

# Quantum Computing

– Quantum Mechanics, Information Theory, Hardware, Software, Algorithmics, Perspectives –

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## Abstract

From the initial empirical evidence of the wave-particle duality of the nature of matter provided by Young's double-slit experiment over the previously postulated Newton's corpuscular theory, over contributions by Boltzmann, Planck, Heisenberg, Schrödinger, Hilbert, and others to the design and operation of first computer systems that will help accelerate in-depth investigations towards the building of quantum computers, this presentation of quantum computing covers key research in quantum mechanics that led us to where we are today as well as previous and current developments in hardware, software, and algorithmics. The latter is presented tightly coupled to challenging applications not sufficiently or not at all served by traditional computing systems. Perspectives of the field and conclusions rounded up this treatment.

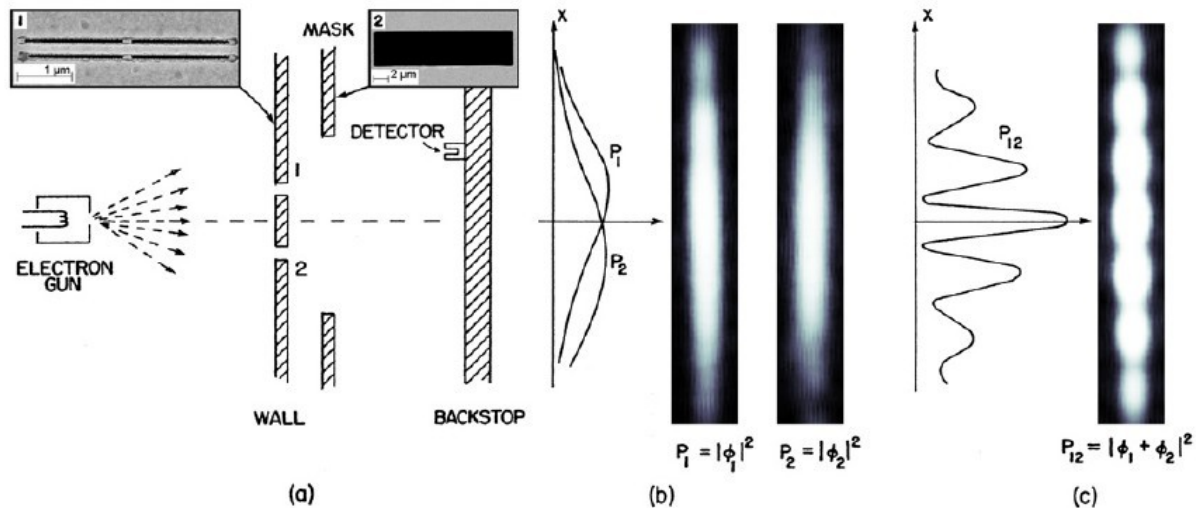


Figure 1: Double-Slit Experiment, from [Bac2013]

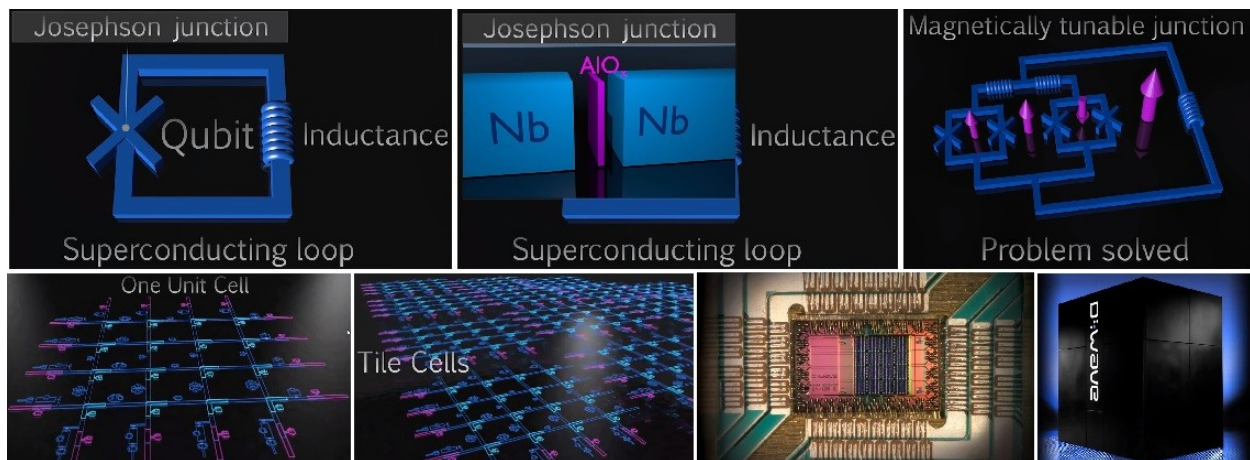


Figure 2: From a Qubit to a Quantum Computer [D-Wave]