Ki3 PHOTONICS
Technologies

Ki3 Q.COMB

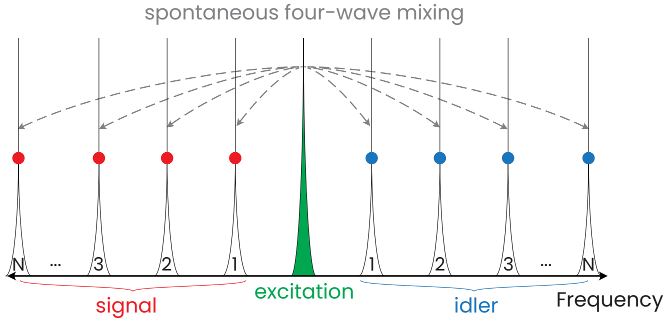
PRISM AWARDS FINALIST

Multichannel Entangled Photon Source

The **Ki3 Q.COMB** is a high-performance, room-temperature entangled photon source designed for applications in secure quantum communication, precision sensing, and advanced information processing.

The unit seamlessly integrates with existing network infrastructure, requiring no modifications. Once plugged in and powered on, it automatically generates and distributes entangled photons through standard optical fiber, making quantum resources readily available within the client's optical network.

At its core, the KI3 QUANTUM COMB leverages spontaneous four-wave mixing (SFWM) to generate entangled photon pairs distributed across an optical frequency comb. This comb is a broad-spectrum light source emitted from an on-chip silicon nitride ring resonator to ensure high spectral purity and efficient photon generation.



Features and benefits:

- Deploy instantly with turn-key, room-temperature operation – No cryogenic cooling required.
- Achieve high-fidelity entanglement (>95% Bell state purity) – Ensures reliable and secure quantum data transfer.
- Generate pulsed photon pairs – Enables precise synchronization in quantum systems.
- Enable time-bin and frequency-bin encoding – Ideal for robust quantum communication; a key advantage over polarization-based sources.
- Ensure narrowband photon channels (<500 MHz) – Provides high spectral purity, at linewidths compatible with quantum memory.
- Support multi-user and high-dimensional quantum networking – Expands connectivity and scalability.
- Integrate seamlessly with the telecom grid – Compatible with standard DWDM spacing (100/200 GHz ITU).
- Scale efficiently with a compact design – Optimized for lab setups, field deployments, and quantum networking applications.

Questions and quote requests:
info@ki3photonics.com
ki3photonics.com

Specification[a]	Pulsed	Continuous-wave
Center wavelength[b]	1550.12 nm	1550.12 nm
Channel spacing	200 GHZ	200 GHZ
Channel linewidth	< 500 MHz	< 500 MHz
Maximum CAR[c]	> 100	> 500
Max pairs/second per channel pair[d]	> 100 kHz	> 100 kHz
Fidelity[e]	> 95%, > 85%	> 95%, > 85%
Schmidt number	< 1.5	-
Heralding efficiency[g]	> 0.15	> 0.1
Pump repetition rate	25 MHz, reconfigurable	-
Output fiber type	PM	
Footprint	2U rack mount (19″×3.5″×13″)	

a. Custom specifications available, please contact info@ki3photonics.com.

b. The signal (idler) photons are found at $f_c \pm n \times FSR$, with f_c being the center frequency and n the number of the resonance pair.

c. Coincidence to accidental ratio.

d. For a 3mW of average pump power.

e. To the Bell state $|+\rangle = (|00\rangle + |11\rangle)/\sqrt{2}$ for time-bin qubit or frequency-bin qubit encoding, respectively.

f. Schmidt number (also known as effective mode number) is a measure of the spectral purity and is defined as $K = (\sum_k e_k^2)^{-1}$, where e_k are eigenvalues of the reduced density operator. It is obtained from measuring the $g^{(2)}(0)$ via relation $K \approx (g^{(2)}(0) - 1)^{-1}$ for the third idler photon.

g. Heralding efficiency is defined as $\mu_{si} = C/P_i P_s$, with C being the rate of coincidence and P_i and P_s the rate of idler and signal photons, respectively.

h. Units can be switched between pulsed and continuous-wave pump configurations via software.

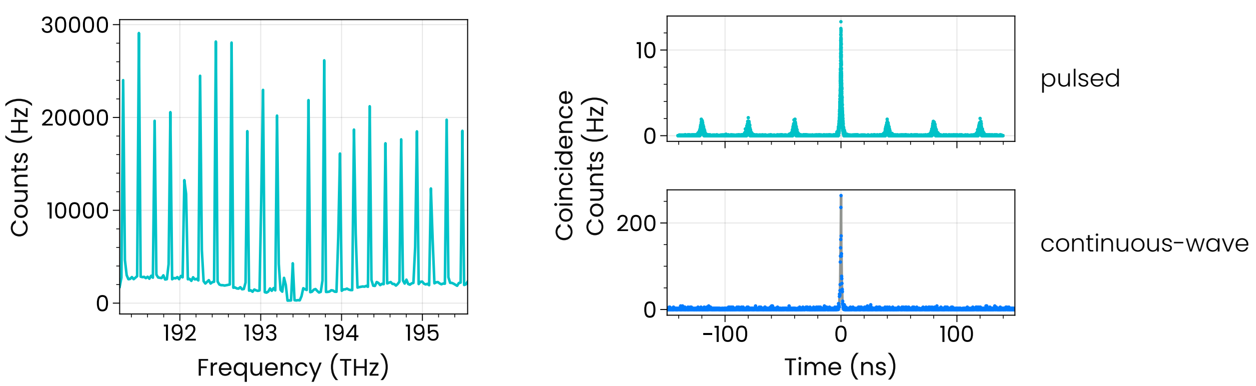


Fig. 2: (left) Single photon spectrum of the C-band Q.COMB entangled photon source. **(right)** Signal-idler cross-correlation for pulsed and continuous-wave pump configuration, configured via the software control interface.

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