6.2, 6.3, 9.2.5]
196. Ishii, H., Yamamoto, T.K.: In: Suzuki, M. (ed.) *Quantum Monte Carlo Methods*. Springer, Heidelberg (1986). [6.3]
197. Ishizuka, H., Motome, Y., Furukawa, N., Suzuki, S.: Quantum Monte Carlo study of molecular polarization and antiferroelectric ordering in squaric acid crystals. *Phys. Rev. B* **84**, 064120 (2011). [3.2]
198. Ishizuka, H., Motome, Y., Furukawa, N., Suzuki, S.: Quantum Monte Carlo study of the transverse-field Ising model on a frustrated checkerboard lattice. *J. Phys. Conf. Ser.* **320**(1), 012054 (2011). [3.2]
199. Itoh, J., Yamagata, Y.: Nuclear magnetic resonance experiments on ammonium halides. ii. Halogen nuclear magnetic resonance. *J. Phys. Soc. Jpn.* **17**(3), 481–507 (1962). [1.3]
200. Its, A.R., Jin, B.Q., Korepin, V.E.: Entanglement in the *XY* spin chain. *J. Phys. A, Math. Gen.* **38**(13), 2975 (2005). [2.2.1]
201. Johnson, M.W., Amin, M.H.S., Gildert, S., Lanting, T., Hamze, F., Dickson, N., Harris, R., Berkley, A.J., Johansson, J., Bunyk, P., Chapple, E.M., Enderud, C., Hilton, J.P., Karimi, K., Ladizinsky, E., Ladizinsky, N., Oh, T., Perminov, I., Rich, C., Thom, M.C., Tolkacheva, E., Truncik, C.J.S., Uchaikin, S., Wang, J., Wilson, B., Rose, G.: Quantum annealing with manufactured spins. *Nature* **473**(7346), 194–198 (2011). [8.4.2]
202. Jona, F., Shirane, G.: *Ferroelectric Crystals*. Pergamon, Oxford (1962). [1.3]
203. Jordan, M.: *Learning in Graphical Models*. MIT Press, Cambridge (1998). [9.2.5]
204. Jörg, T., Krzakala, F., Kurchan, J., Maggs, A.C.: Simple glass models and their quantum annealing. *Phys. Rev. Lett.* **101**, 147204 (2008). [1.3, 8.5.3.2]
205. Jörg, T., Krzakala, F., Kurchan, J., Maggs, A.C., Pujos, J.: Energy gaps in quantum first-order mean-field-like transitions: the problems that quantum annealing cannot solve. *Europhys. Lett.* **89**(4), 40004 (2010). [1.3, 3.4.2, 8.5.3.1]
206. Jörg, T., Krzakala, F., Semerjian, G., Zamponi, F.: First-order transitions and the performance of quantum algorithms in random optimization problems. *Phys. Rev. Lett.* **104**, 207206 (2010). [1.3, 8.5.4]
207. Jullien, R., Fields, J.N., Doniach, S.: Zero-temperature real-space renormalization-group method for a Kondo-lattice model Hamiltonian. *Phys. Rev. B* **16**, 4889–4900 (1977). [2.4.1]
208. Jullien, R., Pfeuty, P., Fields, J.N., Doniach, S.: Zero-temperature renormalization method for quantum systems. i. Ising model in a transverse field in one dimension. *Phys. Rev. B* **18**, 3568–3578 (1978). [2.4, 3.5]
209. Jullien, R., Pfeuty, P., Fields, J.N., Penson, K.A.: In: Brukhardt, T.W., van Leeuwen, J.M.J. (eds.) *Real Space Renormalisation*, p. 119. Springer, Berlin (1982). [2.4]
210. Kabashima, Y., Saad, D.: Statistical mechanics of error-correcting codes. *Europhys. Lett.* **45**(1), 97 (1999). [9.2]

211. Kadowaki, T., Nishimori, H.: Quantum annealing in the transverse Ising model. *Phys. Rev. E* **58**, 5355–5363 (1998). [1.1, 1.3, 8.1, 8.4.1, 9.2, 9.2.6]
212. Kaminow, I.P., Damen, T.C.: Temperature dependence of the ferroelectric mode in KH_2PO_4 . *Phys. Rev. Lett.* **20**, 1105–1108 (1968). [1.3]
213. Kanizg, W.: In: Seitz, F., Turnbull, D. (eds.) *Solid State Physics*, p. 1. Academic Press, New York (1957). [1.3]
214. Karevski, D., Lin, Y.C., Rieger, H., Kawashima, N., Igli, F.: Random quantum magnets with broad disorder distribution. *Eur. Phys. J. B, Condens. Matter Complex Syst.* **20**, 267–276 (2001). [5.3]
215. Kato, T.: On the adiabatic theorem of quantum mechanics. *J. Phys. Soc. Jpn.* **5**(6), 435–439 (1950). [8.3.2]
216. Katsura, S.: Statistical mechanics of the anisotropic linear Heisenberg model. *Phys. Rev.* **127**, 1508–1518 (1962). [1.1, 1.3, 2.1.2, 10.1.2]
217. Katzgraber, H.G., Lee, L.W., Young, A.P.: Correlation length of the two-dimensional Ising spin glass with Gaussian interactions. *Phys. Rev. B* **70**, 014417 (2004). [6.1]
218. Katzgraber, H.G., Körner, M., Young, A.P.: Universality in three-dimensional Ising spin glasses: a Monte Carlo study. *Phys. Rev. B* **73**, 224432 (2006). [6.1]
219. Kawasaki, K.: Diffusion constants near the critical point for time-dependent Ising models. i. *Phys. Rev.* **145**, 224–230 (1966). [7.1.3]
220. Kawasaki, K.: Diffusion constants near the critical point for time-dependent Ising models. ii. *Phys. Rev.* **148**, 375–381 (1966). [7.1.3]
221. Kawasaki, K.: Diffusion constants near the critical point for time-dependent Ising models. iii. Self-diffusion constant. *Phys. Rev.* **150**, 285–290 (1966). [7.1.3]
222. Kawashima, N., Harada, K.: Recent developments of world-line Monte Carlo methods. *J. Phys. Soc. Jpn.* **73**(6), 1379–1414 (2004). [3.2]
223. Kibble, T.W.B.: Some implications of a cosmological phase transition. *Phys. Rep.* **67**(1), 183–199 (1980). [7.2.2.2]
224. Kim, D.H., Kim, J.J.: Infinite-range Ising spin glass with a transverse field under the static approximation. *Phys. Rev. B* **66**, 054432 (2002). [8.1]
225. Kim, K., Chang, M.S., Korenblit, S., Islam, R., Edwards, E.E., Freericks, J.K., Lin, G.D., Duan, L.M., Monroe, C.: Quantum simulation of frustrated Ising spins with trapped ions. *Nature* **465**, 590–593 (2010). [8.4.2]
226. Kimball, J.C.: The kinetic Ising model: exact susceptibilities of two simple examples. *J. Stat. Phys.* **21**, 289–300 (1979). [4.3]
227. Kinoshita, T., Wenger, T., Weiss, D.S.: A quantum Newton’s cradle. *Nature* **440**, 900–903 (2006). [7.2.2]
228. Kirkpatrick, S., Gelatt, C.D., Vecchi, M.P.: Optimization by simulated annealing. *Science* **220**(4598), 671–680 (1983). [8.1, 9.2, 9.2.1]
229. Kitaev, A.: Anyons in an exactly solved model and beyond. *Ann. Phys.* **321**(1), 2–111 (2006). [1.3, 10.2.1]
230. Kobayashi, K.K.: Dynamical theory of the phase transition in KH_2PO_4 -type ferroelectric crystals. *J. Phys. Soc. Jpn.* **24**(3), 497–508 (1968). [1.3]
231. Kogut, J.B.: An introduction to lattice gauge theory and spin systems. *Rev. Mod. Phys.* **51**, 659–713 (1979). [1.1, 2.1.1, 3.A.2]
232. Kopec, T.K.: A dynamic theory of transverse freezing in the Sherrington-Kirkpatrick Ising model. *J. Phys. C, Solid State Phys.* **21**(36), 6053 (1988). [6.2]
233. Kopec, T.K.: Transverse freezing in the quantum Ising spin glass: a thermofield dynamic approach. *J. Phys. C, Solid State Phys.* **21**(2), 297 (1988). [6.2, 6.3]
234. Kopeć, T.K., Tadić, B., Pirc, R., Blinc, R.: Random fields and quantum effects in proton glasses. *Z. Phys. B, Condens. Matter* **78**, 493–499 (1990). [7.1.3]
235. Kovács, I.A., Iglói, F.: Renormalization group study of the two-dimensional random transverse-field Ising model. *Phys. Rev. B* **82**, 054437 (2010). [1.3, 5.3, 8.5.2]
236. Kovács, I.A., Iglói, F.: Infinite-disorder scaling of random quantum magnets in three and higher dimensions. *Phys. Rev. B* **83**, 174207 (2011). [1.3, 5.3, 8.8]

