Short-Range Quantum Connections (ShoQC) https://shoqc.uni-mainz.de

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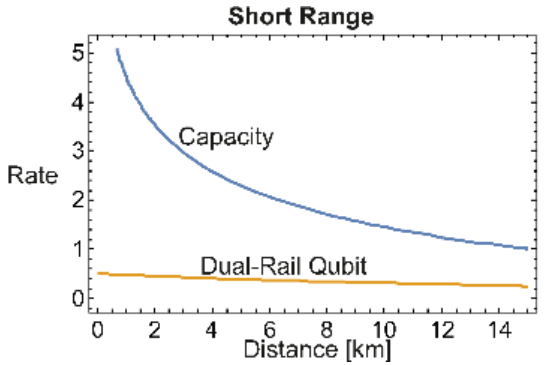
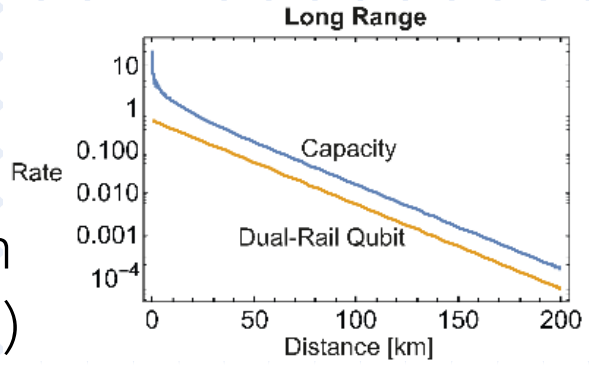
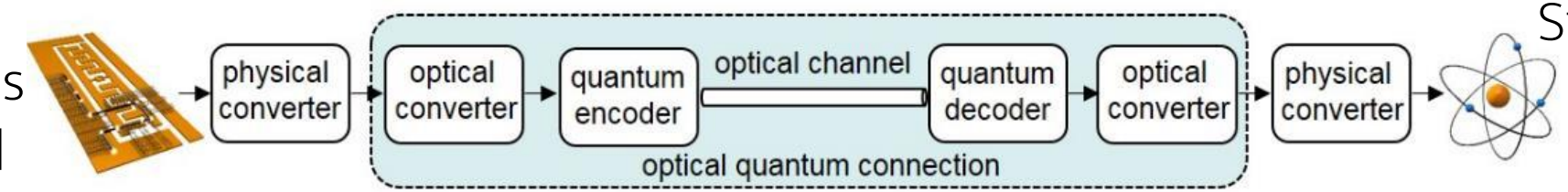


Distance matters, e.g. secret key rates in ⟸ bosonic loss channels ⟹

ShoQC: **Optically connect** distinct quantum processors (encode, decode, convert codes)

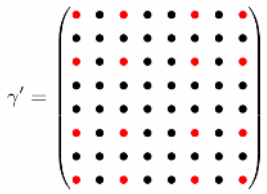


Channels beyond Gaussian loss



Stricter fault tolerance than QKD

A. Hertz...N. Cerf, PRA **104**, 022427 (2021)



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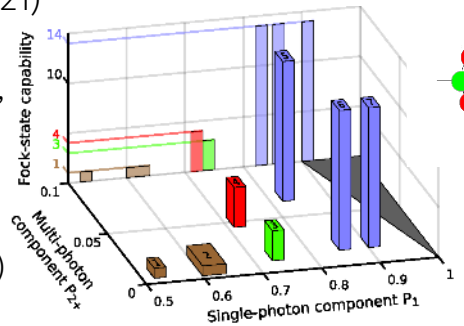
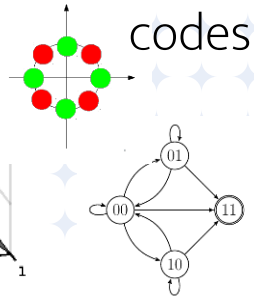
Peizhe Li, P. van Loock, Adv. Q. Techn. 202200151 (2023); E. Shchukin, P. v. L., PRL **128**, 150502 (2022)



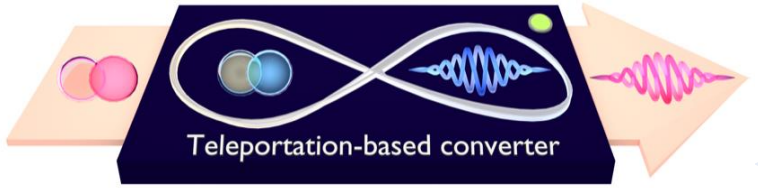
Theory: Non-Classicality, Non-Gaussianity, Bosonic Cat/GKP codes



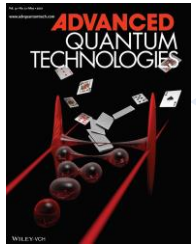
Experiment: Qubit Converter, Photon Adder

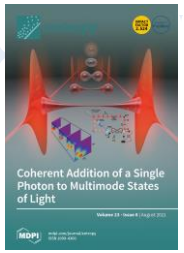
$c_0|0\rangle + e^{i\theta}c_1|1\rangle$ $c_0|cat+\rangle + e^{i\theta}c_1|cat-\rangle$

Single-photon qubit ⟹ CV cat-state qubit



T. Darras... J. Laurat, Nat. Phot. **17**, 165 (2023)





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