

Generating and Teleporting Entanglement for Quantum Networks & Quantum Internet

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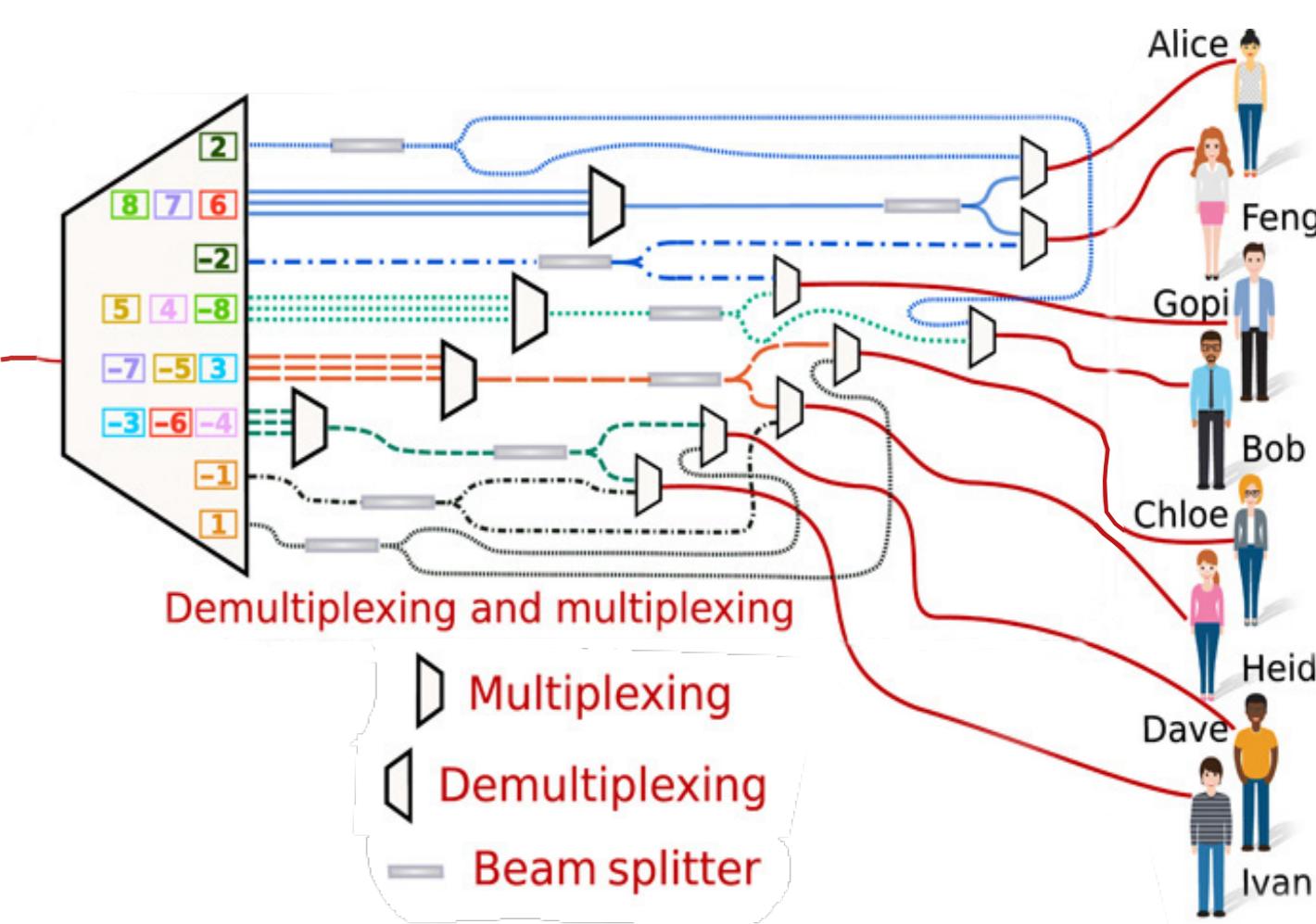
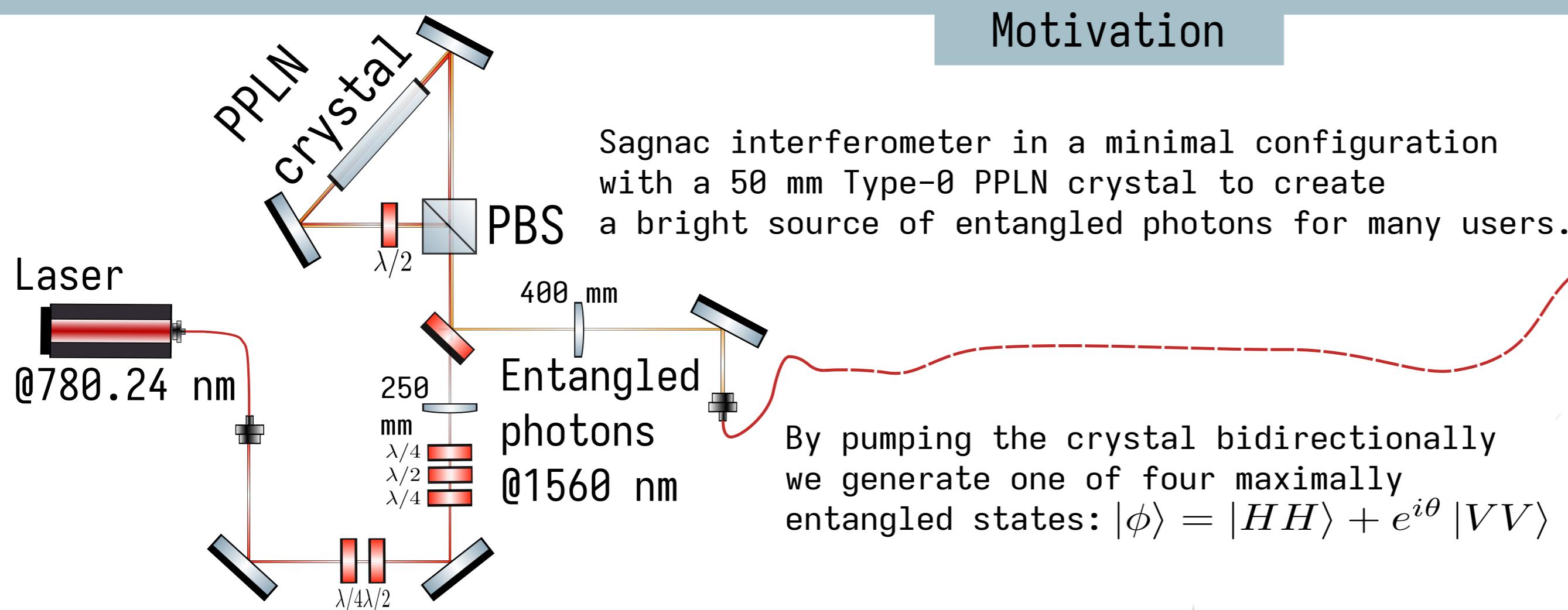