237. Kramers, H.A., Wannier, G.H.: Statistics of the two-dimensional ferromagnet. Part i. *Phys. Rev.* **60**, 252–262 (1941). [2.1.1, 10.1.2]
238. Krzakala, F., Rosso, A., Semerjian, G., Zamponi, F.: Path-integral representation for quantum spin models: application to the quantum cavity method and Monte Carlo simulations. *Phys. Rev. B* **78**, 134428 (2008). [3.4.1]
239. Lage, E.J.S., Stinchcombe, R.B.: Transverse Ising model with substitutional disorder: an effective-medium theory. *J. Phys. C, Solid State Phys.* **9**(17), 3295 (1976). [7.1.2]
240. Lai, P.Y., Goldschmidt, Y.Y.: Monte Carlo studies of the Ising spin-glass in a transverse field. *Europhys. Lett.* **13**(4), 289 (1990). [6.2, 6.3, 6.5, 8.1]
241. Landau, D.P., Binder, K.: *A Guide to Monte Carlo Simulations in Statistical Physics*. Cambridge University Press, Cambridge (2000). [3.2, 5.3, 6.3]
242. Landau, L.D.: On the theory of transfer of energy at collisions ii. *Phys. Z. Sowjetunion* **2**, 46 (1932). [7.A.2]
243. Landau, L.D., Lifshitz, E.M.: *Quantum Mechanics (Non-relativistic Theory)*. Butterworth-Heinemann, Oxford (1958). [7.A.2]
244. Lee, P.A., Ramakrishnan, T.V.: Disordered electronic systems. *Rev. Mod. Phys.* **57**, 287–337 (1985). [1.1]
245. Lieb, E., Schultz, T., Mattis, D.: Two soluble models of an antiferromagnetic chain. *Ann. Phys.* **16**(3), 407–466 (1961). [2.2, 2.A.2, 10.1.2]
246. Lieb, E.H.: Flux phase of the half-filled band. *Phys. Rev. Lett.* **73**, 2158–2161 (1994). [10.2.1]
247. Liebmann, R.: *Statistical Mechanics of Periodic Frustrated Ising Systems*. Lecture Notes in Physics, vol. 251. Springer, Berlin (1986). [4.2, 4.A.3]
248. Lin, Y.C., Kawashima, N., Iglói, F., Rieger, H.: Numerical renormalization group study of random transverse Ising models in one and two space dimensions. *Prog. Theor. Phys. Suppl.* **138**, 479–488 (2000). [5.3]
249. Lubensky, T.C.: In: Balian, R., Maynard, R., Toulouse, G. (eds.) *III-Condensed Matter*. North-Holland, Amsterdam (1979). [5.2]
250. Ma, Y.q., Gong, C.d.: Statics in the random quantum asymmetric Sherrington-Kirkpatrick model. *Phys. Rev. B* **45**, 793–796 (1992). [1.3, 9.1.1]
251. Ma, Y.q., Gong, C.d.: Hopfield spin-glass model in a transverse field. *Phys. Rev. B* **48**, 12778–12782 (1993). [1.3, 9.1.1]
252. Ma, Y.q., Li, Z.y.: Phase diagrams of the quantum Sherrington-Kirkpatrick Ising spin glass in a transverse field. *Phys. Lett. A* **148**(1–2), 134–138 (1990). [6.3]
253. Ma, Y.q., Zhang, Y.m., Ma, Y.g., Gong, C.d.: Statistical mechanics of a Hopfield neural-network model in a transverse field. *Phys. Rev. E* **47**, 3985–3987 (1993). [1.3, 9.1.1]
254. MacKay, D.J.C.: *Information Theory, Inference, and Learning Algorithms*. Cambridge University Press, Cambridge (2003). [8.1, 9.2.1, 9.2.4]
255. Majumdar, C.K., Ghosh, D.K.: On next-nearest-neighbor interaction in linear chain. i. *J. Math. Phys.* **10**(8), 1388–1398 (1969). [1.3, 4.3]
256. Majumdar, C.K., Ghosh, D.K.: On next-nearest-neighbor interaction in linear chain. ii. *J. Math. Phys.* **10**(8), 1399–1402 (1969). [1.3, 4.3]
257. Mangum, B.W., Lee, J.N., Moos, H.W.: Magnetically controllable cooperative Jahn-Teller distortion in TmAsO_4 . *Phys. Rev. Lett.* **27**, 1517–1520 (1971). [1.3]
258. Mari, P.O., Campbell, I.A.: Ising spin glasses: interaction distribution dependence of the critical exponents. *arXiv:cond-mat/0111174* (2001). [6.1]
259. Martoňák, R., Santoro, G.E., Tosatti, E.: Quantum annealing by the path-integral Monte Carlo method: the two-dimensional random Ising model. *Phys. Rev. B* **66**, 094203 (2002). [8.7.2]
260. Martoňák, R., Santoro, G.E., Tosatti, E.: Quantum annealing of the traveling-salesman problem. *Phys. Rev. E* **70**, 057701 (2004). [8.4.1]
261. Matsuda, Y., Nishimori, H., Katzgraber, H.G.: Ground-state statistics from annealing algorithms: quantum versus classical approaches. *New J. Phys.* **11**(7), 073021 (2009). [8.4.1]

