Redefining Measurement

ID281 Superconducting nanowire system

Turnkey multi-channel solution with timing electronics and control software

The ID281 is IDQ's ultimate combination of high-performance single-photon detection, simple and robust cryogenics, 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 (up to 16) are integrated in an automated closed-cycle and compact 0.8 K cryostat providing ease-of-use and unrivalled temperature stability for long-term performance.

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

- Reliable and durable performance
- High system detection efficiency : up to 90%
- Low dark count rate (as low as 1 Hz)
- Short recovery time and true latch-free operation even at high count rates
- Low time jitter
- Automated standalone 0.8K cryostat with built-in cryogenic preamplifiers
- Integrated control, discrimination and time-tagging electronics

New

- Polarisation-insensitive efficiency: > 70%
- Photon-number resolving detection of 4 photons or more
- Up to 16 channels with cryogenic preamplification

Applications

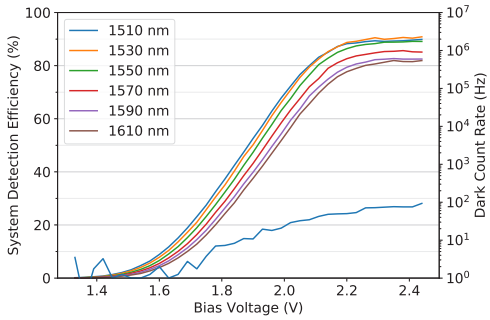
- QKD and quantum communication
- Quantum optics and computing
- Single-photon source characterisation
- Fluorescence lifetime measurements
- Failure analysis of integrated circuits
- VIS, NIR and MIR spectroscopy

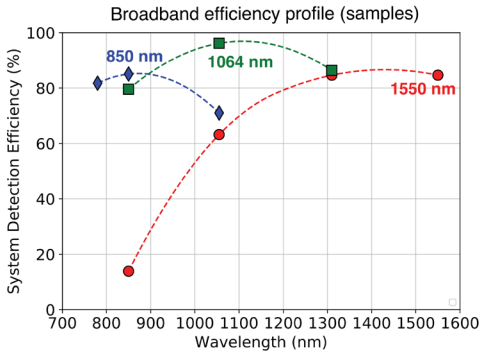
High-performance single-photon detection

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

HIGH EFFICIENCY & LOW NOISE

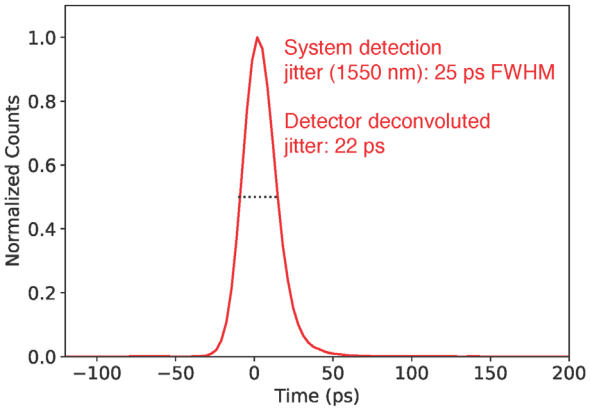
- System detection efficiency up to 90%
  (at 1550, 1310, 780, 850, 950 nm and +)
- Broadband efficiency detectors
- Low dark count rate (DCR):
  < 100 Hz (1310 to 1550 nm)
  < 20 Hz (950 to 1064 nm)
  < 5 Hz (780 to 950 nm)
  Lower DCR available upon request
- Options:
  Multimode fibre coupling: contact us for more information





LOW TIME JITTER

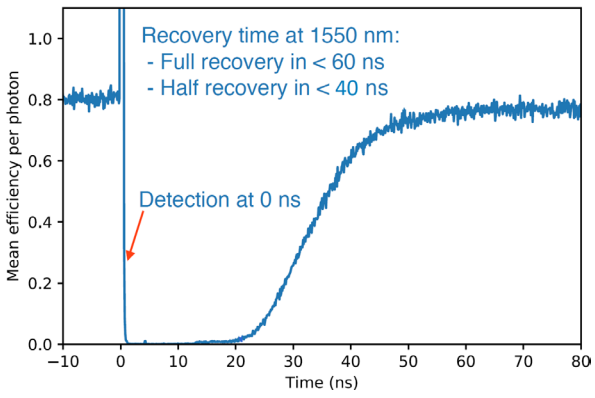
- Time jitter (FWHM) from < 30 to 60 ps



SHORT RECOVERY TIME

- The recovery time is defined as the time necessary for the efficiency to recover to 50% of its nominal value after a detection.
- Typical values are 30 to 60 ns (wavelength dependant).

  The method is described in Journal of Applied Physics 128, 074504 (2020).

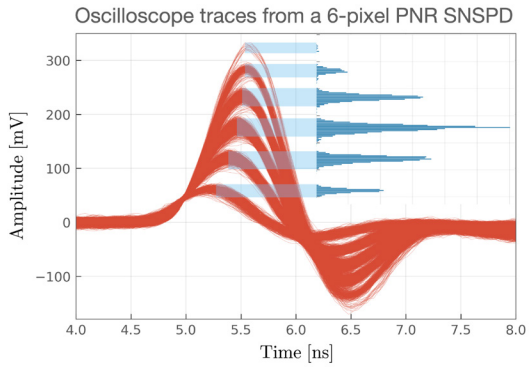


High-performance single-photon detection

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

PHOTON-NUMBER RESOLVING SNSPDs

- >70% nominal system detection efficiency (SDE)
- Efficiency reduction minimized at high count rates
- Photon-number resolution (PNR) capability with a single channel use in the cryostat
- Patent-pending technology



AUTONOMOUS CRYOGENICS AT 0.8 K

- Up to 16 channels in a single cryostat with cryogenic pre-amplifiers
- 12 hours cooldown time
- 0.8 K base temperature with 5 mK stability
- >24 hours runtime at 0.8 K
- Software-controlled cryostat operation
- Automated vacuum pump control option
- Low maintenance
- Remote installation

ID900 TIME CONTROLLER BUILT-IN DATA PROCESSING

- Time-tagging and real-time histogram display
- Single-channel jitter: 5.7 ps rms
- 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 LVTTL)

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.

Specifications

Detectors

System detection efficiency	From ≥ 80% to ≥ 90%
Optimisation wavelengths	from 780 to 1625 nm
Broadband detection efficiency	High SDE over > 100 nm by design (a)
Dark count rate (a)	From < 1 to < 100 Hz
Recovery Time (a,c)	from 30 to 60 ns
Maximum detection rate (a)	20 to 50 MHz
Jitter (FWHM) (a,b)	< 30 to 50 ps
Output pulse width, voltage	> 5 ns, > 100 mV
Design working temperature (d)	0.8 K
Detector package dimensions (incl. optical fibre)	29 x 8 x 40 mm
Fibre type (a, e)	Singlemode fibre

Cryostat

Optical and coaxial channels	1-16
Base temperature	0.8 K
Minimum runtime at 0.8 K	≥ 24 hours
Temperature stability	5 mK peak-to-peak
Cooldown time	12 hours
Compressor Type	Air or water-cooled
Flexlines length	3 m (more upon request)
Dimensions	
- Cryostat	63 x 30 x 30 cm
- Compressor (air-cooled)	50 x 40 x 50 cm

a. Wavelength dependent, 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 a higher temperature but the performance can be impacted. Call for details.

e: For multimode fibre coupling. Call for details.

Use cases

ID281 Superconducting nanowire technology used to perform QKD over record-breaking distance of 421 km

ID281 SNSPD Selected by Arianegroup

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