Quantum Information and Communication with High-Dimensional Encoding

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Quantum Temporal Imaging: erecting time telescope

Construction of efficient Schmidt number witnesses

Erecting compressing time telescope with no input dispersive medium. Either $D_{\text{in}}$ or $D_{\text{out}}$ can be made equal to zero to minimize the number of elements.


Converting picosecond-scale pulses in the telecommunication band, optimal for high-rate fiber transmission, to nanosecond scale pulses in the visible range processed by quantum memories. The pulses can be made identical leaving the encoded quantum information untouched.

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Efficient detection of multidimensional single-photon time-bin superpositions

With dispersive medium we can detect time-bin superpositions in the single-photon-counting regime in an all-fiber setup without the use of interferometers. We showed that we can do that efficiently thanks to the temporal Talbot effect. Currently we are working on using this method for high-dimensional quantum key distribution.

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