262. Mattis, D.C.: Solvable spin systems with random interactions. *Phys. Lett. A* **56**(5), 421–422 (1976). [6.8]
263. Mattis, D.C.: *Encyclopedia of Magnetism in One Dimension*. World Scientific, Singapore (1994). [1.3, 4.1]
264. McCoy, B.: In: Domb, C., Green, M.S. (eds.) *Phase Transitions and Critical Phenomena*, vol. II. Academic Press, London (1972). [5.2, 5.3]
265. McCoy, B.M.: Spin correlation functions of the X – Y model. *Phys. Rev.* **173**, 531–541 (1968). [2.2.1, 2.A.3]
266. McCoy, B.M.: Theory of a two-dimensional Ising model with random impurities. iii. Boundary effects. *Phys. Rev.* **188**, 1014–1031 (1969). [6.4]
267. McCoy, B.M.: Theory of a two-dimensional Ising model with random impurities. iv. Generalizations. *Phys. Rev. B* **2**, 2795–2803 (1970). [6.4]
268. McCoy, B.M.: *Advanced Statistical Mechanics*. Oxford University Press, Oxford (2010). [2.A.3]
269. McCoy, B.M., Wu, T.T.: Theory of a two-dimensional Ising model with random impurities. i. Thermodynamics. *Phys. Rev.* **176**, 631–643 (1968). [5.2, 5.3, 6.4]
270. McCoy, B.M., Wu, T.T.: Theory of a two-dimensional Ising model with random impurities. ii. Spin correlation functions. *Phys. Rev.* **188**, 982–1013 (1969). [5.2, 6.4]
271. Messiah, A.: *Quantum Mechanics*, vol. 2. North-Holland, Amsterdam (1962). [8.3.2]
272. Mézard, M., Monasson, R.: Glassy transition in the three-dimensional random-field Ising model. *Phys. Rev. B* **50**, 7199–7202 (1994). [6.7.1]
273. Mézard, M., Montanari, A.: *Information, Physics, and Computation*. Oxford University Press, Oxford (2009). [1.3, 8.1]
274. Mézard, M., Young, A.P.: Replica symmetry breaking in the random field Ising model. *Europhys. Lett.* **18**(7), 653 (1992). [6.7.1]
275. Mézard, M., Parisi, G., Virasoro, M.A.: *Spin Glass Theory and Beyond*. World Scientific, Singapore (1987). [1.3, 3.4.2, 6.1, 6.5, 6.A.3, 8.1]
276. Miyashita, S.: Dynamics of the magnetization with an inversion of the magnetic field. *J. Phys. Soc. Jpn.* **64**(9), 3207–3214 (1995). [9.2]
277. Miyashita, S.: Observation of the energy gap due to the quantum tunneling making use of the Landau-Zener mechanism. *J. Phys. Soc. Jpn.* **65**(8), 2734–2735 (1996). [9.2]
278. Mizel, A., Lidar, D.A., Mitchell, M.: Simple proof of equivalence between adiabatic quantum computation and the circuit model. *Phys. Rev. Lett.* **99**, 070502 (2007). [8.8]
279. Monasson, R., Zecchina, R., Kirkpatrick, S., Selman, B., Troyansky, L.: Determining computational complexity from characteristic ‘phase transitions’. *Nature* **400**, 133–137 (1999). [8.4.1]
280. Morita, S., Nishimori, H.: Convergence theorems for quantum annealing. *J. Phys. A, Math. Gen.* **39**(45), 13903 (2006). [1.3, 8.7.2]
281. Morita, S., Nishimori, H.: Convergence of quantum annealing with real-time Schrödinger dynamics. *J. Phys. Soc. Jpn.* **76**(6), 064002 (2007). [1.3, 8.7.1]
282. Morita, S., Nishimori, H.: Mathematical foundation of quantum annealing. *J. Math. Phys.* **49**(12), 125210 (2008). [8.8, 9.2.6]
283. Morita, S., Suzuki, S., Nakamura, T.: Quantum-thermal annealing with a cluster-flip algorithm. *Phys. Rev. E* **79**, 065701 (2009). [3.2]
284. Moruzzi, V., Teaney, D.: Specific heat of EuS. *Solid State Commun.* **1**(6), 127–131 (1963). [1.3]
285. Motrunich, O., Mau, S.C., Huse, D.A., Fisher, D.S.: Infinite-randomness quantum Ising critical fixed points. *Phys. Rev. B* **61**, 1160–1172 (2000). [5.3]
286. Mühlischlegel, B., Zittartz, H.: Gaussian average method in the statistical theory of the Ising model. *Z. Phys. A, Hadrons Nucl.* **175**, 553–573 (1963). [3.6.2]
287. Mukherjee, V., Divakaran, U., Dutta, A., Sen, D.: Quenching dynamics of a quantum XY spin- $\frac{1}{2}$ chain in a transverse field. *Phys. Rev. B* **76**, 174303 (2007). [10.1.2]

288. Müller-Hartmann, E., Zittartz, J.: Interface free energy and transition temperature of the square-lattice Ising antiferromagnet at finite magnetic field. *Z. Phys. B, Condens. Matter* **27**, 261–266 (1977). [4.2]
289. Mussardo, G.: *Statistical Field Theory*. Oxford University Press, Oxford (2010). [2.6]
290. Nagai, O., Yamada, Y., Miyatake, Y.: In: Suzuki, M. (ed.) *Quantum Monte Carlo Methods*, p. 95. Springer, Heidelberg (1986). [1.3, 3.2]
291. Nagy, A.: Exploring phase transitions by finite-entanglement scaling of MPS in the 1D ANNNI model. *New J. Phys.* **13**(2), 023015 (2011). [1.1, 1.3, 4.3.7]
292. Nakamura, T., Ito, Y.: A quantum Monte Carlo algorithm realizing an intrinsic relaxation. *J. Phys. Soc. Jpn.* **72**(10), 2405–2408 (2003). [3.2]
293. Nakano, K.: Associatron—a model of associative memory. *IEEE Trans. Syst. Man Cybern.* **2**(3), 380–388 (1972). [9.1]
294. Narath, A., Schirber, J.E.: Effect of hydrostatic pressure on the metamagnetic transitions in $\text{FeCl}_2 \cdot 2\text{H}_2\text{O}$, $\text{CoCl}_2 \cdot 2\text{H}_2\text{O}$, FeCl_2 , and FeBr_2 . *J. Appl. Phys.* **37**(3), 1124–1125 (1966). [1.3]
295. Nielsen, M.A., Chuang, I.L.: *Quantum Computation and Quantum Information*. Cambridge University Press, Cambridge (2000). [2.2.1, 8.1, 8.8]
296. Nishimori, H.: Optimum decoding temperature for error-correcting codes. *J. Phys. Soc. Jpn.* **62**(9), 2973–2975 (1993). [9.2, 9.2.1]
297. Nishimori, H.: *Statistical Physics of Spin Glasses and Information Processing: An Introduction*. Oxford University Press, Oxford (2001). [1.3, 8.1, 9.2, 9.2.2]
298. Nishimori, H., Nonomura, Y.: Quantum effects in neural networks. *J. Phys. Soc. Jpn.* **65**(12), 3780–3796 (1996). [1.1, 1.3, 9.1.1, 9.A]
299. Nishimori, H., Wong, K.Y.M.: Statistical mechanics of image restoration and error-correcting codes. *Phys. Rev. E* **60**, 132–144 (1999). [9.2, 9.2.1, 9.2.4]
300. Obuchi, T., Nishimori, H., Sherrington, D.: Phase diagram of the p -spin-interacting spin glass with ferromagnetic bias and a transverse field in the infinite- p limit. *J. Phys. Soc. Jpn.* **76**, 054002 (2007). [6.6]
301. Oitmaa, J., Plischke, M.: Critical behaviour of the Ising model in a transverse field. *Physica B+C* **86–88**(Part 2), 577–578 (1977). [3.3]
302. Opper, M., Saad, D.: *Advanced Mean Field Methods: Theory and Practice*. MIT Press, Cambridge (2001). [9.2.5]
303. Osterloh, A., Amico, L., Falci, G., Fazio, R.: Scaling of entanglement close to a quantum phase transition. *Nature* **416**, 608–610 (2002). [2.2.1]
304. Parisi, G.: Magnetic properties of spin glasses in a new mean field theory. *J. Phys. A, Math. Gen.* **13**(5), 1887 (1980). [6.1]
305. Parisi, G.: The order parameter for spin glasses: a function on the interval 0–1. *J. Phys. A, Math. Gen.* **13**(3), 1101 (1980). [6.1]
306. Parisi, G.: A sequence of approximated solutions to the S-K model for spin glasses. *J. Phys. A, Math. Gen.* **13**(4), 115 (1980). [6.1]
307. Penrose, R.: *Shadows of the Mind*. Oxford University Press, Oxford (1994). [9.1.1]
308. Penson, K.A., Jullien, R., Pfeuty, P.: Zero-temperature renormalization-group method for quantum systems. iii. Ising model in a transverse field in two dimensions. *Phys. Rev. B* **19**, 4653–4660 (1979). [3.6.1]
309. Perdomo-Ortiz, A., Dickson, N., Drew-Brook, M., Rose, G., Aspuru-Guzik, A.: Finding low-energy conformations of lattice protein models by quantum annealing. *Sci. Rep.* **2**, 571 (2012). [8.4.2]
310. Peschel, I.: On the entanglement entropy for an XY spin chain. *J. Stat. Mech. Theory Exp.* **2004**(12), P12005 (2004). [2.2.1]
311. Peschel, I., Emery, V.J.: Calculation of spin correlations in two-dimensional Ising systems from one-dimensional kinetic models. *Z. Phys. B, Condens. Matter* **43**, 241–249 (1981). [1.3, 4.3, 4.3.7]
312. Pfeuty, P.: The one-dimensional Ising model with a transverse field. *Ann. Phys.* **57**(1), 79–90 (1970). [1.1, 1.3, 2.2, 2.2.1, 2.A.3, 4.3, 5.2, 10.1.2]

