References

1. https://www.forbes.com/sites/ibm/2020/01/16/the-quantum-computing-era-is-here-why-it-mattersand-how-it-may-change-our-world/#45629785c2b1
2. Alicki, R.: Quantum error correction fails for Hamiltonian models. Fluct. Noise Lett. (2006). arxiv.org/quant-ph/0411008
3. Haroche, S., Raymond, J.-M.: Quantum computing: dream or nightmare. Phys. Today **49**, 8, 51 (1996)
4. ‘t Hooft, G.: Quantum gravity as a dissipative deterministic system. Class. Quantum Grav. **16**, 3263 (1999). gr-qc/9903084.
5. Kak, S.: General qubit errors cannot be corrected. Inf. Sci. **152**, 195 (2003)
6. Kalai, G.: How quantum computers fail: quantum codes, correlations in physical systems, and noise accumulation. arXiv:1106.0485. https://www.quantamagazine.org/gil-kalais-argument-against-quantum-computers-20180207/
7. Landauer, R.: The physical nature of information. Phys. Lett. A **217**, 188 (1996)
8. Laughlin, R.: https://www.youtube.com/watch?v=iYQSbV_BlI8
9. Levin, L.: Polynomial time and extravagant models (2003). The tale of one-way functions. Probl. Inf. Transm. **39**(1) (2003). https://arxiv.org/pdf/cs/0012023.pdf
10. Wolfram, S.: Undecidability and intractability in theoretical physics. Phys. Rev. Lett. **54**, 735 (1985)
11. Benioff, P.: The computer as a physical system: a microscopic quantum mechanical Hamiltonian model of computers as represented by Turing machines. J. Stat. Phys. **22**, 563 (1980)
12. Manin, Y.: Vychislimoe i nevychislimoe (Computable and Noncomputable). Sov. Radio, pp. 13–15 (1980) (in Russian)
13. Feynman, R.P.: Simulating physics with computers. Int. J. Theor. Phys. **21**, 467 (1982)
14. Deutsch, D.: Quantum theory, the Church-Turing principle and the universal quantum computer. Proc. Roy. Soc. Lond. A **400**, 97 (1985)
15. Shor, P.W.: Algorithms for quantum computation: discrete logarithms and factoring. In: Proceedings of the 35th Annual Symposium on Foundations of Computer Science, p. 124. IEEE Computer Society Press, Los Alamitos, CA (1994)
16. Grover, L.K.: A fast quantum mechanical algorithm for database search. In: Proceedings of the 28-th Annual ACM Symposium on the Theory of Computing, p. 212 (1996)
17. Shor, P.W.: Scheme for reducing decoherence in quantum computer memory. Phys. Rev. A **52**, 2493 (1995)
18. Steane, A.M.: Error correcting codes in quantum theory. Phys. Rev. Lett. **77**, 793 (1996)
19. Ofek, N., Petrenko, A., et al.: Extending the lifetime of a quantum bit with error correction superconducting circuits. Nature **536**, 441 (2016)
20. Calderbank, A.R., Shor, P.W.: Good quantum error-correcting codes exist. Phys. Rev. A **54**, 1098 (1996)

M. I. Dyakonov, *Will We Ever Have a Quantum Computer?*,
SpringerBriefs in Physics, https://doi.org/10.1007/978-3-030-42019-2

