

# Deployment of National Slovakia Quantum Network for Entangled Based Quantum Key Distribution

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Quantum Key Distribution (QKD) promises unconditional security based on the principles of quantum physics, ensuring that eavesdroppers cannot retrieve key information without introducing detectable errors. This technology enables two remote parties to share sequences of private random bits to distill a secure cryptographic key, without relying on assumptions about the attacker's computing power. Recent studies have shown that entanglement-based QKD is particularly suitable for creating fully connected network topologies, which simplify the addition of new users to the network.

In this work, we present our progress on deploying the backbone infrastructure of the national Slovak quantum network. We focus on generating broadband entangled pairs using type-0 Spontaneous Parametric Down-Conversion (SPDC) generated by a PPLN crystal inside a Sagnac interferometer. We discuss the critical parameters required to achieve a Sagnac source of entangled photon pairs with high visibility and brightness, aiming to approach state-of-the-art performance.