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Optical wireless quantum communication coding system using decimal convertor

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Abstract In this study, a system of microring resonators and an add/drop filter are used to generate a large bandwidth signal as a localized multi wavelength, applicable for continuous dense coding and continuous variable encoding generation. This technique uses the Kerr nonlinear type of light in the MRR to generate multi wavelength of bright and dark soliton for quantum network cryptography. Afterwards, generated bright and dark optical pulses are converted into digital logic quantum codes using a decimal convertor system in which transmission of secured information are performed via an optical wireless communication system. Results show that ranges of multi bright and dark soliton wavelengths from 1.45 to 1.65 μm with central wavelength of 1.55 μm could be simulated, where the FWHM and FSR of 50 and 1,440 pm are obtained, respectively.

Keywords Continuous dense coding (CDC) · Decimal convertor · Microring resonator · Optical wireless communication system

1 Introduction

Quantum communication refers to the distribution of quantum states between two parties, traditionally called Alice and Bob. The quantum states could be entangled states or quantum dense coding (Bennett and Wiesner 1992). Many of the initial works in quantum communication applied discrete quantum variables. However, continuous variables are verified to be appropriate for a quantum communication (Andersen et al. 2009). Quantum key distribution (QKD) is another major branch of quantum communication. It concerns with the establishment of a joint secret key between Alice and Bob, through a quantum channel (Scarani et al. 2009). QKD techniques have been considered as a useful component in network communication systems that need high security (Elliott 2002). Currently, there are large numbers of private networks around the world which offer consumers' desired secured and private

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