21. Aharonov, D., Ben-Or, M.: Fault-tolerant quantum computation with constant error rate. In: Proceedings of the 29th Annual ACM Symposium on the Theory of Computation, p. 176, ACM Press, New York (1998). arXiv:quant-ph/9611025, http://arXiv:quant-ph/9906129
22. Knill, E.: Extracting information from qubits-environment correlations. Nature **463**, 441 (2010)
23. Aliferis, P., Gottesman, D., and Preskill, J.: Accuracy threshold for post selected quantum computation. Quantum Inf. Comput. **8**, 181 (2008). arXiv:quant-ph/0703264
24. D-wave systems. https://en.wikipedia.org/wiki/D-Wave_Systems
25. https://docs.dwavesys.com/docs/latest/c_gs_2.html, https://en.wikipedia.org/wiki/D-Wave_Systems#History
26. https://en.wikipedia.org/wiki/Pi_Josephson_junction
27. https://en.wikipedia.org/wiki/Josephson_effect
28. Likharev, K.K.: Dynamics of Josephson Junctions and Circuits. Gordon and Breach Publications, New York (1986)
29. King, A.D., Carrasquilla, J., et al.: Observation of topological phenomena in a programmable lattice of 1,800 qubits. Nature **560**, 456 (2018)
30. Chen, Y., Neill. C., et al.: Phys. Rev. Lett. **113**, 220502 (2014). https://arxiv.org/pdf/1402.7367.pdf
31. Arute, F., et al.: Quantum supremacy using a programmable superconducting processor. Nature **574**, 505 (2019). https://www.nature.com/articles/s41586-019-1666-5
32. https://www.quantamagazine.org/google-and-ibm-clash-over-quantum-supremacy-claim-20191023/
33. Foxen, B., et al.: Demonstrating a continuous set of two-qubit gates for near-term quantum algorithms. https://arxiv.org/abs/2001.08343
34. Quantum Manifesto. https://qt.eu/app/uploads/2018/04/93056_Quantum Manifesto_WEB.pdf
35. A quantum information science and technology roadmap, Part 1: quantum computation, report of the quantum information science and technology experts panel. http://qist.lanl.gov/qcomp-map.shtml
36. National academies of sciences, engineering, and medicine, quantum computing: progress and prospects. National Academies Press, Washington, DC (2018). https://doi.org/10.17226/25196
37. Bravyi, S.: Universal quantum computation with the $\nu = 5/2$ fractional quantum Hall state. Phys. Rev. A **73**, 042313 (2006). arXiv: quant-ph/0511178
38. Wilczek, F. (ed.): Fractional Statistics and Anyon Superconductivity. World Scientific, Singapore (1990)
39. Kitaev, A.Y.: Fault-tolerant quantum computation by anyons. Ann. Phys. **303**, 2 (2003). arXiv:quant-ph/9707021
40. Moore, J.E.: The birth of topological insulators. Nature **464**, 194 (2010)
41. Wilczek, F.: Majorana returns. Nat. Phys. **5**, 614 (2009)
42. Lian, B., Sun, X.-Q., et al.: Topological quantum computation based on chiral Majorana fermions. Proc. Nat. Acad. Sci. USA **115**(43), 10938 (2018)
43. Pade, J.: Quantum Mechanics for Pedestrians 1: Fundamentals. Springer (2014)
44. Shor, P.: Fault-tolerant quantum computation. In: 37th Symposium on Foundations of Computing, pp. 56–65. IEEE Computer Society Press (1996). arxiv.org/quant-ph/9605011
45. Preskill, J.: Fault-tolerant quantum computation. In: Lo, H.-K., Papesku, S., Spiller, T. (eds.) Introduction to Quantum Computation and Information, pp. 213–269. World Scientific, Singapore (1998). arxiv.org/quant-ph/9712048
46. Gottesman, D.: An introduction to quantum error correction. In: Lomonaco Jr., S.J. (ed.) Quantum Computation: A Grand Mathematical Challenge for the Twenty-First Century and the Millennium, pp. 221–235. American Mathematical Society, Providence, Rhode Island (2002). arxiv.org/quant-ph/0004072
47. Steane, A.M.: Quantum computing and error correction. In: Gonis, A., Turchi, P. (eds.) Decoherence and its Implications in Quantum Computation and Information Transfer, pp. 284–298. IOS Press, Amsterdam (2001). arxiv.org/quant-ph/0304016
48. Steane, A.M.: Overhead and noise threshold of fault-tolerant quantum error correction. Phys. Rev. A **68**, 042322 (2003)

