quED

The Entanglement Demonstrator

Hardware

qutools' quED is a state-of-the-art physics experiment for the generation and analysis of polarization-entangled photon pairs. The setup is perfectly suited to demonstrate the physics of entanglement in student lab courses at colleges and universities. The high performance enables its integration into modern scientific experiments and commercial applications. A fully automated motorized version is available, also for most of the add-ons.

quED Specifications

	Basic model	High rate option
Single-count rate	> 10 kHz	> 50 kHz
Coincident-count rate	> 1 kHz	> 5 kHz
Pump laser power @405nm	15 mW	> 50 mW

Output laser power	< 10 µW
Operating wavelength	810 nm
Entanglement quality	S > 2.3
SPDC	Type I degenerate; non-collinear
Coincidence window length	Approx. 40 ns
Dimensions (in mm)	Optical unit: < 450 x 600 x 100 Electronic unit: 480 x 300 x 150
Counting rate interface	Graphical touch display
Connections	USB, Ethernet

Key Features

- Easy-to-use
- Generation / analysis of true polarization-entangled photon pairs
- Complete system to violate Bell's inequalities (CHSH)
- Hands-on study of quantum phenomena
- Motorized version available
- Additional polarization control and polarization analysis optics available
- Added laser safety with the new magnetic interlock system
- Remote Control of every motorized experiment possible

Add-Ons

quED-MI Michelson Interferometer
Demonstrate the wave nature of single photons through their interference or build a quantum eraser.

quED-HBT Hanbury Brown-Twiss
Explore the particle nature of single photons or generate quantum random numbers.

quED-HOM Hong-Ou-Mandel Effect
Experience the purely quantum 2-photon interference effect by revealing the Hong-Ou-Mandel dip.

quED-QKD Quantum Key Distribution
Exploit quantum resources to demonstrate secure key generation using the BB84 key distribution protocol.

quED-TOM Tomography
Find out more about the exact quantum state produced in the quED and learn about density matrices of single qubits and 2-qubit (entangled) states.

System includes

- Two silicon avalanche photodiodes
- Four channel counter with integrated coincidence logic
- Two polarizers in rotation mounts
- Control and readout unit with touch display and rotary knob - quCR
- Alignment utilities including auxiliary low-power laser module
- Connection to a PC