

# Towards a Sagnac photon-pair source for uplink spaceborne QKD

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With the rising capabilities of quantum computers, quantum communication becomes increasingly critical. Not only are quantum computers required to eventually communicate through quantum channels, but quantum key distribution (QKD) will also become essential for secure encryption at the same time, underscored by the vulnerability of traditional encryption methods to quantum computers. Particularly for globe spanning networks, satellite-based quantum communication is favourable over optical fibers, as reliable quantum repeaters, capable of mitigating optical losses are not available yet. Spaceborne QKD has been demonstrated before, but communication from ground to space is still to be demonstrated. To address this gap, we present construction of a compact Sagnac interferometer for the generation of heralded single photons and entangled photon pairs. This photon source will be integrated into the currently planned Innsbruck quantum optical ground station telescope. Subsequently, this optical ground station equipped with the photon-pair source will then be used for ground to space QKD as the counterpart of quantum satellites.

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