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Quantum Disruption and the Demise of Encryption: A Jurisprudential Inquiry into the Post-Quantum Reconfiguration of Data Protection Normativity

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Abstract: Quantum computing poses a structural challenge to contemporary cryptographic infrastructures that underpin digital governance, financial systems, and cross-border data flows. As quantum capabilities advance, widely deployed encryption standards risk obsolescence, exposing systemic vulnerabilities within cloud architectures, blockchain ecosystems, and global data protection regimes. This paper critically explores the convergence of Quantum Computing, Post- Quantum Cryptography (PQC) and international regulatory frameworks. It analyses the preparedness of key jurisdictions such as the European Union, the United States, Japan, China and Singapore, in embedding quantum-resilient standards into cybersecurity and data privacy laws. The paper proposes prospective strategies for building harmonized governance mechanisms and developing agile regulatory mechanisms that can evolve alongside quantum technological progress. Securing data against quantum threats is not solely a technical imperative but a pressing legal and geopolitical priority in the evolving architecture of digital sovereignty.

Keywords: Quantum Computing, Post-Quantum Cryptography, Data Protection, Cybersecurity Law, Cloud Ecosystems, International Legal Systems

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