

Quantum cryptography using practical photonic systems

The ability to distribute secret keys with information-theoretic security is undoubtedly one of the most important achievements of quantum information science. Quantum key distribution (QKD) protocols in which the key information is encoded on quantum continuous variables (CV), such as the values of the quadrature components of coherent states of light, present the advantage that they require only standard telecommunication technology, and in particular that they do not use photon counters. In this talk, after an overview of both discrete and continuous-variable QKD protocols, we will present the state-of-the-art in long-distance fibre-optic experiments for CV-QKD and the development of silicon photonic chips for such systems, which opens the way to their widespread use for high-security applications. We will also present recent implementations of other important quantum cryptographic tasks, enabling for instance flipping quantum coins or transactions with quantum money, that will be at the heart of future quantum communication networks.