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Generation of Bi-partite Polarization Correlation using Coherent States for Quantum Communication VIKTOR BOLLEN, YONG MENG SUA, KIM FOOK LEE, Michigan Technological University — We present a novel scheme to generate bi-partite polarization correlation using coherent states for quantum communication. The scheme can be used for entanglement based quantum cryptography, where the bi-partite correlation will be protected by quantum noise. We perform experimental measurement on two independent coherent states with low mean photon numbers. A coherent state with polarization H is mixed with another coherent state with polarization V through a beam splitter. Polarization correlation is manipulated by using a quarter wave plate and a linear polarizer at each output of the beam splitter. The product signal obtained from the output modes contains bi-partite correlation and other noise terms. We obtain the bi-partite correlation function by employing mean-value measurement based on Stapp's formulation on the product signal, where the noise term is then averaged to zero due to randomness of quantum phase noise. The bi-partite correlation obtained by using two coherent states is quantum correlation because coherent states with low mean photon numbers are involved and the correlations are protected by randomness of quantum noise as inherited by mean photon number fluctuation and its associated phase fluctuation. Preparations for four types of coherent-state polarization correlation functions are also outlined.

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