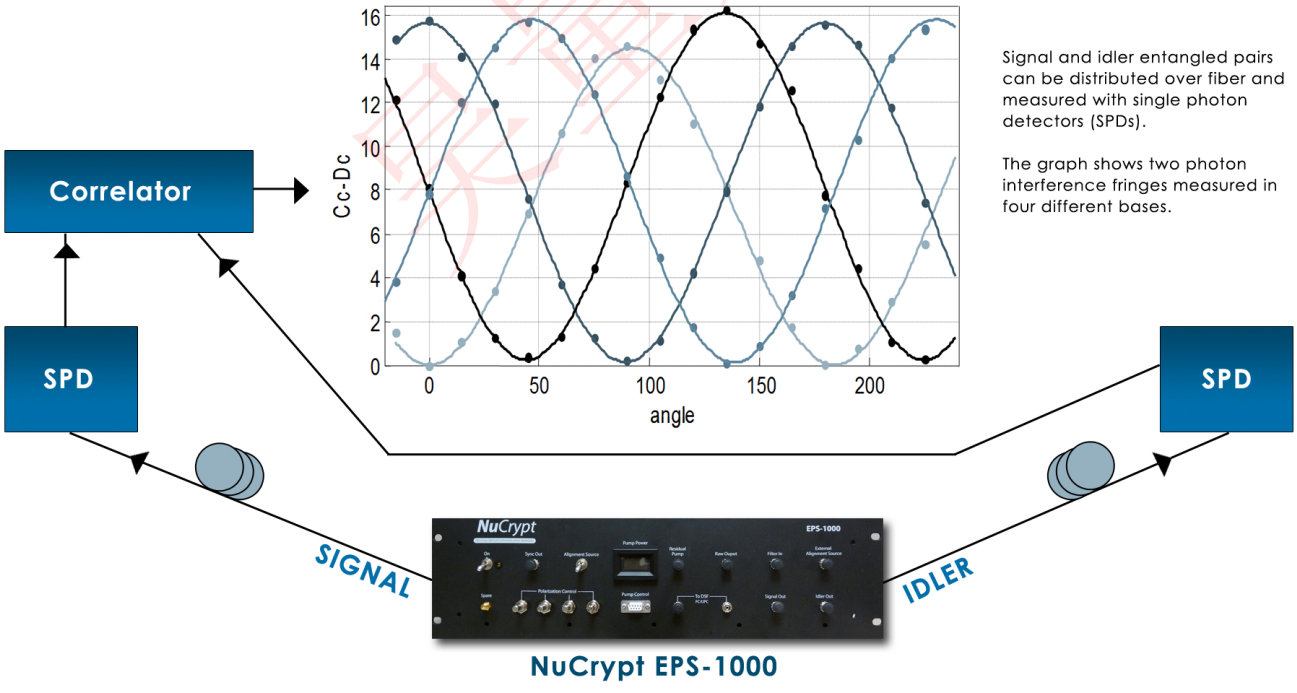
NuCrypt

Entangled Photons Source

Product Overview

EPS-1000

NuCrypt has developed a fiber-coupled source of entangled photons which is remarkably easy to use. The source is inherently compatible with fiber optics, has excellent modal purity, and high spectral brightness. NuCrypt's patent pending architecture for the entangled photons source leads to a stable output and allows for an "alignment" mode of operation to make it easy for the users to align their measurement basis (polarization analyzers) to a desired orientation. The rack-mountable source is simple enough for non-experts in the field to use and thereby greatly expands the potential for applications development. The pair-emission rate is computer controlled. Upon request, the nonlinear fiber can be mounted outside the source so it can be cooled by the user to reduce Raman scattering, thereby improving the source's performance.



Signal and idler entangled pairs can be distributed over fiber and measured with single photon detectors (SPDs).

The graph shows two photon interference fringes measured in four different bases.

NuCrypt EPS-1000

- Distribution of polarization entangled photons over fiber
- Use in quantum cryptography, quantum imaging, or quantum metrology applications
- Stable fiber optical output with high spectral purity and brightness

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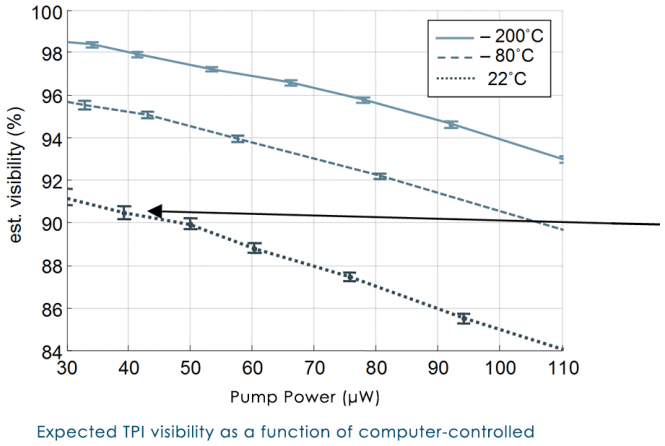
*Product Specifications

EPS-1000

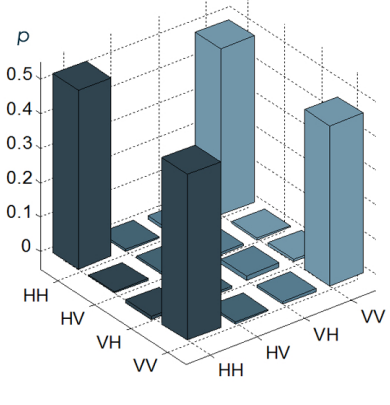
Attribute	Value	Units	Comments
Pulse Rate	50	MHZ	
Signal Wavelength	1550.1	nm	Other Values on the ITU grid are available
Idler Wavelength	1558.1	nm	Other Values on the ITU grid are available
Signal photon 3-dB bandwidth	1.0	nm	Transform limited pulse
Idler photon 3-dB bandwidth	1.0	nm	Transform limited pulse
Signal/Idler photon duration	~5	ps	
Pair-emission probability (p)	0.0001 to >0.005	per pulse	User settable, inferred at fiber tips after filtering*
TPI visibility (300K)	{90, 85}	%	{p ~ 0.0003, p ~ 0.001}
TPI visibility (77K)	{97, 93}	%	{p ~ 0.0005, p ~ 0.002}
Form factor			Standard 5U 19" rack mountable box

TPI = Two-photon interference
* Example calculation of expected measured coincidence-count (CC) rate.
Assume: polarization-analyzer tranmittance = 0.7, single photon gate rate of 50 MHz with 25% detection efficiency, and p ~ 0.0005:
CC = 50 x 10^6 * 0.0005 * $(0.7 * 0.25)^2$ = 770/s [photon-pair emission rate at fiber tips = 25,000/s at 50 MHz pump-pulse rate]

- Electrical and optical clock signals at the repetition rate for synchronizing detectors
- Computer controllable two-photon generation rate
- Built-in polarized alignment signal for easy alignment of measurement analyzers



Expected TPI visibility as a function of computer-controlled pump power at various fiber temperatures. Two-photon generation rate improves quadratically with pump power, but due to multiphoton effects the quality of entanglement degrades, lowering the TPI visibility.



Corresponding tomography at 40μW of power with the fiber at room temperature.

(* Specifications listed above are estimates subject to change without notice)

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