



Cyber security solutions

Security and sovereignty of information are granted today by complex algorithm-based cryptography. The rise of quantum computing will challenge our state-of-the-art, mathematical based encryption technologies. By fighting quantum challenges with quantum technologies, we develop and deliver quantum key distribution (QKD) systems based on entangled photons. This allows the implementation of cyber security solutions on the fundamentals of physical laws. We enable a quantum added value.

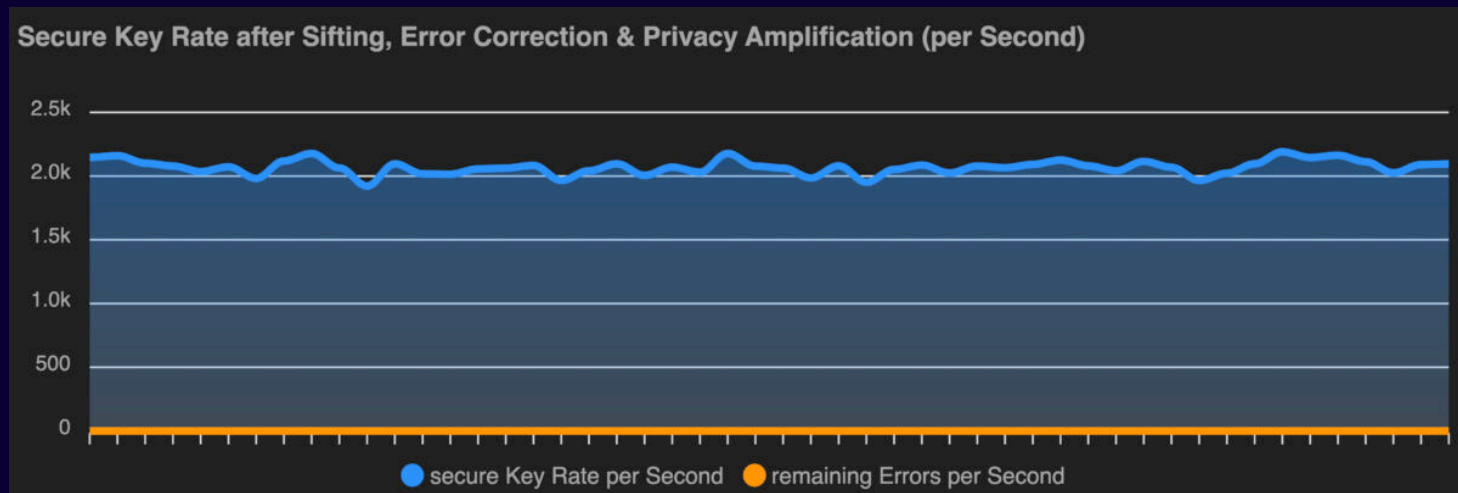
About Quantum Entanglement:

- A truly quantum mechanical property
- Only two particles can be entangled at once and they will be described as one system until measurement
- Single photon measurements enable the verification of entangled states and the generation of unique cyber security features
- No need of QRNG or RNG
- Mostly passive elements and a minimum of electronics

We offer quantum key distribution solutions for fiber-based networks as well as payloads and sub-systems for QKD-satellite networks and constellations.

Quantum Key Distribution Systems

The building blocks for the »Elvis« QKD systems consist of the entangled photon pair source »HD«, the polarization analyzing and control sub-systems »PAM«, and our unique quantum protocol implementation »LLC«, which is based on the BBM92 protocol. The modularity enables cost-efficient implementation for data-center connections and communication networks as well as experimental setups. Short distance and free space QKD systems at 800 nm wavelength and long-distance fiber-network systems at 1300 nm and 1500 nm are available.



Our advanced software suite forms the backbone of our entanglement based key distribution systems, offering real-time analysis and key management capabilities. It precisely measures entangled photon correlations across four polarization bases, providing instant feedback on quantum bit error rates. The software tracks key pool sizes for both SKIP and ETSI QKD 014 protocols, alongside up-to-the-second key rate data. Designed with flexibility in mind, our software can be tailored

to meet specific customer requirements and support diverse academic research scenarios, ensuring optimal performance and adaptability for various quantum communication applications.

We will gladly advise you in planning star-like, multi-user, or long-distance trusted node networks. Different protocol options for the implementation to encryptors and existing infrastructures are available. Customized management and hardware status interfaces are available for easy maintenance as well as experimental applications with enhanced characterization needs.

	ELVIS 800	ELVIS 1500
Wavelength in nm	780 – 830	1300 – 1550
Fidelity in %	> 92	> 92
QBER in %	< 9	< 9
Server-Rack height in HU	max. 2	max. 2 + detector setup
Secure Key Rate (10 dB loss) in Bits/s	> 1.500	> 1.500

Entangled photon pair sources for fiber networks and space applications



Our »HD« product line stands for outstanding performance with highest entangled photon pair numbers to generate secure encryption keys, quantum imaging setups, or quantum technology experiments. Our customized system will generate polarization entangled photon pairs. The sources will be available for wavelengths around 800 nm, 1300 nm (O-Band), or 1500 nm (C-Band).



The »HD« products are characterized by a compact design, a high-precision fabrication and assembly on a thermo-mechanically stable platform. Our core technology covers the effective integration and deterministic assembly algorithms to achieve highest accuracies.

	HD 800	HD 1300	HD 1500
Wavelength in nm	800	1300 (O-Band)	1500 (C-Band)
Entangled photon pairs in Mio./sec	> 50	> 40	> 40
Fidelity in %	> 97	> 97	> 97
Heralding in %	15 – 20	13 – 18	15 – 20
Spectral bandwidth in nm	0.6 or 3	0.6 or 3	0.6 or 3
Size in mm (width, depth, height)	290 x 165 x 60	290 x 165 x 60	290 x 165 x 60
Application fields	Short distance fiber networks (<8km), space, free-space links	Middle and long distance fiber networks	Middle and long distance fiber networks

Polarization Analyzing Modules



Polarization Analyzing Module »PAM«

Our »PAM« product line enables the automated and self-calibrated measurement of vertical and horizontal polarization states. The sub-system will be available with free space optics for experimental setups or fiber coupled for integration in data centers or communication networks. Within our QKD-system the patent-protected automated polarization control secures long-term stability under varying and changing environmental conditions.



Self-calibrating and automatized polarization control

All systems will be delivered with software tools for data acquisition. In QKD setups the automated polarization control optimizes the Quantum Bit Error Rate (QBER) to the optimal value during operation and highest key rates.

	PAM 800	PAM 1500
Wavelength in nm	750 – 850	1100 – 1550
Available detectors	Single Photon Avalanche Diodes (SPAD), efficiency > 50%	Superconducting Nanowire Single Photon Detectors (SNSPD), efficiency > 60%
Self-calibration	Yes	Yes
Size in mm (width, depth, height)	157 x 109 x 26	157 x 109 x 26