论文

基于高维两粒子纠缠态的超密编码方案

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摘要：

基于通信双方预先共享d维二粒子最大纠缠态非定域相关性,信息发送方Bob只需要向信息接收者Alice传送一个粒子,就可以传送$\log d_2^2$比特经典信息,为保护信息的安全,方案采用诱骗光子技术,安全性等价于改进后的原始量子密钥分配方案（Bennett-Brassard 1984,BB84）.本文讨论了基于高维纯纠缠态超密编码方案.即通过引入一个附加量子比特,信息接收方对手中的纠缠粒子和附加粒子在执行相应的幺正演化,可以获取$d\alpha k_2\log d_2 + \log d_2$（$\alpha k = \min \alpha j, j \in 0, L, d-1$）比特经典信息.通信双方采用诱骗光子技术确保量子信道的安全建立.与其他方案相比,该方案具有通信效率较高、实用性较强的优点.

关键词： 量子纠缠　Bell态　安全性分析　量子超密编码

Quantum Superdense Coding Scheme Based on High-dimensional Two-particles System

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Abstract:

 The author presents a generalized superdense coding scheme based on high-dimensional two particles maximally entangled state following some ideas of superdense coding scheme based on four-dimensional two particles.The quantum superdense coding based on noisy quantum channel was discussed.The receiver（Alice）can extract $d\alpha k_2 \log d_2 + \log d_2$ （$\alpha k = \min \alpha j, j \in 0, L, d-1$）bits classic information by introducing one auxiliary two-level particle and perfprming corresponding unitray operation on her particles.All the parties can use some decoy photons to set up their quantum channel securely.The scheme only requires pure entangled state,which makes this scheme more convenient than others in practical application.Moreover,it has the advantage of having high communication efficiency.

Keywords: Quantum entangled state　Bell state　Security analyse　Quantum superdense coding

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