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Some communication protocols using entangled quantum states as channels

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It has been established through research activities over the last three decades that it is possible to make communications using quantum mechanical resources. A pioneering quantum communication protocol appeared in the work of Bennet *et. al* in 1993 which is known as quantum teleportation protocol. It is a process for transferring information through entangled channels. The work was followed by a large number of research works focusing on the extension of the process as well as for inventing protocols of similar types for performing various jobs of information and state transfer. There have been experimental realizations of some of these protocols. At the heart of these process lies the idea of quantum entanglement. The idea of entanglement can be traced back to the works of Einstein, Podolsky and Rosen in 1935. Its potential applications have been discovered during last two decades. There are various types of entanglements between two or more parties who, in the contexts of quantum communication, are the senders, receivers and possible controllers of the process. Here we present some teleportation protocols where the purpose is to transmit multiqubit entangled states. We present the use of quantum channels which are robust in the noisy environment. Noise is a serious concern for all communication systems. This can create devastation in the communication process. For that purpose we present the use of concatenated channels which are more stable against noise. Our protocols are perfect teleportation protocols, that is, there are no cases of failures.

Biography

Binayak S Choudhury is a Professor of Mathematics, Indian Institute of Engineering Science and Technology, Shibpur, West Bengal, India. He obtained his PhD degree in Applied Mathematics from University of Calcutta in 1995. He has published about 200 research papers in Mathematics and Physics. He has guided 14 PhD students. His areas of research interest include Functional Analysis, Quantum Information Theory and Cosmology.

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