Quantum Communications

- The text shows the student how to apply quantum mechanical ideas for the next generation of telecommunications technology
- End-of-chapter problems and experiment together with worked examples help the student to assimilate knowledge stage by stage
- Shows the reader how to apply theoretical knowledge of quantum physics and quantum information to practical telecommunications systems
- Demonstrates the systematic application of the technique of “square root measurement” for the evaluation of the performance of quantum communication systems both in absence and in the presence of thermal noise, for both binary and multilevel systems
- Solutions manual for problems provided to instructors as supplementary material

This book demonstrates that a quantum communication system using the coherent light of a laser can achieve performance orders of magnitude superior to classical optical communications. Quantum Communications provides the Masters and PhD signals or communications student with a complete basics-to-applications course in using the principles of quantum mechanics to provide cutting-edge telecommunications. Assuming only knowledge of elementary probability, complex analysis and optics, the book guides its reader through the fundamentals of vector and Hilbert spaces and the necessary quantum-mechanical ideas, simply formulated in four postulates. A turn to practical matters begins with and is then developed by: development of the concept of quantum decision, emphasizing the optimization of measurements to extract useful information from a quantum system; general formulation of a transmitter–receiver system particular treatment of the most popular quantum communications systems—OOK, PPM, PSK and QAM; more realistic performance evaluation introducing thermal noise and system description with density operators; consideration of scarce existing implementations of quantum communications systems and their difficulties with suggestions for future improvement; and separate treatment of quantum information with discrete and continuous states.