Characterization of a free-space portable QKD system

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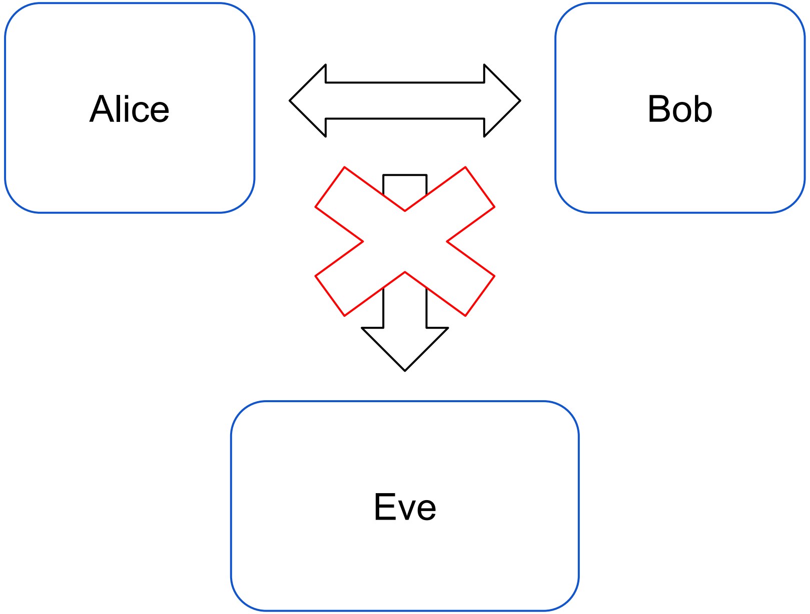
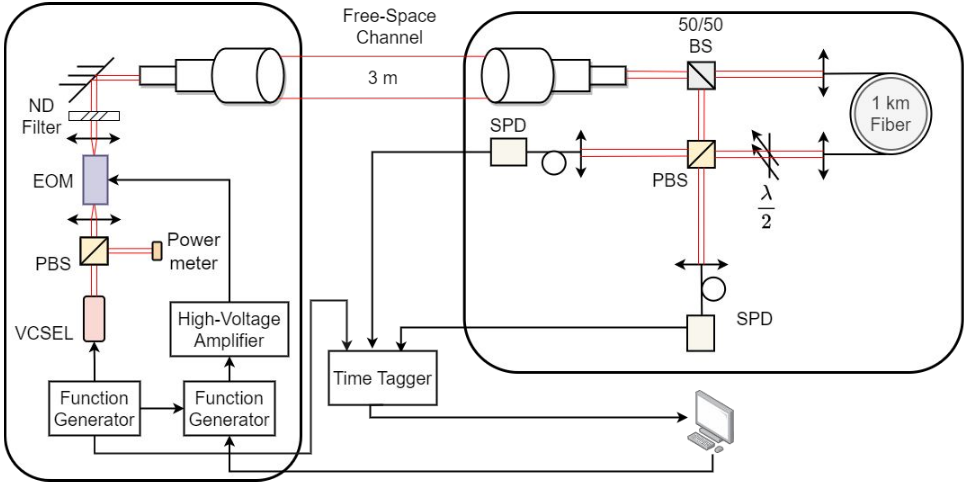
Quantum secure communication

- There are growing risks to current information security.
- Quantum key distribution (1984), offers a secure solution to key exchange based on the laws of physics alone
- Challenges with practical implementation and scalability.
- Recent protocols work with relaxed and simpler assumptions, e.g. Multi photon sources.



Experimental Setup

- Information is encoded in polarized weak coherent pulses
- The emitter sends three different quantum states (3-state protocol).
- The receiver uses time multiplex to reduce the number of detectors to 2.

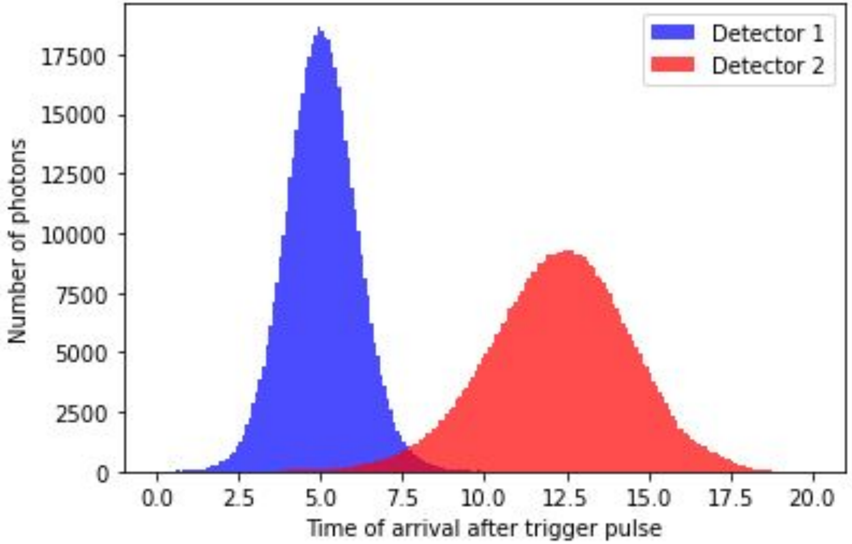


Characterization Results

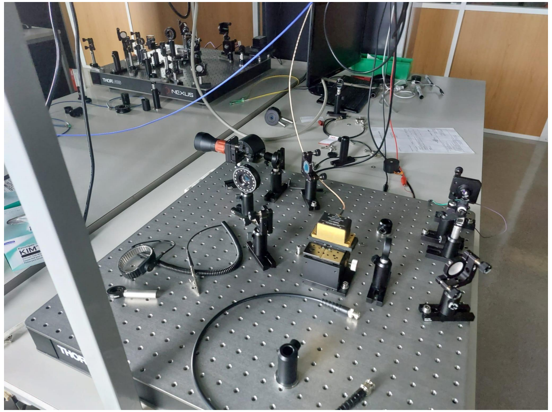
- Verification of time multiplexing with a fiber-delay.

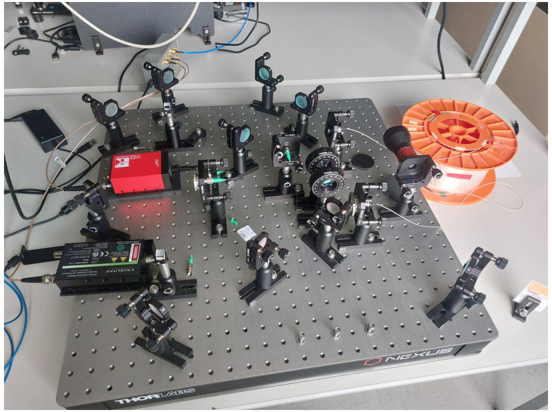
- Estimation of the quantum state fidelity:
  - 0.999 ± 0.024 $|H\rangle$,
  - 0.998 ± 0.024 $|V\rangle$,
  - 1.000 ± 0.024 $|D\rangle$

- QBER of 2.5% in Z basis and 2.11% in X basis.



Conclusion





- Characterized compact free-space QKD system

- Future work: The addition of decoy states and field trials in different environments.

- Suitability for airborne applications, satellite communication and drones