FSO/CV-QKD/QBaudSK system based on 2PolSK-BPSK scheme considering dynamical atmospheric conditions

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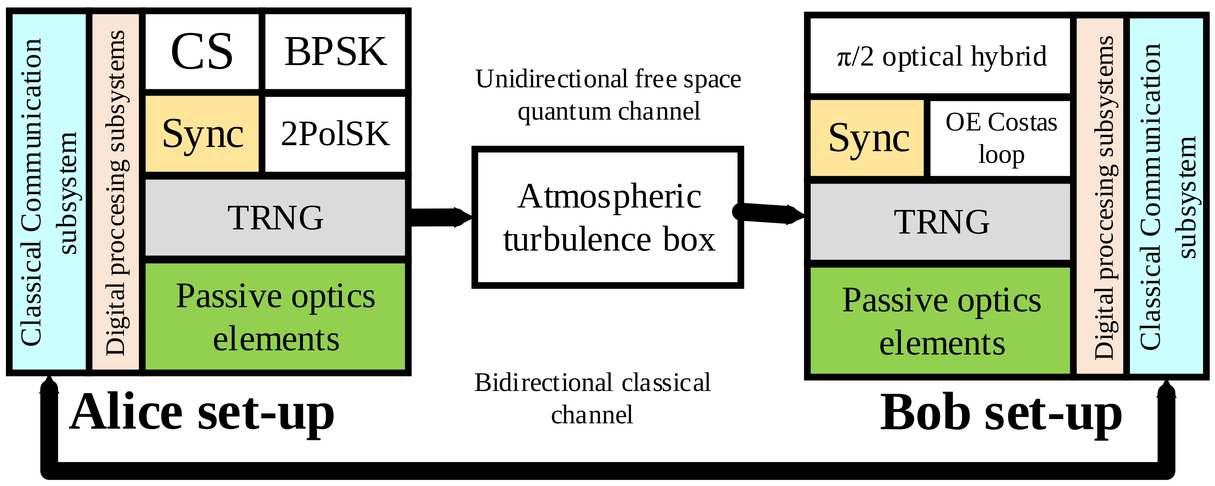
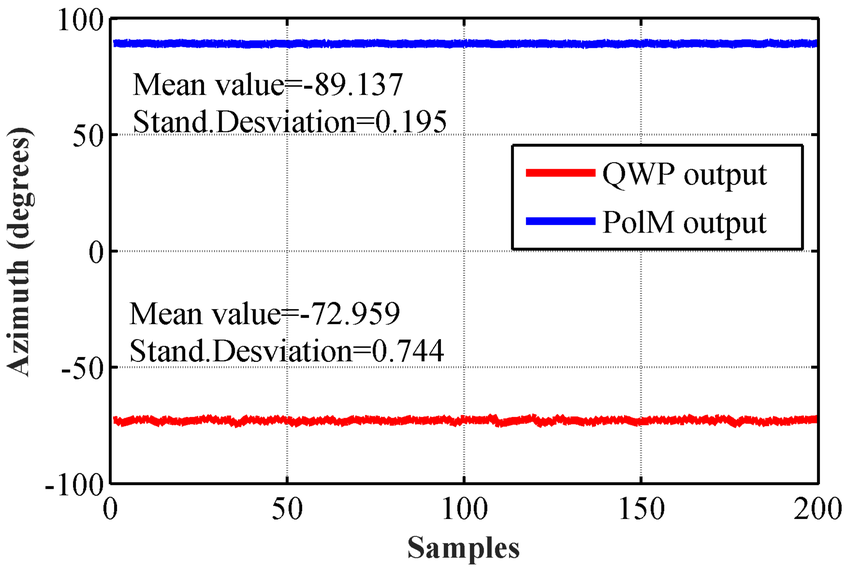
EXPERIMENTAL SET-UP