313. Pfeuty, P., Elliott, R.J.: The Ising model with a transverse field. ii. Ground state properties. *J. Phys. C, Solid State Phys.* **4**(15), 2370 (1971). [3.6.1]
314. Pfeuty, P., Jullien, R., Penson, K.A.: In: *Real Space Renormalisation. Topics in Current Physics*, vol. 30, p. 119. Springer, Heidelberg (1982) [1.3, 4.3]
315. Pich, C., Young, A.P., Rieger, H., Kawashima, N.: Critical behavior and Griffiths-McCoy singularities in the two-dimensional random quantum Ising ferromagnet. *Phys. Rev. Lett.* **81**, 5916–5919 (1998). [1.3, 5.3]
316. Pirc, R., Tadić, B., Blinc, R.: Tunneling model of proton glasses. *Z. Phys. B, Condens. Matter* **61**, 69–74 (1985). [1.3, 6.2, 6.3]
317. Pirc, R., Tadić, B., Blinc, R.: Random-field smearing of the proton-glass transition. *Phys. Rev. B* **36**, 8607–8615 (1987). [1.3]
318. Polkovnikov, A.: Universal adiabatic dynamics in the vicinity of a quantum critical point. *Phys. Rev. B* **72**, 161201 (2005). [1.3, 7.2.2.2, 8.6]
319. Polkovnikov, A., Sengupta, K., Silva, A., Vengalattore, M.: Colloquium: nonequilibrium dynamics of closed interacting quantum systems. *Rev. Mod. Phys.* **83**, 863–883 (2011). [7.2.2]
320. Pryce, J.M., Bruce, A.D.: Statistical mechanics of image restoration. *J. Phys. A, Math. Gen.* **28**(3), 511 (1995). [9.2]
321. Quilliam, J.A., Meng, S., Mugford, C.G.A., Kycia, J.B.: Evidence of spin glass dynamics in dilute $\text{LiHo}_x\text{Y}_{1-x}\text{F}_4$. *Phys. Rev. Lett.* **101**, 187204 (2008). [1.1, 1.3]
322. Ray, P., Chakrabarti, B.K.: Exact ground-state excitations of the XY model in a transverse field in one dimension. *Phys. Lett. A* **98**(8–9), 431–432 (1983). [1.3, 10.1.2]
323. Ray, P., Chakrabarti, B.K., Chakrabarti, A.: Sherrington-Kirkpatrick model in a transverse field: absence of replica symmetry breaking due to quantum fluctuations. *Phys. Rev. B* **39**, 11828–11832 (1989). [1.3, 6.2, 6.3, 6.5, 8.1]
324. Raymond, J., Sportiello, A., Zdeborová, L.: Phase diagram of the 1-in-3 satisfiability problem. *Phys. Rev. E* **76**, 011101 (2007). [8.4.1]
325. Read, N., Sachdev, S., Ye, J.: Landau theory of quantum spin glasses of rotors and Ising spins. *Phys. Rev. B* **52**, 384–410 (1995). [1.3, 6.2, 6.4, 6.5]
326. Reinelt, G.: TSPLIB. <http://www.iwr.uni-heidelberg.de/groups/comopt/software/TSPLIB95/>. [8.4.1]
327. Rieger, H.: In: Stauffer, D. (ed.) *Annual Review of Computational Physics*, vol. 2, p. 925. World Scientific, Singapore (1995). [6.2]
328. Rieger, H.: Critical behavior of the three-dimensional random-field Ising model: two-exponent scaling and discontinuous transition. *Phys. Rev. B* **52**, 6659–6667 (1995). [6.7.1]
329. Rieger, H., Kawashima, N.: Application of a continuous time cluster algorithm to the two-dimensional random quantum Ising ferromagnet. *Eur. Phys. J. B, Condens. Matter Complex Syst.* **9**, 233–236 (1999). [5.3]
330. Rieger, H., Uimin, G.: The one-dimensional ANNNI model in a transverse field: analytic and numerical study of effective Hamiltonians. *Z. Phys. B, Condens. Matter* **101**, 597–611 (1996). [4.3.7]
331. Rieger, H., Young, A.P.: Critical exponents of the three-dimensional random field Ising model. *J. Phys. A, Math. Gen.* **26**(20), 5279 (1993). [6.7.1]
332. Rieger, H., Young, A.P.: Zero-temperature quantum phase transition of a two-dimensional Ising spin glass. *Phys. Rev. Lett.* **72**, 4141–4144 (1994). [1.3, 6.2, 6.5, 6.4]
333. Rieger, H., Young, A.P.: Griffiths singularities in the disordered phase of a quantum Ising spin glass. *Phys. Rev. B* **54**, 3328–3335 (1996). [5.3, 6.2, 8.5.2]
334. Rossini, D., Silva, A., Mussardo, G., Santoro, G.E.: Effective thermal dynamics following a quantum quench in a spin chain. *Phys. Rev. Lett.* **102**, 127204 (2009). [1.1, 1.3, 7.2.2.1]
335. Rossini, D., Suzuki, S., Mussardo, G., Santoro, G.E., Silva, A.: Long time dynamics following a quench in an integrable quantum spin chain: local versus nonlocal operators and effective thermal behavior. *Phys. Rev. B* **82**, 144302 (2010). [1.1, 1.3, 7.2.2.1]
336. Ruján, P.: Critical behavior of two-dimensional models with spatially modulated phases: analytic results. *Phys. Rev. B* **24**, 6620–6631 (1981). [1.1, 4.3]

