

Quantum Cryptography: A Comprehensive Study

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Abstract: *Quantum cryptography leverages the principles of quantum mechanics to enhance security in communication systems, addressing the vulnerabilities inherent in classical cryptographic methods. This paper explores the theoretical foundations, practical implementations, and the potential future of quantum cryptography. Emphasizing quantum key distribution (QKD) protocols like BB84 and E91, it examines the advancements, challenges, and real-world applications of quantum cryptography. The study combines an extensive review of literature, a detailed methodology, and a comprehensive analysis to present a holistic view of the current state and future prospects of quantum cryptography*

Keywords: Quantum Cryptography, Quantum Key Distribution, BB84 Protocol, Quantum Mechanics, Information Security