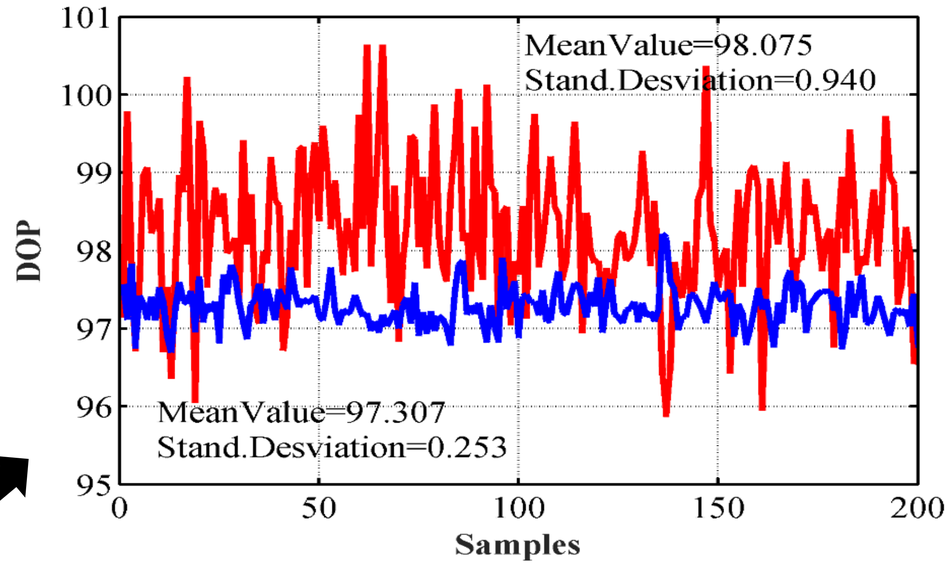
Alice uses a laser (λ=1550.1 nm) to generates Coherent States (CS) with diffused phase / Phase Modulator (PM) modifies the optical phase based on a BPSK scheme and a PolM modifies the SOP related to the 2PolSK modulation scheme / The PM and PolM are drives by digital TRNG / After, Alice and Bob use an optical signal of 100nW and 2mW (necessary for reach the Standard Quantum Limit, SQL) / At the Bob's side, a free space π/2 optical hybrid uses the SOPs of the two optical signals for the simultaneous detection of the conjugate variables of the Weak Coherent State (WCS) due to that performance depends of the degree of polarization (DOP) / Thus, the output electrical current of Balanced Homodyne Detection (BHD) represents the information of the quadrature components of the quantum state transmitted /
It is important to mention that the WCS is transmitted through a unidirectional free space channel and the dynamical atmospheric conditions are emulated by an atmosphere turbulence box.



Alice-Bob experimental set-up

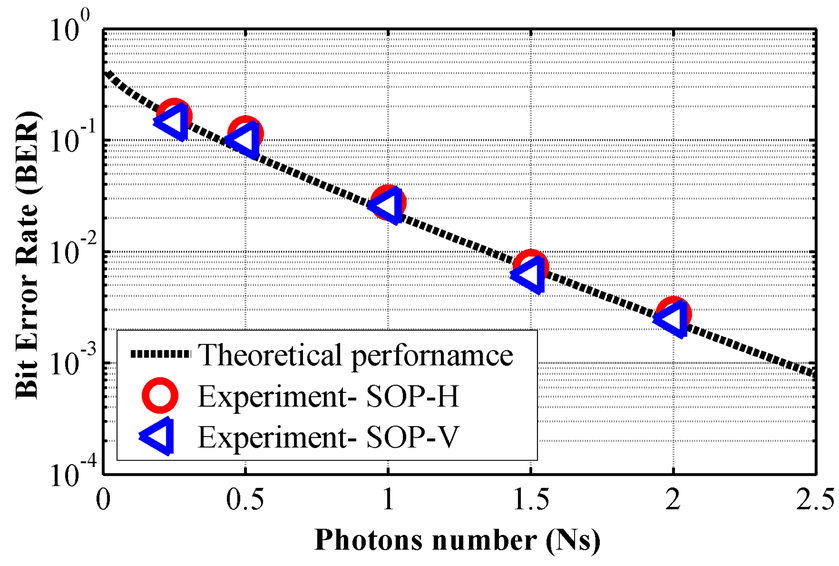


Performance of DOP of the output signal in the PolM and QWP



Performance of the Alice-Bob systems considering: $\rho = 1\ g/cm^3$ (general value of the water), although the water density change based on the salty level and temperature, $\eta = 1.8x10^{-4}\ g/(cmxs)$, $a = 1$, $R = 4\ in/hr$.

RESULTS AND ANALYSIS



Bit error rate for different photons number with the same atmospheric conditions

CONCLUSION

The paper presents the emulated performance of an FSO/CV-QKD systems using a 2PolSK-BPSK considering dynamical atmospheric conditions. Some results regarding the state and degree of polarization are shown in order to determine the Bit Error Rate for different photons number. It is crucial the understanding of the atmospheric channel in order to improve the communications systems and thus, enhance the existing communications systems and research novel communications systems that support a lot of information.

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