

Quantum Computing Fundamentals

Quantum computing was first proposed by Feynman [1] as a way to simulate quantum systems efficiently.

The field has since evolved significantly, with foundational textbooks [2] establishing the theoretical framework.

Quantum Algorithms

Shor's algorithm [3] demonstrated polynomial-time factoring, threatening current cryptographic systems.

$$|\psi\rangle = \alpha |0\rangle + \beta |1\rangle \quad (1)$$

The general qubit state shown in Equation 1 represents a superposition of basis states.

Bibliography

- [1] R. P. Feynman, "Simulating Physics with Computers," *International Journal of Theoretical Physics*, vol. 21, no. 6-7, pp. 467-488, 1982.
- [2] M. A. Nielsen and I. L. Chuang, *Quantum Computation and Quantum Information*, 10th Anniversary Edition. Cambridge University Press, 2010.
- [3] P. W. Shor, "Algorithms for quantum computation: discrete logarithms and factoring," in *Proceedings 35th Annual Symposium on Foundations of Computer Science*, 1994, pp. 124-134.