

# An analysis of quantum based space communication

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The quantum satellite communication is based on the need of long distance secret communication. According to the laws of quantum mechanics, any attempt of eavesdropping the key will disturb the quantum states during the quantum key distribution (QKD) process, thus revealing the presence of an eavesdropper. The errors of the optical channels are negligible in idealistic calculations. However, in practical applications, the errors introduced by an eavesdropper could be masked by natural noise of the channel. Since the losses tend to be proportional to the channel length, this limits the range of QKD in fiber cables. One possible solution is to use free-space links and communicate via satellites. With our model based on the behavior of single-photon sources, we are able to model the effect of losses originated from beam spreading and pointing error on the QKD. As it is presented, we are working on the simulation of a complex, satellite based QKD system.

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