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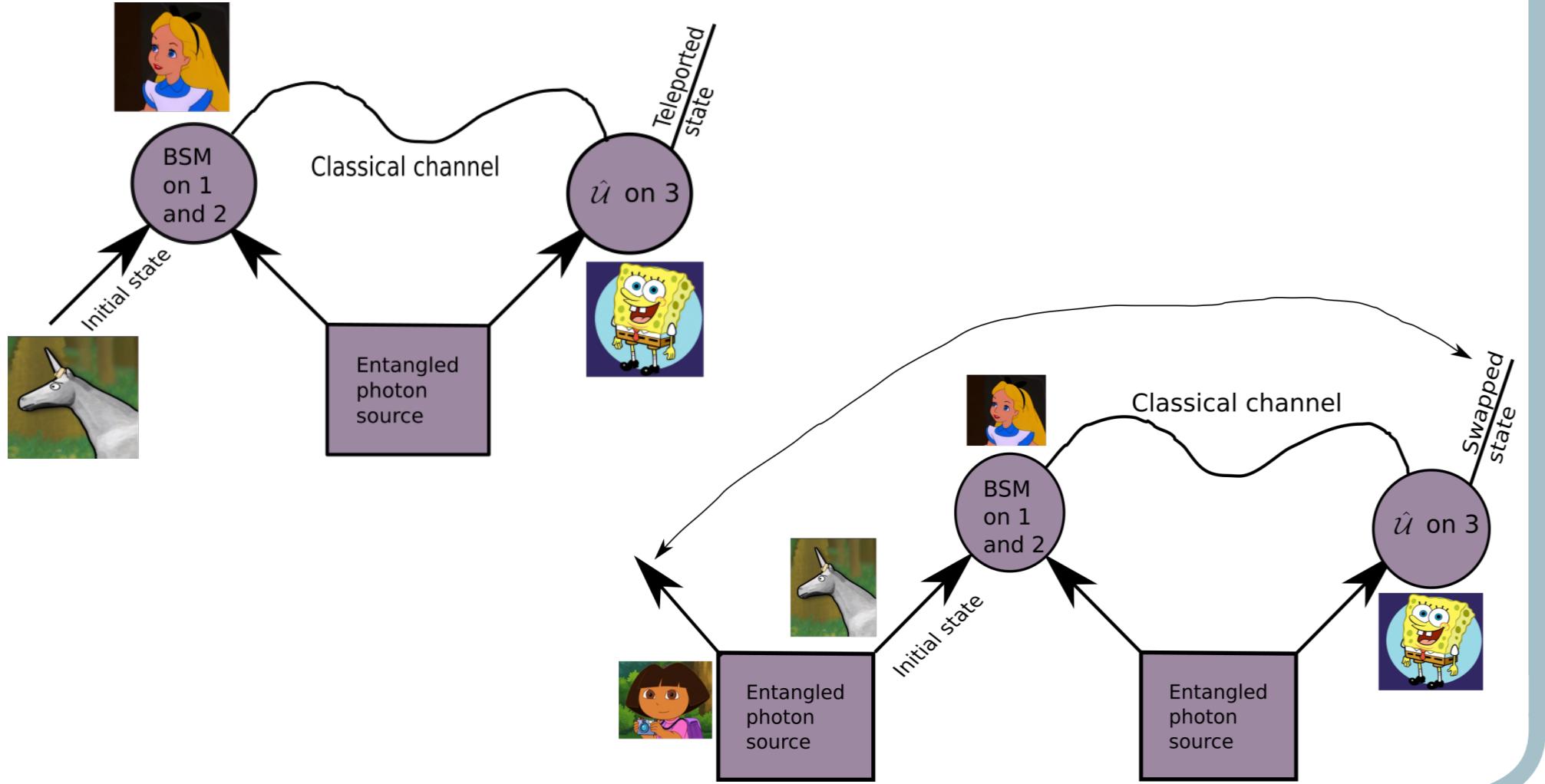
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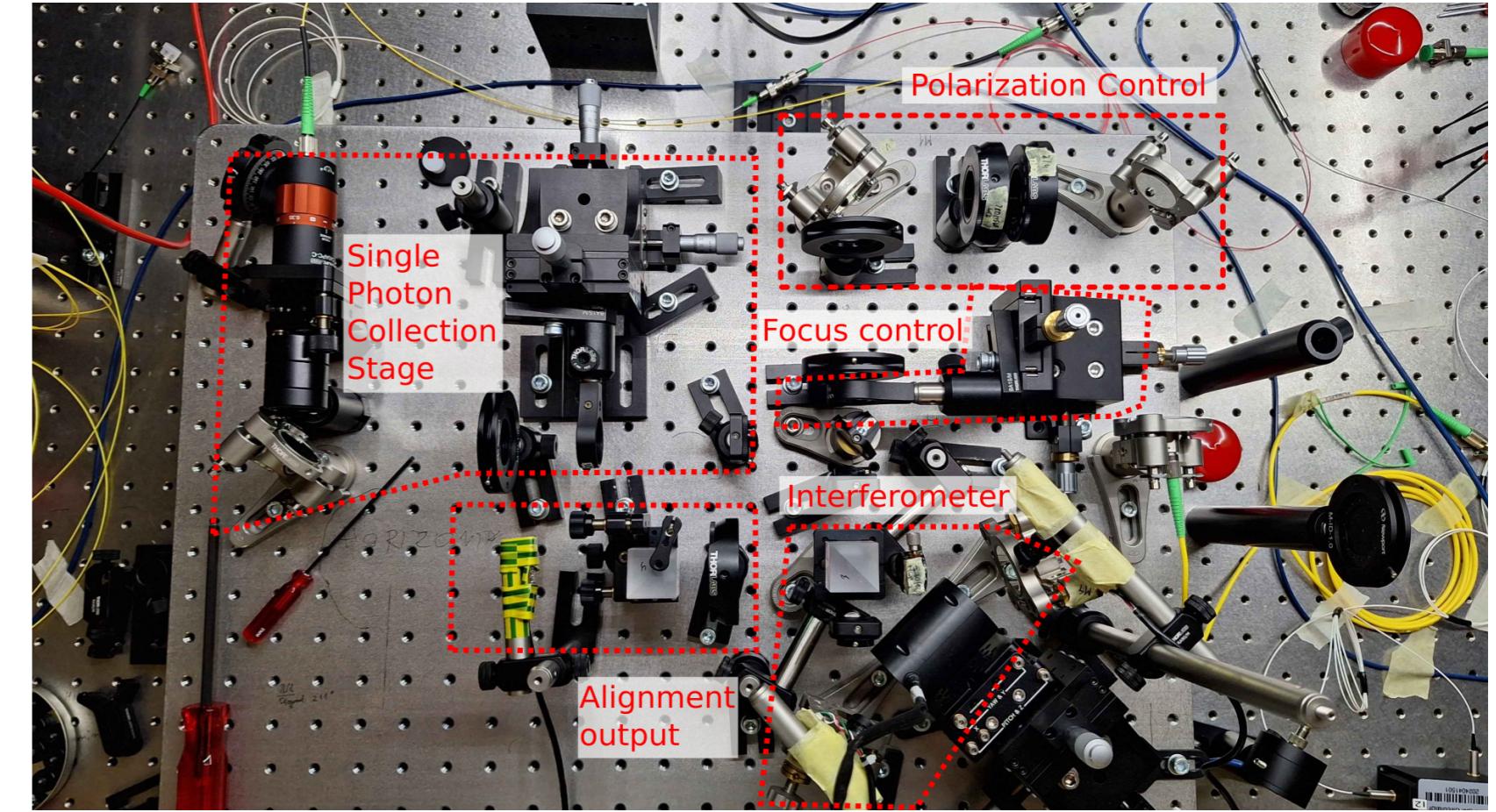
Entanglement is a key resource for quantum technologies of the future quantum networks, and the development of the quantum internet. Having the ability to efficiently distribute it between distant parties is essential. We implement a Sagnac source of polarization entangled photons around 1560 nm for use in already existing fiber infrastructure. The source will be characterized in our lab at the Faculty of Mathematics and Physics in Ljubljana, and later will be used for entanglement distribution over large distances. An identical source will be built by partners at the Jozef Stefan Institute, allowing us to demonstrate teleportation and entanglement swapping by performing Bell state measurements.