49. Kribs, D., Laflamme, R., Poulin, D.: A unified and generalized approach to quantum error correction. Phys. Rev. Lett. **94**, 180501 (2005)
50. Kak, S.: General qubit errors cannot be corrected. Inf. Sci. **152**, 195 (2003). arxiv.org/quant-ph/0206144
51. Aharonov, D.: Quantum computation. In: Stauffer, D. (ed.) Annual Reviews of Computational Physics, p. 259. World Scientific, VI (1999). arXiv:quantph/98120
52. Because of this similarity, it is quite probable that the design and the theory of such machines will become the next hot topic, especially if a good name (beginning with the magic word "quantum") for this activity will be invented
53. Dyakonov, M.I.: Quantum computing: a view from the enemy camp. In: Luryi, S., Xu, J., Zaslavsky, A. (eds.) Future Trends in Microelectronics. The Nano Millennium, p. 307, Wiley (2002). arXiv:cond-mat/0110326
54. Dyakonov, M.I.: Prospects for quantum computing: extremely doubtful. Int. J. Mod. Phys.Conf. Ser. **33**, 1460357 (2014). arxiv:1401.3629
55. Sastry, S.: Nonlinear Systems: Analysis, Stability and Control. Springer (1999)
56. Gutzwiller, M.C.: Chaos in Classical and Quantum Mechanics. Springer, New York (1990)
57. Vandersypen, L.M.K., et al.: Experimental realization of Shor's quantum factoring algorithm using nuclear magnetic resonance. Nature **414**, 883 (2001)
58. Lanyon, B.P., et al.: Experimental demonstration of a compiled version of Shor's algorithm with quantum entanglement. Phys. Rev. Lett. **99**, 250505 (2007)
59. Lucero, E., et al.: Computing prime factors with a Josephson phase qubit quantum processor. Nat. Phys. **8**, 719 (2012). arXiv:1202.5707
60. Beckman, D., et al.: Efficient networks for quantum factoring. Phys. Rev. A **54**, 1034 (1996). arXiv:quant-ph/9602016
61. Martin-López, E., et al.: Experimental realization of Shor's quantum factoring algorithm using qubit recycling. Nat. Photonics, **6**, 773 (2012). arXiv:1111.4147
62. Dyakonov, M.I.: Is fault-tolerant quantum computation really possible? In: Luryi, S., Xu, J., Zaslavsky, A. (eds.) Future Trends in Microelectronics. Up the Nano Creek, p. 4. Wiley (2007). arXiv:quant-ph/0610117
63. Twain, M.: A Connecticut Yankee in King Arthur's Court, Chapter 24 (1889). http://www.gutenberg.org/files/86/86-h/86-h.htm
64. To put it bluntly, one should refrain from proving theorems about systems and phenomena of which one has no profound understanding
65. Hašek, J.: The Fateful Adventures of the Good Soldier Švejk During the World War (translated by Sadlon, Z.K.). SAMIZDAT (2007). amazon.com/Fateful-Adventures-Soldier-Svejk-During/dp/1585004286
66. Banach, S., Tarski, A.: Sur la décomposition des ensembles de points en parties respectivement congruents. Fundam. Math. **6**, 244 (1924)
67. www.wikipedia.org/wiki/Banach_Tarski
68. Nasreddin Hodja was a populist philosopher and a wise man believed to have lived around 13-th century during the Seljuq dynasty and remembered for his funny stories and anecdotes. The International Nasreddin Hodja fest is celebrated annually in July in Aksehir, Turkey every year
69. Knill, E.: Quantum computing. Nat. Phys. **463**, 441 (2010)
70. When a spin relaxation time of 10 ns is measured, instead of 1 ns previously, this is heralded as another breakthrough on the way to quantum computing
71. Dyakonov, M.I.: State of the art and prospects for quantum computing. In: Luryi, S., Xu, J., Zaslavsky, A. (eds) Future Trends in Microelectronics. Frontiers and Innovations, p. 266. Wiley (2013). arXiv:1212.3562
72. Dyakonov, M.I.: Revisiting the hopes for scalable quantum computation. JETP Lett. **98**, 514 (2013). arXiv:1210.1782
73. Dyakonov, M.: The case against quantum computing. IEEE Spectr. **56**(3), 24 (2019)
74. Dyakonov, M.I.: When will we have a quantum computer? Solid State Electron. **155**, 4 (2019)

Index

M. I. Dyakonov, *Will We Ever Have a Quantum Computer?*,
SpringerBriefs in Physics, https://doi.org/10.1007/978-3-030-42019-2