From Ultra-Secure Quantum Networks to Distributed Quantum Computing









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Ivan B. Djordjevic

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Quantum Networking Rodney Van Meter, 2014-05-09 Quantum networks build on entanglement and quantum measurement to achieve tasks that are beyond the reach of classical systems Using quantum effects we can detect the presence of eavesdroppers raise the sensitivity of scientific instruments such as telescopes or teleport quantum data from one location to another Long distance entanglement can be used to execute important tasks such as Byzantine agreement and leader election in fewer rounds of communication than classical systems improving the efficiency of operations that are critical in distributed systems Quantum Networks Ming-Xing Luo, 2024-10-22 This book provides a comprehensive overview of the rapidly advancing research in quantum networks both in theory and application While the classical internet has become essential in our daily lives its communication techniques have limitations such as vulnerability to interception and eavesdropping Quantum networks by transmitting quantum gubits address these security concerns using the principles of quantum mechanics such as superposition no cloning and Heisenberg uncertainty Kimble first proposed the concept of a quantum internet in 2008 envisioning a network that harnesses quantum devices and laws to transmit information Wehner and colleagues reviewed the steps necessary to achieve a quantum internet in 2018 outlining development stages leading to increasingly powerful applications While a fully functional quantum internet is still in progress significant advances have been made through experiments such as satellite based quantum key distribution networks and quantum metropolitan area networks This book aims to provide a unified theoretical framework for students and researchers interested in the quantum internet offering insights into topics like network communication theory secure communication distributed computation nonlocality and quantum configuration By presenting cutting edge research and potential applications in the field of quantum information processing including the quantum internet this book stands out as a valuable resource for beginners undergraduate students graduate students and researchers in physics computer science and information science It bridges the gap between theoretical perspectives and practical applications offering a comprehensive guide to the exciting possibilities of quantum networks Wireless Quantum Networks, Volume 1 Savo G. Glisic, 2023-06-07 This is a comprehensive description of the principles algorithms design technology quantum machine learning and quantum physics in quantum computing and communications Unifying several disciplines in the field especially computing and communication the book also covers computing and artificial intelligence quantum machine learning quantum cyber security quantum circuit design and relative quantum physics phenomena Based on the latest results in the field enabling the reader researcher to understand these interrelations of a complex system in practice the book moves from introductory to advanced level step by step providing a self contained text Undergraduate and postgraduate students will find several DESIGN EXAMPLES to replace the classical concept of using problems and solutions addendums at the end of the chapters book This enables offering more sophisticated assignments for the teamwork of the students This is a stand alone volume and onward reading is

available in Volume 2 Quantum Vs Post Quantum Security Algorithms and Design Technology Topics covered in Volume 1 include Visible Light Communication Terahertz Communications Optical Wireless Communications Quantum Key Distribution over THz band Deep Neural Networks Quantum Network Routing and Technology Design Quantum Machine Learning and An Introduction to Quantum Communication Networks Mohsen Razavi, 2018-05-25 With the fast pace of developments in quantum technologies it is more than ever necessary to make the new generation of students in science and engineering familiar with the key ideas behind such disruptive systems This book intends to fill such a gap between experts and non experts in the field by providing the reader with the basic tools needed to understand the latest developments in quantum communications and its future directions This is not only to expand the audience knowledge but also to attract new talents to this flourishing field To that end the book as a whole does not delve into much detail and most often suffices to provide some insight into the problem in hand The primary users of the book will then be students in science and engineering in their final year of undergraduate studies or early years of their post graduate programmes Quantum Networks and Their Applications in AI Ananth, Christo, Ibrahim Khalaf, Osamah, Anand, Jose, 2024-08-15 The union of quantum networks and artificial intelligence marks a pivotal moment in the trajectory of technological advancement This encompasses data security optimization finance high precision sensors simulations and computer applications Numerous quantum information and processing systems have been created and proven in labs fields and commercial settings during the last few decades Quantum technologies have received considerable support for research and development from corporations and governments However considerable work is required to bring quantum technology based gadgets and systems to consumers homes Quantum Networks and Their Applications in AI investigates the potential uses of artificial intelligence and related technologies in quantum networks and to educate the computational intelligence community about current advances in quantum information technology. The purpose of this research topic is to bring together individuals from academia and industry from the classical and quantum artificial intelligence communities in order to discuss the theory technology and applications of quantum technologies and to exchange ideas on how to efficiently advance the engineering and development of this fascinating field Covering topics such as machine learning management systems and quantum networks this book is a valuable resource for computer scientists engineers professionals researchers academicians government officials policy Wireless Quantum Networks, Volume 2 Savo G. Glisic, 2023-06-27 This is a comprehensive description makers and more of the principles algorithms design technology quantum machine learning and quantum physics in quantum computing and communications Current work on quantum computers is motivated by the need for significantly faster and more powerful computers and there are already in use so called near term quantum computers with initial reduced capabilities used for research and further enhancement of the technology The outcome is distributed quantum computing which requires quantum networks to enable connections between such computers which is a focus of this book Moving from introductory to advanced

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