Modeling the error ratio in digital optical communications

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In classical or quantum digital optical communications, the useful transmitted information may decreases due to the random noises and perturbations that cannot be eliminated and which matter in the case of very low level optical signals. The paper examines the errors of the transmitted bits or qubits which are conditioned by different random optoelectronic noises which are mathematically modeled to be appropriate to different physical phenomenon. In the classical communications case it was pointed out the possibility to obtain an error ratio error ratio of 10-9 as well as of the usual value of 10-6. In the quantum communications case, the error rates are significantly higher, usually around a few percent. This case is distinct from the bit error ratio used in standard communications and is analyzed within the formalism specific to quantum physics. Quantum error ratio need to be corrected down to 10-9 with different algorithms than those used in classical communications. The main purpose of these algorithms is to keep the secrecy of the transmitted information. Based on normalized standard models (with terminology and definitions revisited) numerical simulations have performed in the MathCAD software environment.

random noise, bit error ratio / rate, quantum communications, MathCAD simulation