Quantum Entanglement and Its Applications in Modern Technology

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Abstract. This article explores the phenomenon of quantum entanglement, a cornerstone of quantum mechanics, and its implications for modern technology. We discuss recent advancements in quantum computing, cryptography, and communication systems that leverage entangled states. The potential for quantum entanglement to revolutionize data security and processing speeds is enormous. We also address the challenges in maintaining entangled states over long distances and the technological innovations aimed at overcoming these barriers.

Keywords: Quantum Entanglement, Quantum Computing, Cryptography, Quantum Communication, Data Security

Introduction

Quantum entanglement is a fundamental concept in quantum mechanics, describing a situation where the quantum states of two or more objects become interconnected. This phenomenon has intrigued physicists since its inception and has led to significant breakthroughs in technology. In this paper, we explore how quantum entanglement is being harnessed in various technological domains, such as quantum computing and secure communication systems. We discuss the theoretical foundations and practical applications, while highlighting the current challenges and future prospects.

References

1. Ambrosone, A., Scotto di Vettimo, M. R., Malvindi, M. A., Roopin, M., Levy, O., Marchesano, V., ... & Tino, A. (2014). Impact of amorphous SiO2 nanoparticles on a living organism: morphological, behavioral, and molecular biology implications. Frontiers in bioengineering and biotechnology, 2, 37.

2. Ambrosone A, Scotto di Vettimo MR, Malvindi MA, et al. Impact of amorphous SiO2 nanoparticles on a living organism: morphological, behavioral, and molecular biology implications. Front Bioeng Biotechnol. 2014;2:37.