Quantum communications require a long distance quantum network, consisting of nodes that are optically linked to each other. Each node consists of an ion trap, that stores information in quantum states (qubits) which is distributed between nodes in fibre. Presented here are efforts to create a reliable source of single photons to emulate the output of these ion traps, done using parametric down conversion (PDC) in a non linear crystal.

A periodically poled lithium niobate (PPLN) crystal was used to facilitate the PDC process. PPLN is a nonlinear material that demonstrates temperature dependent birefringence, allowing quasi type-0 phase matching. This means we are able to produce co-polarized photon pairs.

For long range data transfer, it would be more efficient to use photons at 1550nm therefore this source will be integrated with (FWM) fibres to demonstrate conversion of photons from 1092nm to 1550nm. Since the 1092nm photons produced will have some bandwidth the tunability aids in producing photons at the end of the FWM fibre that are closer to 1550nm. This will give even better transmission and allow communication over distances to the order of tens of kilometers.