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Intrinsic Quantum Correlations of Weak Coherent States for Quantum Communication YONG MENG SUA, ERIN SCANLON, TRAVIS BEAULIEU, VIKTOR BOLLEN, KIM FOOK LEE, Michigan Technological University — Intrinsic quantum correlations of weak coherent states are observed between two parties, which can be used as a supplement to the existence decoy-state BB84 and differential phase-shift quantum key distribution protocols. In a proof-of-principle experiment, we generate bi-partite correlations of weak coherent states using weak local oscillator fields in two spatially separated balanced homodyne detections. We employ non-linearity of post-measurement method to obtain the bi-partite correlations from two single-field interferences at individual homodyne measurement. This scheme is then used to demonstrate bits correlations in a transmission fiber over a distance of 10 km. We believe that the scheme can add another physical layer of security to these protocols for quantum key distribution and implement linear optics quantum computing with weak coherent states.

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