

Ki3 QUANTUM COMB: Entangled Photon Source

- Turn-key room-temperature photon entanglement centered at 1550 nm (S, C, L-band)
- Pulsed and continuous-wave photon pair generation via spontaneous four-wave mixing
- Narrow bandwidth (< 800 MHz) photon channels with high spectral purity, aligned to the standard telecom grid (100 or 200 GHz spaced DWDM ITU)
- High fidelity entangled states ($> 95\%$ for Bell state generation)
- Ideal for multi-user or high-dimensional quantum networking applications

Please contact info@ki3photonics.com for custom photon source units

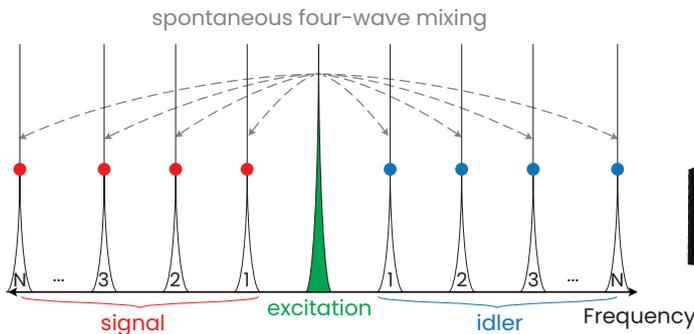
Applications:

- Quantum networking
- Entanglement distribution
- Quantum memory interfacing
- Two-photon interference

- Secret sharing
- Quantum sensing
- Network characterization
- Photon heralding

Benefits:

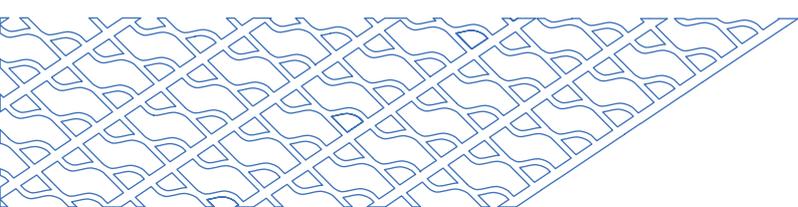
- Scalability
- Compact packaging
- Multi-channel photon generation
- Telecom integration



Ki3 QUANTUM COMB is a deployable entangled photon source that generates photon pairs near 1550 nm wavelengths for applications in quantum cryptography, metrology, and information processing. The source generates photons distributed over an optical frequency comb, using spontaneous four-wave mixing (SFWM). The comb is a light source with a broad spectrum of evenly-spaced frequency modes, emitted from an on-chip silicon nitride ring resonator that exhibits third-order nonlinearity. Emitted photon pairs are coupled out for distribution via fiber.

The source generates pulsed photon pairs at a rate of > 100 kHz for both pulsed and continuous-wave excitation. The photons have an effective mode number of nearly one for a pair of single resonances (one idler and one signal) and correspond to high-fidelity time-bin or frequency-bin quantum states. Furthermore, the pulsed excitation scheme facilitates the synchronization between photons as needed in quantum networks.

The photon source units communicate via Ethernet and can be controlled and monitored with the Ki3 Photonics Python API.



Specification	Pulsed	Continuous-wave
Center wavelength ^b	1550.12 nm	1550.12m
Channel spacing	200 GHz	200 GHz
Channel linewidth	< 500 MHz	< 500 MHz
Maximum CAR ^c	> 100	> 500
Max pairs/second ^d	> 100 kHz	> 100 kHz
Fidelity ^e	> 95%, >85%	> 95%, >85%
Schmidt number ^f	< 1.5	-
Heralding efficiency ^g	> 0.15	> 0.1
Pump repetition rate	25 Mhz, reconfigurable	-
Output fiber type	PM	PM
Footprint	2U rack unit (19"×3.5"×13")	2U rack unit (19"×3.5"×13")

- a. Custom specifications available, please contact info@ki3photonics.com.
- b. The signal (idler) photons are found at $f_c \pm n \times \text{FSR}$, 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.

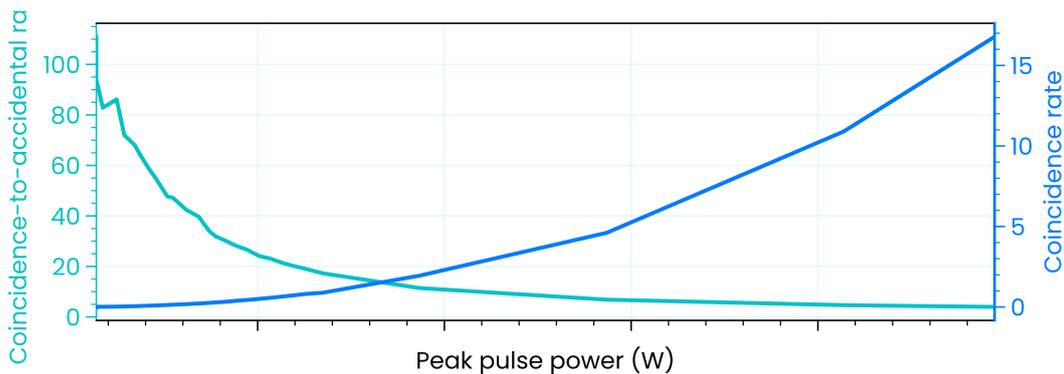


Fig. 2: Coincidence and coincidence to accidental (CAR) values of the Ki3 QUANTUM COMB.

Questions and quote requests:
info@ki3photonics.com

Learn more:
ki3photonics.com

Ki3 Photonics Technologies
 301-2547 Rue Sicard
 Montreal, Quebec, Canada
 H1V 2Y8
 tel: +1 514 434 8829