

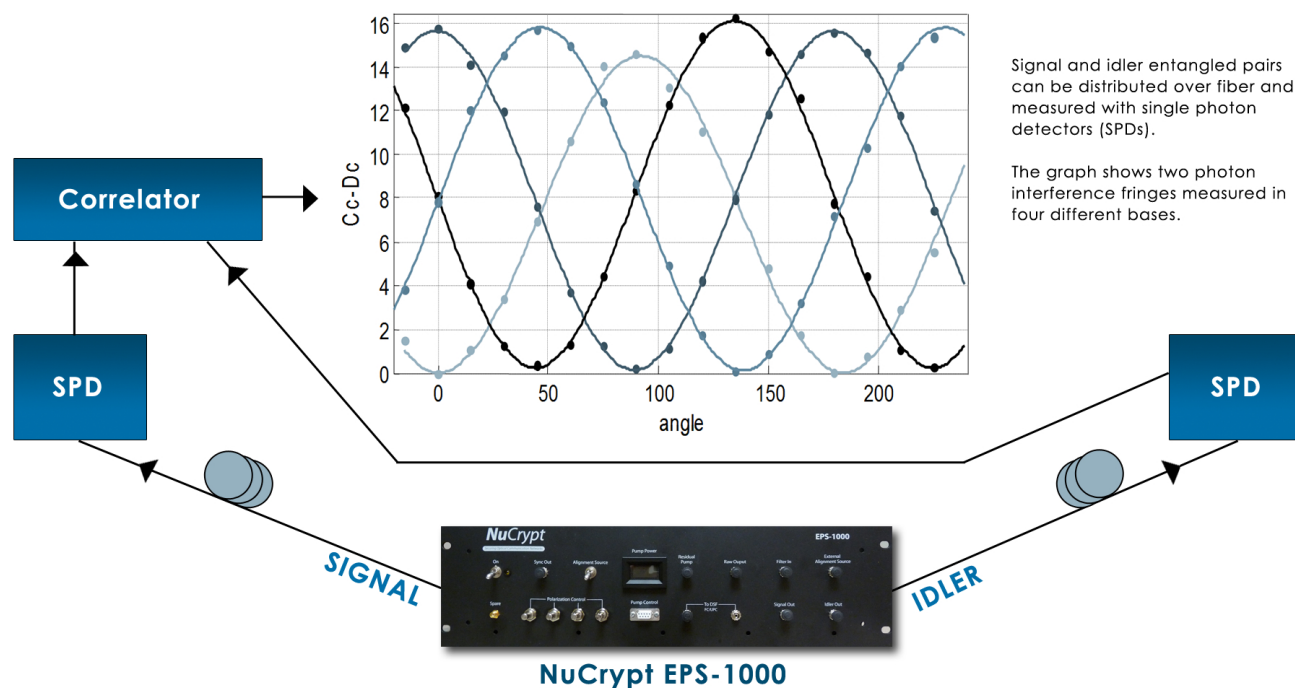
# NuCrypt

## 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.



- 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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## Entangled Photons Source

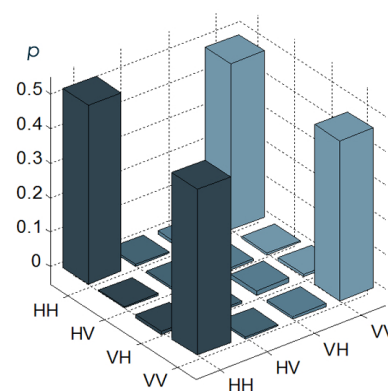
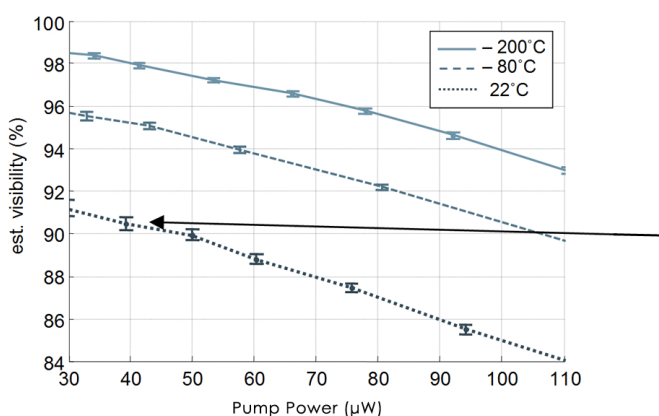
### Product Specifications

### 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 ( $\rho$ ) | 0.0001 to >0.005 | per pulse | User settable, inferred at fiber tips after filtering* |
| TPI visibility (300K)                | {90, 85}         | %         | { $\rho \sim 0.0003, \rho \sim 0.001$ }                |
| TPI visibility (77K)                 | {97, 93}         | %         | { $\rho \sim 0.0005, \rho \sim 0.002$ }                |
| Form factor                          |                  |           | Standard 5U 19" rack mountable box                     |

TPI = Two-photon interference  
 \* Example calculation of expected measured coincidence-count (CC) rate.  
 Assume: polarization-analyzer transmittance = 0.7, single photon gate rate of 50 MHz with 25% detection efficiency, and  $\rho \sim 0.0005$ :  
 $CC = 50 \times 10^6 \times 0.0005 \times (0.7 \times 0.25)^2 = 770/s$  [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)