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**MAJOR RESEARCH INTERESTS**

The scientists at the Centre for Quantum Technologies perform theoretical and experimental research in the multidisciplinary field of quantum information science where physics merges with information theory, discrete mathematics, computer science, and other fields. Presently, my own interest focuses on various subjects, including the design and analysis of novel schemes for quantum cryptography, that is: secure distribution of cryptographic keys whereby the laws of quantum physics protect the privacy; the foundations of quantum mechanics – such as quantitative aspects of wave-particle duality or the classification of quantum degrees of freedom; spin-polarized currents in non-ferromagnetic metals; and, most recently, ultracold fermionic atoms in two-dimensional lattices.

**SOME RELEVANT PUBLICATIONS**

- M. O. Scully, BGE, and H. Walther, *Quantum optical tests of complementarity*, Nature **351**, 111–116 (1991).
- *Fringe Visibility and Which-Way Information: An Inequality*, Physical Review Letters **77**, 2154–2157 (1996).
- J. A. Bergou and BGE, *Heisenberg's dog and quantum computing*, Journal of Modern Optics **45**, 701–711 (1998).
- BGE and Y. Aharonov, *The mean king's problem: Prime degrees of freedom*, Physics Letters A **284**, 1–5 (2001).
- D. Kaszlikowski, L. C. Kwek, M. Żukowski, and BGE, *Information-theoretic approach to single-particle and two-particle interference in multi-path interferometers*, Physical Review Letters **91**, art. 037901 (4 pages) (2003).
- Y. C. Liang, D. Kaszlikowski, BGE, L. C. Kwek, and C. H. Oh, *Tomographic Quantum Cryptography*, Physical Review A **68**, art. 022324 (9 pages) (2003).
- D. Kaszlikowski, A. Gopinathan, Y. C. Liang, L. C. Kwek, and BGE, *Quantum Cryptography: Security Criteria Reexamined*, Physical Review A **70**, art. 032306 (5 pages) (2004).
- D. Kaszlikowski, J. Y. Lim, L. C. Kwek, and BGE, *Coherent Eavesdropping Attacks in Quantum Cryptography: Nonequivalence of Quantum and Classical Key Distillation*, Physical Review A **72**, art. 042315 (5 pages) (2005).
- J. Řeháček, BGE, and D. Kaszlikowski, *Minimal qubit tomography*, Physical Review A **70**, art. 052321 (13 pages) (2004).
- J. Řeháček, BGE, and D. Kaszlikowski, *Iterative procedure for computing accessible information in quantum communication*, Physical Review A **71**, art. 054303 (4 pages) (2005).
- BGE, D. Kaszlikowski, H. K. Ng, W. K. Chua, J. Řeháček, and J. Anders, *Highly Efficient Quantum Key Distribution With Minimal State Tomography*, eprint arXiv:quant-ph/0412075.
- BGE, K. L. Lee, A. Mann, and M. Revzen, *Periodic and discrete Zak bases*, Journal of Physics A: Mathematical and General **39**, 1669–1682 (2006).
- S. M. Assad, J. Suzuki, and BGE, *Raw-data attacks in quantum cryptography with partial tomography*, International Journal of Quantum Information **4**, 1003–1012 (2006).
- C. Miniatura, C. A. Müller, Y. Lu, G. Wang, and BGE, *Path distinguishability in double scattering of light by atoms*, Physical Review A **76**, art. 022101 (4 pages) (2007).

**Books**

- *Lectures on Quantum Mechanics* (in three companion volumes, World Scientific, Singapore 2006).
- G. Chen, D. A. Church, BGE, C. Henkel, B. Rohwedder, M. O. Scully, and M. S. Zubairy, *Quantum Computing Devices: Principles, Designs and Analysis* (Chapman & Hall/CRC, Boca Raton 2006).

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