

Quantum mechanics provides new possibilities of information processing, such as quantum teleportation, secure cryptographic key generation, or a speed-up in certain computational tasks. Some of these applications rely on a strictly quantum phenomenon of entanglement. Commonly, it is utilized in the most basic form, namely a maximally entangled state of a pair of photons. More complex forms are much more difficult in production and analysis, but also provide new effects.

Within the scope of the project, we want to study, how highly entangled states, which may turn up relatively easy to obtain, can replace those, which are known to be suitable for certain task, such as quantum computation or protection against naturally occurring errors, but are less attainable.

We also would like to propose some novel methods, that can be useful in producing new classes of entangled states. These ideas could then be tested in one of the befriended optical laboratories. The results we hope to obtain will make a contribution to quantum cryptography, communication, and in future, also to quantum computation.