

Introduction to the Issue on Quantum Communication and Cryptography

WELCOME to the IEEE JOURNAL OF SELECTED TOPICS IN QUANTUM ELECTRONICS (JSTQE) issue on Quantum Communication and Cryptography. In the last decade, we have witnessed dramatic changes in research related to quantum cryptography: from proof-of-principle experiments to the construction of practical quantum key distribution (QKD) systems over installed fiber networks. In line with the goal of providing a practical and potentially ultimate means of network security, current QKD systems take account of possible security loopholes resulting from imperfections in their implementation. Moreover, a broad spectrum of research has been ongoing on constructing scalable quantum communication networks based on quantum repeaters. The topics of this research range from the development of basic network components such as single photon sources and quantum memories, to new architectures for efficient quantum networking.

The object of this issue is to provide a brief overview of this rapidly changing field of quantum communication. We hope that readers will benefit from this glimpse at on-going research and that they will find hints for future innovation by reading the selected papers. The papers published in this issue cover a broad range of topics related to quantum communication, summarized in the sections on single-photon detectors, entangled photons, quantum communication, and quantum cryptography. These key research topics highlight the current status and future trends in the field of quantum communication and cryptography.

This issue contains 26 papers, including 13 invited papers authored by well-regarded research groups and promising scientists from all over the world. The invited papers include extended reviews on recent progress on quantum communications, including topics such as novel QKD protocols, quantum network architectures, photonic quantum devices, and QKD security.

We hope you will find this JSTQE issue on Quantum Communication and Cryptography to be an interesting and useful reference that will stimulate your studies in quantum communication.

ACKNOWLEDGMENT

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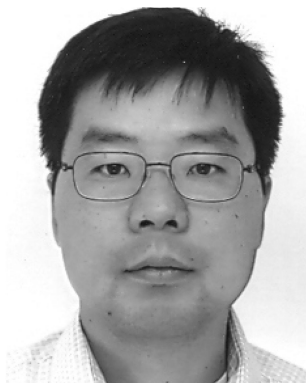


Eleni Diamanti received the Diploma degree in electrical and computer engineering from the National Technical University of Athens, Athens, Greece, in 2000, and the Ph.D. degree in electrical engineering from Stanford University, Stanford, CA, USA, in 2006, on the topic of the security and implementation of differential phase shift quantum key distribution protocols. She then worked as a Marie Curie Postdoctoral Scholar at the Institut d'Optique Graduate School, France, on a continuous-variable quantum key distribution platform, before joining Telecom ParisTech, France, as a CNRS Researcher in 2009. Her research interests include the field of theoretical and experimental quantum cryptography and quantum information networks.

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