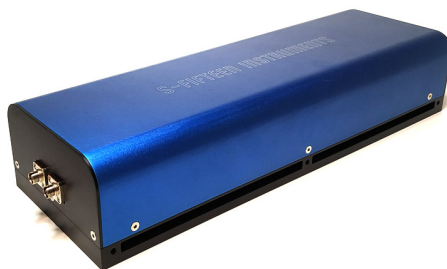# Polarization-entangled Photon-Pair Source - EPPS-O by S-Fifteen Instruments

1 Features

- Bright polarization-entangled photon pairs source
- Pair spectrum centered at 1320 nm
- Spectral width of 100 nm
- High polarization-entanglement visibility
- High brightness
- Minimum dispersion in G652/G657 fibers

Applications: Quantum key distribution, quantum metrology, absorption spectroscopy, 2-photon interference, sub-shot-noise imaging, random number generation, clock synchronization, ghost imaging, entanglement swapping

2 General Description

This photon pair source generates polarization-entangled photons at 1320 nm via spontaneous parametric down-conversion in a PPKTP crystal. The down-conversion process is driven with the integrated 660 nm pump laser achieving a photon pair rate >500 000 pairs/s and a photon-heralding probability of >30%. The spectrally non-degenerate photons in each pair are separated with a wavelength-division multiplexer. The visibility >96% of the polarization-entangled photons makes it an ideal photon-pair source for quantum optics applications.

3 Specifications

Table 1: Device specifications

Photon Pair Source Performance	
Center wavelength	1320 nm
Bi-photon bandwidth	100 nm
Photon pair rate	>500 000 pairs/s (before detection)
Polarization-entanglement visibility	>96%
Photon-heralding probability	>25%
Photon Output Fibers	ITU-T G.657.A1
Software Control	
Physical port	USB 2.0, Type B
Communication	Serial communication via virtual COM port / USB CDC ACM class
Crystal temperature	Ambient temperature to 70°C
Laser temperature	18–40°C
Laser current	0–100 mA
Electrical Specifications	
Power Supply	12 V DC, Max. 50 Watt, 2.1mm Barrel socket, Supply included
Physical dimensions	
Size (L x W x H)	350 mm x 155 mm x 70 mm
Weight	3.4 kg

4 Quality of Polarization Entanglement
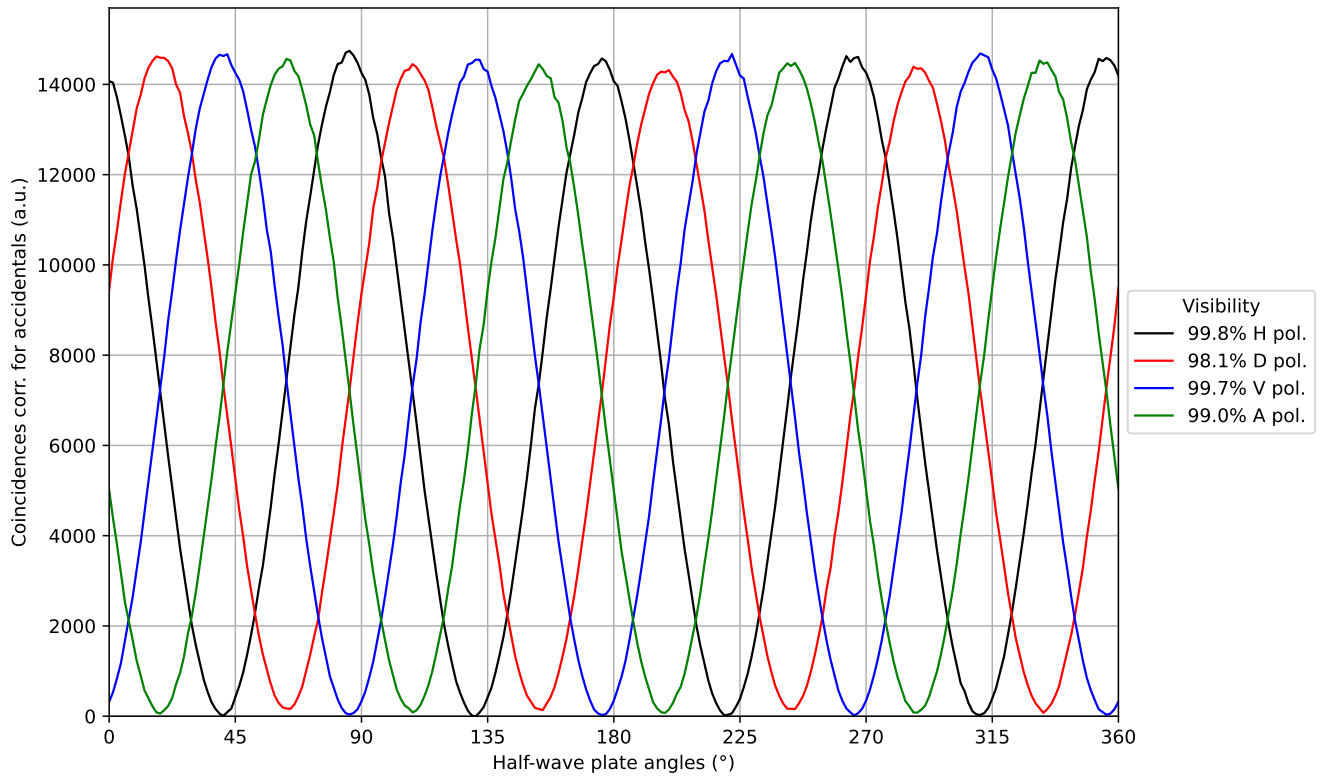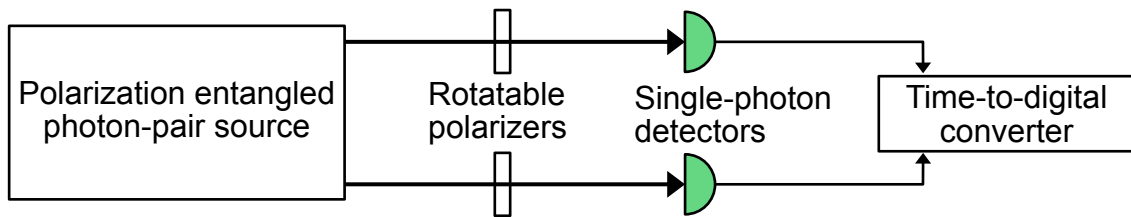
5   Photon-pair Spectrum