Quantum Teleportation and Entanglement Swapping



Optimizing alignment and coupling, testing various automation code, and tinkering with postprocessing for entanglement swapping.



Tomography measurements

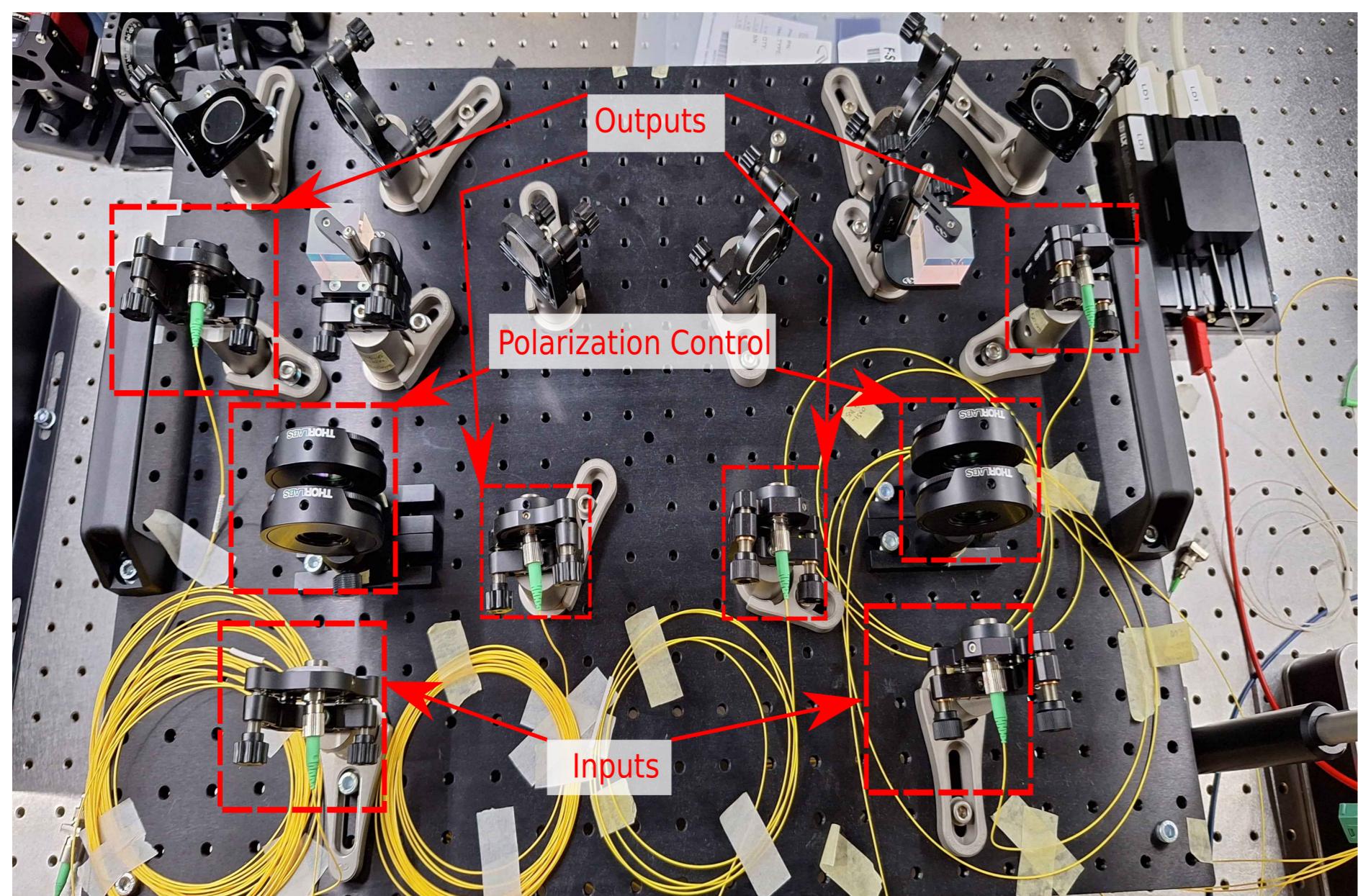
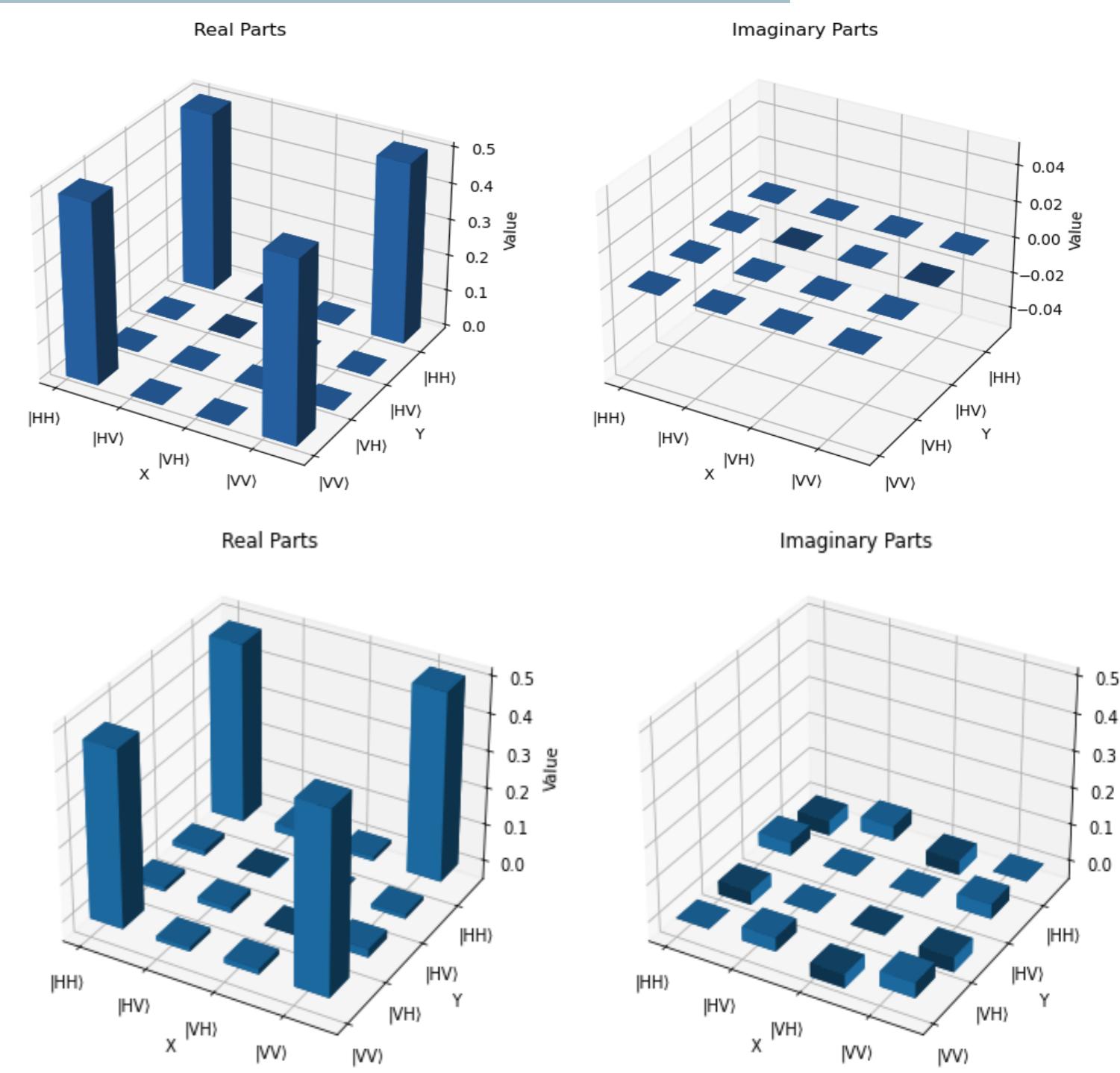
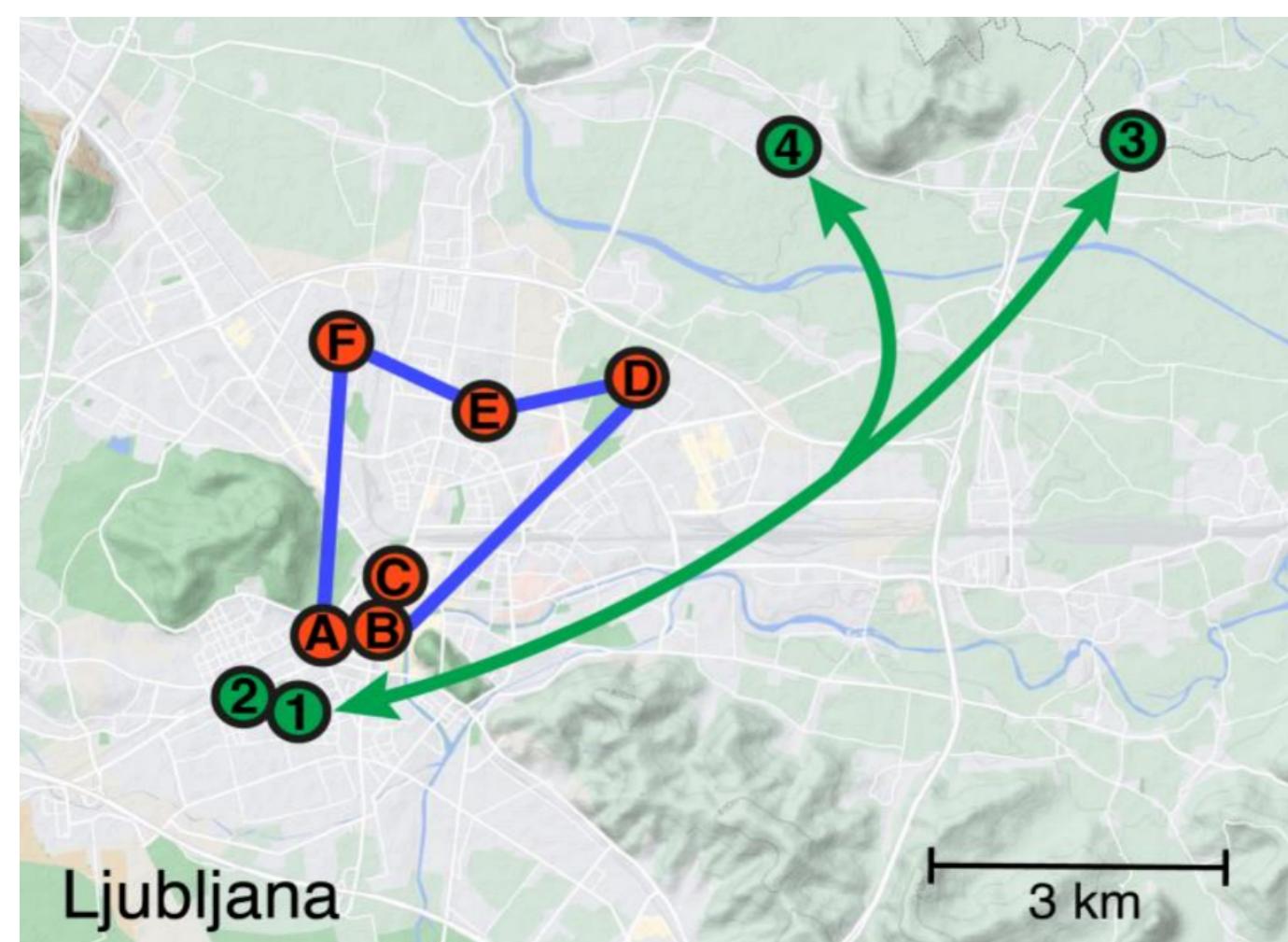