337. Ruján, P.: Finite temperature error-correcting codes. *Phys. Rev. Lett.* **70**, 2968–2971 (1993). [9.2, 9.2.1]
338. Sachdev, S.: Universal, finite-temperature, crossover functions of the quantum transition in the Ising chain in a transverse field. *Nucl. Phys. B* **464**(3), 576–595 (1996). [2.A.3]
339. Sachdev, S.: *Quantum Phase Transitions*. Cambridge University Press, Cambridge (1999). [1.1, 2.A.3]
340. Samara, G.A.: Vanishing of the ferroelectric and antiferroelectric states in KH_2PO_2 -type crystals at high pressure. *Phys. Rev. Lett.* **27**, 103–106 (1971). [1.3]
341. Santoro, G.E., Tosatti, E.: Optimization using quantum mechanics: quantum annealing through adiabatic evolution. *J. Phys. A, Math. Gen.* **39**(36), 393 (2006). [8.1]
342. Santoro, G.E., Martoňák, R., Tosatti, E., Car, R.: Theory of quantum annealing of an Ising spin glass. *Science* **295**(5564), 2427–2430 (2002). [8.4.1, 9.2]
343. Sarjala, M., Petäjä, V., Alava, M.: Optimization in random field Ising models by quantum annealing. *J. Stat. Mech. Theory Exp.* **2006**(01), P01008 (2006). [8.4.1]
344. Satija, I.I.: Symmetry breaking and stabilization of critical phase. *Phys. Rev. B* **48**, 3511–3514 (1993). [1.3, 10.1.3]
345. Satija, I.I.: Spectral and magnetic interplay in quantum spin chains: stabilization of the critical phase due to long-range order. *Phys. Rev. B* **49**, 3391–3399 (1994). [1.3, 10.1.3]
346. Satija, I.I., Chaves, J.C.: XY -to-Ising crossover and quadrupling of the butterfly spectrum. *Phys. Rev. B* **49**, 13239–13242 (1994). [1.3, 10.1.3]
347. Schiff, L.I.: *Quantum Mechanics*. McGraw-Hill, London (1968). [4.A.3]
348. Schneider, T., Pytte, E.: Random-field instability of the ferromagnetic state. *Phys. Rev. B* **15**, 1519–1522 (1977). [6.7.1, 6.7.2]
349. Schultz, T.D., Mattis, D.C., Lieb, E.H.: Two-dimensional Ising model as a soluble problem of many fermions. *Rev. Mod. Phys.* **36**, 856–871 (1964). [1.1, 1.3, 3.1, 3.A.2, 10.1.2]
350. Schwartz, M., Soffer, A.: Critical correlation susceptibility relation in random-field systems. *Phys. Rev. B* **33**, 2059–2061 (1986). [6.7.1]
351. Seki, Y., Nishimori, H.: Quantum annealing with antiferromagnetic fluctuations. *Phys. Rev. E* **85**, 051112 (2012). [8.8]
352. Selke, W.: The ANNNI model—theoretical analysis and experimental application. *Phys. Rep.* **170**(4), 213–264 (1988). [4.1, 4.2]
353. Selke, W.: In: Domb, C., Lebowitz, J.L. (eds.) *Phase Transitions and Critical Phenomena*, vol. 15. Academic Press, New York (1992). [4.1, 4.2]
354. Selke, W., Duxbury, P.M.: The mean field theory of the three-dimensional ANNNI model. *Z. Phys. B, Condens. Matter* **57**, 49–58 (1984). [4.2]
355. Sen, D.: Large- S analysis of a quantum axial next-nearest-neighbor Ising model in one dimension. *Phys. Rev. B* **43**, 5939–5943 (1991). [1.3, 4.4]
356. Sen, D., Chakrabarti, B.K.: Large- S analysis of one-dimensional quantum-spin models in a transverse magnetic field. *Phys. Rev. B* **41**, 4713–4722 (1990). [1.3, 4.3, 4.4]
357. Sen, P.: Ground state properties of a one dimensional frustrated quantum XY model. *Phys. A, Stat. Mech. Appl.* **186**(1–2), 306–313 (1992). [4.6]
358. Sen, P.: Order disorder transitions in Ising models in transverse fields with second neighbour interactions. *Z. Phys. B, Condens. Matter* **98**, 251–254 (1995). [3.3, 4.5]
359. Sen, P., Chakrabarti, B.K.: Ising models with competing axial interactions in transverse fields. *Phys. Rev. B* **40**, 760–762 (1989). [1.1, 1.3, 4.3]
360. Sen, P., Chakrabarti, B.K.: Critical properties of a one-dimensional frustrated quantum magnetic model. *Phys. Rev. B* **43**, 13559–13565 (1991). [1.1, 1.3, 4.3]
361. Sen, P., Chakrabarti, B.K.: Frustrated transverse Ising models: a class of frustrated quantum systems. *Int. J. Mod. Phys. B* **6**, 2439–2469 (1992). [1.1, 1.3, 4.6, 6.2, 6.3]
362. Sen, P., Chakraborty, S., Dasgupta, S., Chakrabarti, B.K.: Numerical estimate of the phase diagram of finite ANNNI chains in transverse field. *Z. Phys. B, Condens. Matter* **88**, 333–338 (1992). [1.1, 1.3, 4.3]
363. Sen, P., Acharya, M., Chakrabarti, B.K. (1992, unpublished). [6.5]

364. Sengupta, K., Sen, D.: Entanglement production due to quench dynamics of an anisotropic xy chain in a transverse field. *Phys. Rev. A* **80**, 032304 (2009). [10.1.2]
365. Sengupta, K., Powell, S., Sachdev, S.: Quench dynamics across quantum critical points. *Phys. Rev. A* **69**, 053616 (2004). [1.1, 1.3, 7.2.2.1]
366. Sengupta, K., Sen, D., Mondal, S.: Exact results for quench dynamics and defect production in a two-dimensional model. *Phys. Rev. Lett.* **100**, 077204 (2008). [1.3, 10.2.3]
367. Shankar, R.: In: Pati, J., Shafi, Q., Lu, Yu (eds.) *Current Topics in Condensed Matter and Particle Physics*. World Scientific, Singapore (1993). [2.2.1]
368. Shankar, R., Murthy, G.: Nearest-neighbor frustrated random-bond model in $d = 2$: some exact results. *Phys. Rev. B* **36**, 536–545 (1987). [5.3, 6.4]
369. Sherrington, D., Kirkpatrick, S.: Solvable model of a spin-glass. *Phys. Rev. Lett.* **35**, 1792–1796 (1975). [6.1, 9.1.1, 9.1.2, 9.2, 9.2.4, 9.2.5]
370. Shor, P.W.: Algorithms for quantum computation: discrete logarithms and factoring. In: *Proceedings of the 35th Annual Symposium on Foundations of Computer Science*, pp. 124–134 (1994). [8.1]
371. Skalyo, J., Frazer, B.C., Shirane, G.: Ferroelectric-mode motion in KD_2PO_4 . *Phys. Rev. B* **1**, 278–286 (1970). [1.3]
372. Smelyanskiy, V.N., Rieffel, E.G., Knysh, S.I., Williams, C.P., Johnson, M.W., Thom, M.C., Mcready, W.G., Pudenz, K.L.: A near-term quantum computing approach for hard computational problems in space exploration. [arXiv:1204.2821](https://arxiv.org/abs/1204.2821) (2012). [8.1]
373. Sokoloff, J.: Unusual band structure, wave functions and electrical conductance in crystals with incommensurate periodic potentials. *Phys. Rep.* **126**(4), 189–244 (1985). [10.1.3]
374. Sourlas, N.: Spin-glass models as error-correcting codes. *Nature* **339**, 693–695 (1989). [9.2, 9.2.2, 9.2.4]
375. Stauffer, D., Aharony, A.: *Introduction to Percolation Theory*. Taylor & Francis, London (1992). [5.1, 5.2]
376. Steffen, M., van Dam, W., Hogg, T., Breyta, G., Chuang, I.: Experimental implementation of an adiabatic quantum optimization algorithm. *Phys. Rev. Lett.* **90**, 067903 (2003). [8.4.2]
377. Stella, A.L., Vanderzande, C., Dekeyser, R.: Unified renormalization-group approach to the thermodynamic and ground-state properties of quantum lattice systems. *Phys. Rev. B* **27**, 1812–1831 (1983). [2.4.1]
378. Stevens, K.W.H., van Eekelen, H.A.M.: Thermodynamic effects of spin-phonon coupling. *Proc. Phys. Soc.* **92**(3), 680 (1967). [1.3]
379. Stinchcombe, R.B.: Ising model in a transverse field. i. Basic theory. *J. Phys. C, Solid State Phys.* **6**(15), 2459 (1973). [1.1, 1.2, 1.3, 3.6.2, 6.7.2]
380. Stinchcombe, R.B.: Diluted quantum transverse Ising model. *J. Phys. C, Solid State Phys.* **14**(10), 263 (1981). [1.3, 5.2]
381. Stinchcombe, R.B.: Exact scalings of pure and dilute quantum transverse Ising chains. *J. Phys. C, Solid State Phys.* **14**(16), 2193 (1981). [1.3, 5.2]
382. Stinchcombe, R.B.: In: Domb, C., Lebowitz, J.L. (eds.) *Phase Transition and Critical Phenomena*, vol. VII, p. 151. Academic Press, New York (1983). [1.3, 5.1, 5.2, 6.7.2]
383. Stout, J.W., Chisholm, R.C.: Heat capacity and entropy of $CuCl_2$ and $CrCl_2$ from 11° to $300^\circ K$. magnetic ordering in linear chain crystals. *J. Chem. Phys.* **36**(4), 979–991 (1962). [1.3]
384. Strat, R.M.: Path-integral methods for treating quantal behavior in solids: mean-field theory and the effects of fluctuations. *Phys. Rev. B* **33**, 1921–1930 (1986). [3.3, 3.4.1, 4.5]
385. Suzuki, M.: Relationship among exactly soluble models of critical phenomena. i. *Prog. Theor. Phys.* **46**(5), 1337–1359 (1971). [1.1, 1.3, 3.1, 10.1.2]
386. Suzuki, M.: Relationship between d -dimensional quantal spin systems and $(d + 1)$ -dimensional Ising systems. *Prog. Theor. Phys.* **56**(5), 1454–1469 (1976). [1.1, 1.3, 3.1, 5.2, 8.7.2, 9.1.2, 9.2, 9.2.4, 9.2.5, 9.2.6]
387. Suzuki, M.: In: Suzuki, M. (ed.) *Quantum Monte Carlo Methods*, p. 1. Springer, Heidelberg (1986). [1.1, 1.3, 3.1, 4.3, 6.5, 6.A.2]

