

Redefining Measurement

ID281 Superconducting nanowire system

Turnkey solution with timing electronics and control software

The ID281 is IDQ's ultimate combination of high-performance single-photon detection, simple cryogenics and best-in-class time-tagging and control electronics.

Push the limit of your application to new heights with Swiss made SNSPDs combining high detection efficiency, low jitter, low noise and short recovery time.

The detectors are integrated in an automated closed-cycle and compact 0.8 K cryostat providing ease-of-use and unrivalled temperature stability.

The system comes with our Time Controller ID900 for high-speed and high-resolution time-tagging, as well as the possibility to control your experiment. You can process and display your data quickly with its built-in realtime processing tools. Get the best results out of your application.



Key Features

- ▶ High reliability
- ▶ System detection efficiency: > 85%
- ▶ Broadband detection efficiency
- ▶ Low dark count rate
- ▶ Short recovery time and high detection rate
- ▶ Low jitter
- ▶ Latch-free operation at high count rates
- ▶ Automated standalone 0.8 K cryostat with multiple channels
- ▶ Integrated control, discrimination and time-tagging electronics

Applications

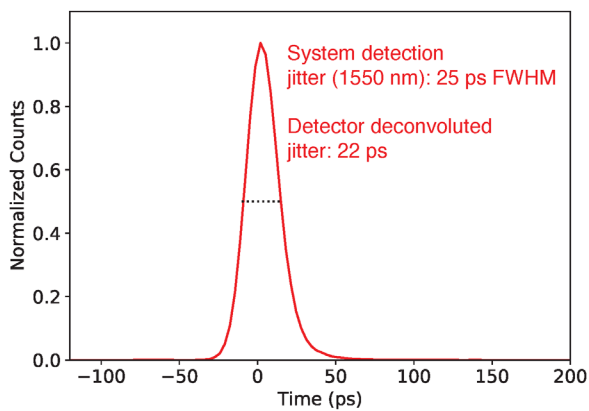
- ▶ QKD and quantum communication
- ▶ Quantum optics and computing
- ▶ OTDR in optical fibres
- ▶ Single-photon source characterisation
- ▶ Eye-safe laser light ranging (LIDAR)
- ▶ Fluorescence lifetime measurement
- ▶ Photoluminescence
- ▶ Failure analysis of integrated circuits
- ▶ VIS, NIR and MIR spectroscopy

High-performance single-photon detection

The ID281 detectors combine the best performances that superconducting nanowires can provide

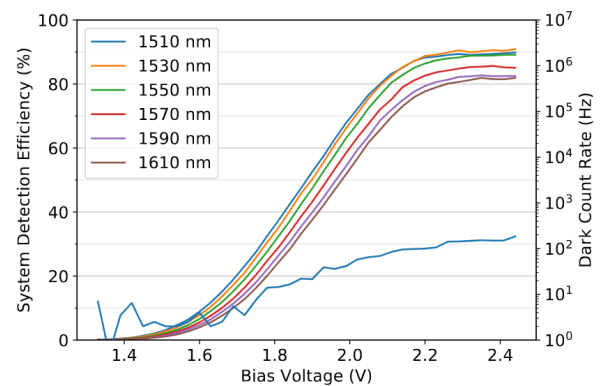
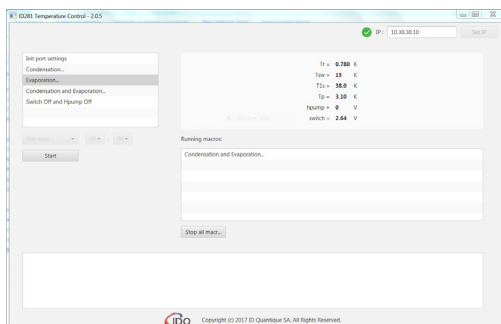
HIGH DETECTION EFFICIENCY

- ▶ System detection efficiency up to 90%
- ▶ Broadband efficiency > 80% from 1510 to 1610 nm
- ▶ Centre wavelength for high efficiency from 780 to 1600 nm
- ▶ Ultra low-noise option
- ▶ Sensitivity from UV to MIR



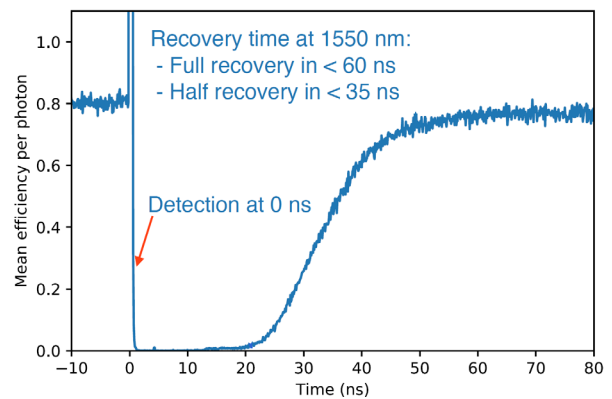
FAST RECOVERY TIME

- ▶ Standard recovery time of 60 ns (50% recovery) at 1550 nm
- ▶ Faster recovery time option
- ▶ Recovery time decreases with shorter wavelengths



