Quantum key distribution by using double entanglement

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Abstract

I propose a scheme for quantum key transmission based on bi-photons which are doubly-entangled both in polarisation and phase. I show, analysing different transmission protocols, that an eventual eavesdropper is bound to introduce a larger error on the quantum communication than for a single entangled bi-photon communication, when he steels the same information (e.g. 19/6 larger for BB84 when the eavesdropper uses the Breidbart basis).

Keywords: quantum cryptography and cryptographical protocols