388. Suzuki, S.: In: Das, A., Chakrabarti, B.K. (eds.) *Quantum Annealing and Related Optimization Method*, p. 207. Springer, Berlin (2005). [7.A.2]
389. Suzuki, S.: Cooling dynamics of pure and random Ising chains. *J. Stat. Mech. Theory Exp.* **2009**(03), P03032 (2009). [1.3, 8.6]
390. Suzuki, S., Okada, M.: Residual energies after slow quantum annealing. *J. Phys. Soc. Jpn.* **74**(6), 1649–1652 (2005). [8.6]
391. Swendsen, R.H., Wang, J.S.: Nonuniversal critical dynamics in Monte Carlo simulations. *Phys. Rev. Lett.* **58**, 86–88 (1987). [1.3, 3.2]
392. Syljuåsen, O.F.: Entanglement and spontaneous symmetry breaking in quantum spin models. *Phys. Rev. A* **68**, 060301 (2003). [2.2.1]
393. Szegő, G.: On certain Hermitian forms associated with the Fourier series of a positive function. *Comm. Sém. Math. Univ. Lund (Medd. Lunds Univ. Mat. Sem.)* **1952**(Tome Supplémentaire), 228–238 (1952). [2.A.3]
394. Takahashi, K., Matsuda, Y.: Effect of random fluctuations on quantum spin-glass transitions at zero temperature. *J. Phys. Soc. Jpn.* **76**, 043712 (2010). [6.3]
395. Takahashi, K., Takeda, K.: Dynamical correlations in the Sherrington-Kirkpatrick model in a transverse field. *Phys. Rev. B* **78**, 174415 (2007). [6.3]
396. Tanaka, K.: Statistical-mechanical approach to image processing. *J. Phys. A, Math. Gen.* **35**(37), 81 (2002). [9.2]
397. Tanaka, K., Horiguchi, T.: Quantum statistical-mechanical iterative method in image restoration. *Electron. Commun. Jpn.* **83**(3), 84 (2000). [1.3, 9.2, 9.2.5]
398. Temperley, H.N.V.: *Proc. Phys. Soc.* **67**, 233 (1954). [3.4.1]
399. Tentrup, T., Siems, R.: Structure and free energy of domain walls in ANNNI systems. *J. Phys. C, Solid State Phys.* **19**(18), 3443 (1986). [4.5]
400. Thill, M.J., Huse, D.A.: Equilibrium behaviour of quantum Ising spin glass. *Phys. A, Stat. Mech. Appl.* **214**(3), 321–355 (1995). [6.2]
401. Thirumalai, D., Li, Q., Kirkpatrick, T.R.: Infinite-range Ising spin glass in a transverse field. *J. Phys. A, Math. Gen.* **22**(16), 3339 (1989). [1.3, 6.2, 6.5, 8.1]
402. Trammell, G.T.: Magnetic ordering properties of rare-earth ions in strong cubic crystal fields. *Phys. Rev.* **131**, 932–948 (1963). [1.3]
403. Trotter, H.F.: On the product of semi-groups of operators. *Proc. Am. Math. Soc.* **10**, 545–551 (1959). [3.1, 9.2.4]
404. Tsallis, C., Stariolo, D.A.: Generalized simulated annealing. *Phys. A, Stat. Mech. Appl.* **233**(1–2), 395–406 (1996). [8.8]
405. Tucker, J.W., Saber, M., Ez-Zahraouy, H.: A study of the quenched diluted spin 32 transverse Ising model. *J. Magn. Magn. Mater.* **139**(1–2), 83–94 (1995). [5.2]
406. Usadel, K.: Spin glass transition in an Ising spin system with transverse field. *Solid State Commun.* **58**(9), 629–630 (1986). [6.3]
407. Usadel, K.: Frustrated quantum spin systems. *Nucl. Phys. B, Proc. Suppl.* **5**(1), 91–96 (1988). [10.1.4]
408. Usadel, K., Schmitz, B.: Quantum fluctuations in an Ising spin glass with transverse field. *Solid State Commun.* **64**(6), 975–977 (1987). [6.3]
409. Uzelac, K., Jullien, R., Pfeuty, P.: Renormalisation group study of the random Ising model in a transverse field in one dimension. *J. Phys. A, Math. Gen.* **13**(12), 3735 (1980). [5.2]
410. Vidal, G., Latorre, J.I., Rico, E., Kitaev, A.: Entanglement in quantum critical phenomena. *Phys. Rev. Lett.* **90**, 227902 (2003). [2.2.1]
411. Villain, J.: Equilibrium critical properties of random field systems: new conjectures. *J. Phys. Fr.* **46**(11), 1843–1852 (1985). [6.7.1]
412. Villain, J., Bak, P.: Two-dimensional Ising model with competing interactions: floating phase, walls and dislocations. *J. Phys. Fr.* **42**(5), 657–668 (1981). [1.1, 4.2, 4.A.3]
413. Vitanov, N.V., Garraway, B.M.: Landau-Zener model: effects of finite coupling duration. *Phys. Rev. A* **53**, 4288–4304 (1996). [7.A.2]
414. Vitiello, G.: Coherence and dissipative dynamics in the quantum brain model. *Neural Netw. World* **5**, 717 (1995). [9.1.1]