LOW TIME JITTER

- ▶ Standard jitter < 50 ps FWHM (1550 nm)
- ▶ Low-jitter option < 30 ps (1550 nm)
- ▶ Jitter decreases for shorter wavelengths



AUTONOMOUS CRYOGENICS AT 0.8 K

- ▶ Cryogenic operation controlled by software
- ▶ Fully automated and continuous operation
- ▶ 0.8 K base temperature with 0.005 K stability
- ▶ Automated vacuum pump control option

A turnkey solution for all applications

The ID281 system includes all the necessary electronics and software to be seamlessly integrated in your application

ID900 TIME CONTROLLER BUILT-IN DATA PROCESSING

- ▶ Time-tagging and realtime histogram display
- ▶ Internal FPGA-based processing (coincidence, conditional outputs, etc)
- ▶ Delay generation with multi-hit capability
- ▶ Pattern generation
- ▶ High-speed (1 GHz) counters



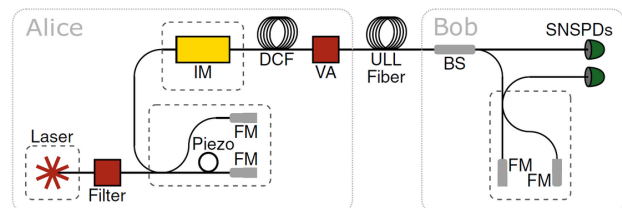
- ▶ Precise discriminators (-2 V to 2 V in 1 mV steps)
- ▶ 4 input channels
- ▶ 4 output channels (NIM or LVTTTL)
- ▶ High timing resolution: 8 ps RMS (20 ps FWHM) and 13 ps bin width

The ID900 Time Controller, included in the ID281 system, allows to get the most out of the detectors and to control your application. It combines discriminators, counters, time-to-digital converters (time-tagging), delay and pattern generators. It also allows you to fully characterise your detectors using its built-in processing capability and visual interface.

IDEAL FOR STATE-OF-THE ART RESEARCH AND DEMANDING INDUSTRIAL APPLICATIONS

The ID281 Superconducting nanowire technology was used to perform QKD over a record-breaking distance of 421 km of optical fibre.

A. Boaron et al., PRL 121, 190502 (2018)
Image credit: APS/Alan Stonebraker,
<https://alanstonebraker.com>



ID QUANTIQUE SNSPD TECHNOLOGY SELECTED BY ARIANEGROUP

The ID281 Superconducting nanowire and the ID900 Time Controller have been chosen by ArianeGroup for its unrivalled sensitivity and accuracy as crucial quality control devices used in the fabrication and operation of the upcoming Ariane 6 launcher.



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Specifications

Detectors	
System detection efficiency	≥ 85%
Optimisation Wavelengths	from 780 to 1625 nm
Broadband detection efficiency	> 85% over min 100 nm
Dark count rate (a,b)	10 to 100 Hz
Recovery Time (a,c)	from 30 to 60 ns
Maximum detection rate (a)	20 to 50 MHz
Jitter (FWHM) (b)	20 to 40 ps
Output pulse width, voltage	> 5 ns, > 100 mV
Design working temperature (d)	0.8 K
Detector package dimensions	13 x 20 x 25 mm
Fibre type (a)	Singlemode fibre

Cryostat	
Optical and coaxial channels	1-8 (upon request)
Base temperature	0.8 K
Minimum runtime at 0.8 K (e)	24 to 100 hours, configurable
Temperature stability	0.005 K
Cooldown time	12 hours
Compressor Type	Air or water-cooled
Flexlines length	3 m (upon request)
Dimensions	
- Cryostat	53 x 30 x 30 cm
- Compressor (air-cooled)	50 x 40 x 50 cm

a. Wavelength dependant, call for details.

b: Lower values available upon request

c: Time for the efficiency to recover 50% of the maximum efficiency after a detection.

d: The detectors can be operated at 2.5 K but the specifications are impacted. Call for details.

e: Programmed 2 hours of automatic recycling between runtime periods at 0.8K

Detector customisations
MMF fiber coupling
Polarization-independant efficiency
Broadband efficiency > 70% from 1300 to 1600 nm
Ultra-low noise detectors: DCR < 1 Hz

World Headquarters

ID Quantique SA
 Chemin de la Marbrerie 3 bis
 1227 Carouge/Geneva Switzerland
 info@idquantique.com
 www.idquantique.com

Sales Offices and Engineering Labs

Switzerland Geneva	United Kingdom Bristol
America Boston & Washington	South Korea SungNam-si