Photo of the analysis stage design

Currently successfully able to produce the entangled state $|\phi\rangle = |HH\rangle + |VV\rangle$. This has been done with a fidelity of $\approx 97.76\%$. Currently in the process of maximizing the source brightness and heralding efficiency.



Plans for the future

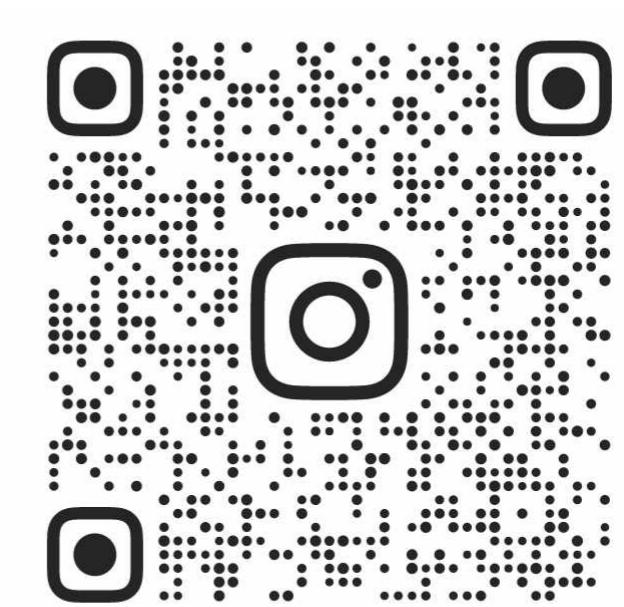
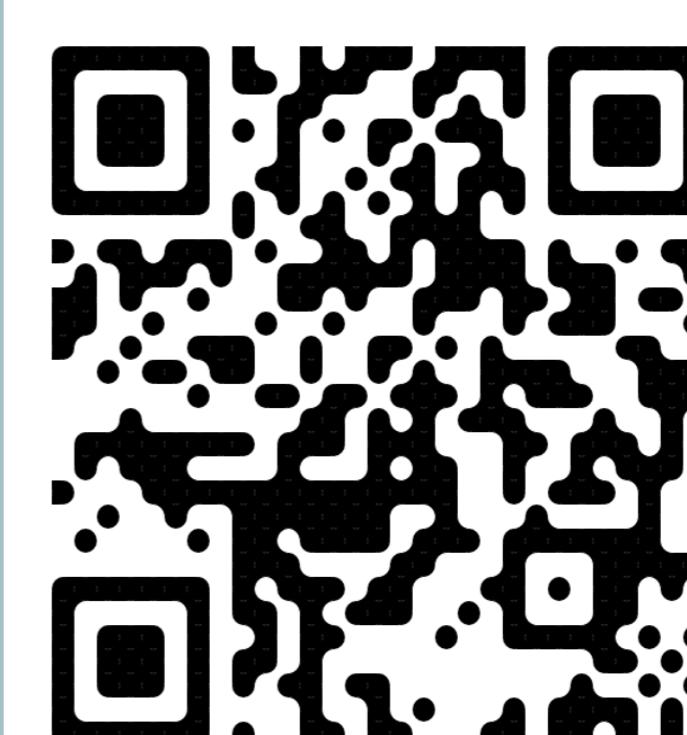


Ljubljana experimental and government network



Proposed Slovenian Quantum Network

Our group



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