415. Vojta, T.: Rare region effects at classical, quantum and nonequilibrium phase transitions. *J. Phys. A, Math. Gen.* **39**(22), 143 (2006). [1.3, 5.1, 8.5.2]
416. von Neumann, J., Wigner, E.: *Phys. Z.* **30**, 467–470 (1929). [8.3.1]
417. Walasek, K., Lukierska-Walasek, K.: Quantum transverse Ising spin-glass model in the mean-field approximation. *Phys. Rev. B* **34**, 4962–4965 (1986). [1.3, 6.2]
418. Walasek, K., Lukierska-Walasek, K.: Cluster-expansion method for the infinite-range quantum transverse Ising spin-glass model. *Phys. Rev. B* **38**, 725–727 (1988). [1.3, 6.3]
419. Wang, Y.L., Cooper, B.R.: Collective excitations and magnetic ordering in materials with singlet crystal-field ground state. *Phys. Rev.* **172**, 539–551 (1968). [1.3]
420. Wielinga, R., Huiskamp, W.: The spontaneous magnetization of the B.C.C. Heisenberg ferromagnet $\text{Cu}(\text{NH}_4)_2\text{Br}_4 \cdot 2\text{H}_2\text{O}$. *Physica* **40**(4), 602–624 (1969). [1.3]
421. Wiesler, A.: A note on the Monte Carlo simulation of one dimensional quantum spin systems. *Phys. Lett. A* **89**(7), 359–362 (1982). [1.3, 3.2, 6.3]
422. Winkler, G.: *Image Analysis, Random Fields, and Markov Chain Monte Carlo Methods: A Mathematical Introduction*. Springer, Berlin (2002). [9.2]
423. Wolf, D., Zittartz, J.: On the one-dimensional spin-1/2-chain and its related fermion models. *Z. Phys. B, Condens. Matter* **43**, 173–183 (1981). [4.3]
424. Wolf, W.P.: Anisotropic interactions between magnetic ions. *J. Phys., Colloq.* **32**, C1-26–C1-33 (1971). [1.3]
425. Wootters, W.K.: Entanglement of formation of an arbitrary state of two qubits. *Phys. Rev. Lett.* **80**, 2245–2248 (1998). [2.2.1]
426. Wu, T.T.: Theory of Toeplitz determinants and the spin correlations of the two-dimensional Ising model. i. *Phys. Rev.* **149**, 380–401 (1966). [5.2]
427. Wu, W., Ellman, B., Rosenbaum, T.F., Aeppli, G., Reich, D.H.: From classical to quantum glass. *Phys. Rev. Lett.* **67**, 2076–2079 (1991). [1.1, 1.3, 6.2.1, 7.1.3]
428. Wu, W., Bitko, D., Rosenbaum, T.F., Aeppli, G.: Quenching of the nonlinear susceptibility at a $T = 0$ spin glass transition. *Phys. Rev. Lett.* **71**, 1919–1922 (1993). [1.1, 1.3, 6.2.1]
429. Yamada, Y., Yamada, T.: Inter-dipolar interaction in NaNO_2 . *J. Phys. Soc. Jpn.* **21**(11), 2167–2177 (1966). [1.3]
430. Yamada, Y., Fujii, Y., Hata, I.: Dielectric relaxation mechanism in NaNO_2 . *J. Phys. Soc. Jpn.* **24**(5), 1053–1058 (1968). [1.3]
431. Yamada, Y., Fujii, Y., Terauchi, H.: *J. Phys. Soc. Jpn. Suppl.* **28**, 274 (1970). [1.3]
432. Yamamoto, T.: Ground-state properties of the Sherrington-Kirkpatrick model with a transverse field. *J. Phys. C, Solid State Phys.* **21**(23), 4377 (1988). [6.3]
433. Yamamoto, T., Ishii, H.: A perturbation expansion for the Sherrington-Kirkpatrick model with a transverse field. *J. Phys. C, Solid State Phys.* **20**(35), 6053 (1987). [1.3, 6.2, 6.3, 9.2.5]
434. Yanase, A.: Correlation index of the Ising model with a transverse field. *J. Phys. Soc. Jpn.* **42**(6), 1816–1818 (1977). [3.6.1]
435. Yeomans, J.: The theory and application of axial Ising models. *Solid State Phys.* **41**, 151–200 (1988). [4.1, 4.2]
436. Yokoi, C.S.O., Coutinho-Filho, M.D., Salinas, S.R.: Ising model with competing axial interactions in the presence of a field: a mean-field treatment. *Phys. Rev. B* **24**, 4047–4061 (1981). [4.2]
437. Yokota, T.: Numerical study of the SK spin glass in a transverse field by the pair approximation. *J. Phys. Condens. Matter* **3**(36), 7039 (1991). [6.3, 6.5]
438. Young, A.P.: Quantum effects in the renormalization group approach to phase transitions. *J. Phys. C, Solid State Phys.* **8**(15), L309 (1975). [1.1, 3.5, 3.6.2]
439. Young, A.P., Rieger, H.: Numerical study of the random transverse-field Ising spin chain. *Phys. Rev. B* **53**, 8486–8498 (1996). [1.3, 5.3]
440. Young, A.P., Knysh, S., Smelyanskiy, V.N.: Size dependence of the minimum excitation gap in the quantum adiabatic algorithm. *Phys. Rev. Lett.* **101**, 170503 (2008). [8.5.3.3]
441. Young, A.P., Knysh, S., Smelyanskiy, V.N.: First-order phase transition in the quantum adiabatic algorithm. *Phys. Rev. Lett.* **104**, 020502 (2010). [8.5.3.3]

442. Zamolodchikov, A.B.: Integrals of motion and s-matrix of the (scaled) $t = t_c$ Ising model with magnetic field. *Int. J. Mod. Phys. A* **4**, 4235 (1989). [2.6]
443. Zener, C.: Non-adiabatic crossing of energy levels. *Proc. R. Soc. Lond. Ser. A* **137**, 696–702 (1932). [7.A.2, 9.2]
444. Zurek, W.H.: Cosmological experiments in superfluid helium? *Nature* **317**, 505 (1985). [7.2.2.2]
445. Zurek, W.H., Dorner, U., Zoller, P.: Dynamics of a quantum phase transition. *Phys. Rev. Lett.* **95**, 105701 (2005). [1.1, 1.3, 7.2.2]

Index

A

Adiabatic approximation, 236, 259
Anderson localisation, 11, 253, 254
ANNNI model in transverse field, 73, 76, 79,
83, 86, 89, 91, 378
Associative memory, 291, 293

B

Bayes formula, 307
Bayesian statistics, 305, 308, 311
BCS Hamiltonian, gap equation, 1, 11,
355–357
Binary symmetric channel (BSC), 306–308,
311
Binder ratio, 120, 121
Bit-error rate, 304, 309, 312, 313, 315–318,
320–325, 327–330, 337, 340, 343–347
Bogoliubov transformation, 19, 39, 43, 186,
358, 370

C

Channel capacity, 311, 324, 333
Channel coding theorem, 324
Chapman-Kolmogorov equation, 266, 277,
278, 286
Combinatorial optimisation problem, 2, 10,
225–229, 244, 304
Commensurate and incommensurate phases, 9,
73, 75, 92
Computational complexity, 228, 261
Concurrence of transverse Ising chain, 26

D

Defect density, 199–203, 256, 361–363
Dilute transverse Ising system, 108
Disorder line, 74, 75, 79, 86, 90
Dynamic phase transition, 203–206, 208, 209