The photon pair spectrum has a full width at half maximum of about 50 nm FWHM due to internal Band Pass filter. The unfiltered spectrum is about 100nm FWHM. The gap at 1320 nm is due to the wavelength-division multiplexer (WDM) used to separate the photons and has a width of 6 nm.
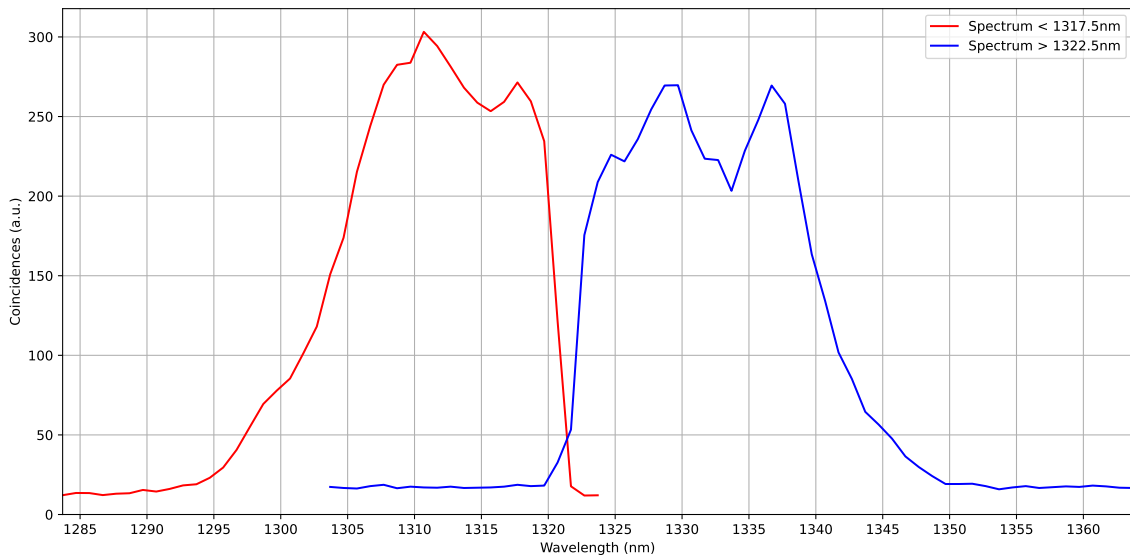
6 Software control commands

Send plain-text commands separated by newline/cr or semicolon via the virtual COM port. The reply comes terminated with cr+lf. Commands are case-insensitive.

Table 2: List of serial commands/queries

Command	Description
*IDN?	Returns device identifier.
*RST	Resets device.
PVOLT <value> HVOLT <value>	When temperature control loops are turned off, sets the voltages for the heater or the Peltier element.
HVOLT?, PVOLT?	Queries instantaneous heater or Peltier voltage.
HTEMP?, PTEMP?	Queries instantaneous temperatures at heater and Peltier.
LCURRENT <value>, LCURRENT?	Sets or queries the nominal laser diode current (in mA).
ON, OFF	Switches laser diode on/off.
HSETTEMP <value>, HSETTEMP?	Sets or queries heater temperature target (in Celsius).
HCONSTP <value>, HCONSTI <value>, HCONSTD <value>	Sets the control constants for the heater loop in units of V/K, V/K/s, Vs/K.
HLOOP <v>	Closes (v!=0) or opens (v=0) the heater control loop.
HCONSTP?, HCONSTI?, HCONSTD?, HLOOP?	Queries the heater control parameters.
PSETTEMP <value>, PSETTEMP?, PCONSTP <value>, PCONSTP?, ...	Sets and queries temperature control loop parameters for the Peltier.
HLIMIT <value>, HLIMIT?	Sets or queries the limit for the heater voltage.
PLIMIT <value>, PLIMIT?	Sets or queries the limit for the Peltier voltage.
LLIMIT <value>, LLIMIT?	Sets or queries the laser diode current limit.
SAVE	Saves the current settings into the EEPROM.
HELP	Print this help text.