E

Edwards-Anderson model in transverse field,
9, 125, 142, 143, 149
Energy gap, 11, 21, 22, 66, 70, 118, 119, 121,
136, 138, 139, 196, 202, 226, 227, 229,
236, 243–246, 248, 251–257, 259, 270,
357, 358, 372
Entanglement, 9, 24–26, 87, 363
entropy of transverse Ising chain, 24, 25
Ergodicity, 51, 151
strong, 264, 268, 270, 282, 287
weak, 266, 268, 271, 283–286
Error-correcting codes, 11, 303, 305, 310–313,
324, 325, 327, 332, 337, 340
Exact Cover, 238, 239, 252–255
Exact diagonalisation, 9, 27, 83, 84, 86, 87,
135, 151

F

Finite size scaling, 10, 27, 30, 135, 143, 377
Finite temperature estimate, 309
Floating incommensurate phase, 74, 86

G

Gaussian channel, 306, 313, 325, 333
Gibbs sampler, 308
Glauber dynamics, 297
Griffiths phase and singularity, 9, 105,
114–117, 121, 122, 126, 136, 143, 146

H

Harper model, 363, 379
Harris criterion, 107, 108, 113
Hartree-Fock method, 79, 80, 96
Hebb rule, 291, 295
Hopfield model, 11, 291, 293, 294, 296, 297,
301–303, 348, 351, 378
Hopf's theorem, 259, 272

Husimi-Temperley-Curie-Weiss model in transverse field, 55, 56, 59

I

Image restoration, 11, 303, 304, 310–318, 320, 323, 334, 340, 341, 343, 345, 346

Infinite randomness fixed point, 148, 244–246, 270

J

Jordan-Wigner transformation, 1, 6, 11, 17, 18, 38, 117, 185, 355, 357, 358, 364, 368, 377

K

Kibble-Zurek argument, 257, 258

Kink density, 257, 258

Kitaev model, 11, 367–370, 372, 373, 375, 379

L

Landau-Zener problem, 199, 217, 218, 374

Large S analysis, 89–91, 98

Lifshitz point, 75, 77, 90–92

Likelihood, 307, 308, 318–320

Limit cycle, 301, 302

Loading capacity, 293, 294

Lower critical dimension, 10, 55, 124, 148, 168

M

Majumdar-Ghosh chain, 96

Markov chain, 51, 264, 266–268, 270, 277–280, 282, 284, 287, 304, 308, 312, 320, 322, 344

Mass gap, 14–16, 27–30, 34, 35, 66, 77, 85, 88, 103, 117, 118, 136, 137, 151, 359

Master equation, 77, 78, 222, 237, 297

Mattis model in transverse field, 9, 167, 168

MAXCUT, 242

Maximizer of Posterior Marginal (MPM), 303, 304, 308, 309, 312, 313, 316–321, 323, 324, 340, 341, 343–346

Maximum A Posteriori (MAP), 303, 304, 308, 309, 312, 313, 316–319, 321, 322, 340, 341, 343, 348

McCoy-Wu model, 107, 112, 114, 143

Mean field algorithm, 334, 336, 337

N

Neural network, 293, 296

Nishimori temperature, 303, 323

Nishimori-Wong condition, 304, 322, 323

NMR quantum computer, 242

Noisy channel, 305–307, 324

Non-crossing rule, 226, 229, 230, 232, 233, 251, 253, 254

NP, 228

NP-complete, 228, 238, 241, 270

NP-hard, 228, 242, 270

P

P, 228

p -Body Ising ferromagnet, 246

p -Body random Ising model (random energy model), 249

Parity check, 303, 305, 306, 310, 315, 317, 318, 329, 341

Path integral method, 55, 56, 91, 95

Pattern, 291, 292, 294, 296, 301–303, 348, 354

Perron-Frobenius theorem, 259, 274, 276, 277, 280

Peschel-Emery line (one dimensional line), 9, 77, 89, 90

Phase diagram, 1, 2, 4, 9, 10, 29, 34, 36, 46, 49, 56, 59, 61, 63, 73–77, 80, 82–95, 102, 105–107, 112, 113, 121, 126–130, 132, 133, 135, 142, 143, 149, 151, 155, 164, 165, 167, 208, 209, 292–294, 329, 332, 338, 359, 360, 366, 372, 378

of dilute transverse Ising system, 112

of dynamic phase transition, 208, 209

of Hopfield model in transverse field, 293, 294

of pure transverse Ising chain, 360

of random field transverse Ising model, 167, 378

of transverse ANNNI model, 89, 95

of transverse Ising model, 56, 135, 167

of transverse Ising spin glass, 126–128

Posterior, 303, 307–309, 312, 314, 318, 319, 325

Prior, 304, 307, 310, 316, 318, 319, 325, 334

Pure transverse Ising chain, 6, 22, 109, 110, 243, 360, 377

Q

Quantum adiabatic theorem, 226, 232, 233, 236, 255, 258, 262

Quantum annealing, 10, 11, 225–227, 232, 236–246, 252, 253, 255–258, 262, 263, 270–272, 291, 304, 305, 312, 316, 317, 321, 343–348, 378, 379

convergence theorem of, 262, 263, 343

over a first order quantum phase transition, 11, 246, 253, 255

over a second order quantum phase transition, 244, 255, 256

Quantum computer, 226, 242, 270

- Quantum hysteresis, 2, 179, 203, 209, 211, 212
- Quantum Monte Carlo, 9, 49, 50, 53, 87, 114, 120, 121, 126, 127, 143, 147, 149, 246, 252, 255, 262, 263, 271, 296, 297, 304, 322, 337, 340, 341, 343
- Quench of transverse field
 slow, 10, 11, 189, 197, 372, 373, 375
 sudden, 10, 189–191, 196
- R**
- Random field transverse Ising model, 114, 162, 167, 378
- Random field transverse Ising system, 123
- Rate of transmission, 311, 324, 333
- Rayleigh-Schrödinger perturbation theory, 249
- Renormalisation group method, 30, 31, 125
 density matrix, 9, 35, 87
 field theoretic, 66, 67, 83
 real space, 30, 125
- Replica symmetry and its breaking, 10, 136, 149, 151, 155, 176, 226, 329, 331, 332, 334, 378
- Residual energy, 255–258, 270
- RPA, 80, 92, 181
- S**
- Shannon bound, 304, 324, 332, 334
- Sherrington-Kirkpatrick model in transverse field, 10, 123, 125, 127, 135, 149, 169, 183, 226, 237, 238, 291, 292, 294, 297, 303, 313, 339, 378
 with antiferromagnetic bias, 140, 175
- Simulated annealing, 10, 11, 225–227, 237, 238, 240–242, 258, 262, 264, 270, 271, 308, 312, 316, 343–348
- Sourlas codes, 304, 311, 325, 327, 329, 336, 338, 341
- Strong coupling eigenstate method, 28, 85
- Superconducting flux qubits, 242
- Susceptibility, 1, 10, 30, 31, 49–51, 65, 66, 88, 92, 102, 103, 115, 121, 124, 126, 127, 132, 133, 136, 138, 139, 146–148, 151, 168, 180, 182–185, 205, 206, 214, 215, 242
- Suzuki-Trotter method, 365
- Synaptic connection, 295
- Szegő's theorem, 45, 88, 192
- T**
- Thermalisation, 197
- Thermofield dynamical approach, 128
- Thouless-Anderson-Palmer (TAP) equation, 129, 336, 337, 340, 341
- 3-satisfiability, 241
- Tight-binding model, 253, 369
- Time-dependent Bogoliubov-de Gennes equation, 189–191, 198
- Toeplitz determinant, 45, 192, 193, 195
- Travelling salesman problem, 227, 228, 239–241
- Trotter dimension, 10, 49, 54, 69, 70, 86, 93, 107, 134, 149
- U**
- Upper critical dimension, 10, 124, 148, 149
- V**
- Villain model, 241
- X**
- XY model in transverse field, 1, 11, 355–357