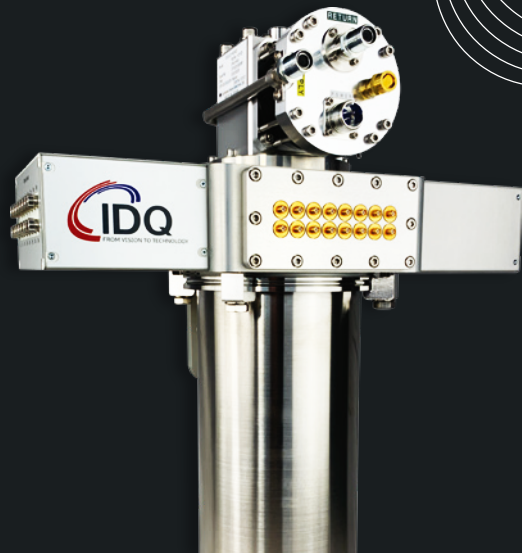




ID281

Superconducting Nanowire Series

" The very best in single photon detection,
with ultra stable performance "



Push your photonic experiments and applications to new heights with our Swiss-made superconducting nanowire single-photon detectors (SNSPDs), combining incredibly high detection efficiency, timing precision, low noise and fast recovery time.

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

Get the best out of your photonic experiments and applications with the ID281 Superconducting Nanowire Series today.

Applications

- ▶ Quantum computing
- ▶ QKD and quantum communication
- ▶ Single-photon source characterization
- ▶ Fluorescence lifetime imaging and TCSPC
- ▶ Single emitters and color centers analysis
- ▶ LIDAR, remote sensing and environmental monitoring

Key Features

- ▶ **Near-perfect detection efficiency:** can exceed 95%
- ▶ **Ultra-low noise:** as low as < 1 cps dark count rate
- ▶ **Superb precision with built-in cryogenic amplifiers:** as low as < 20 ps timing jitter
- ▶ **Maximum detection rates:** up to 250 Mcps
- ▶ **Hardware-based true latch-free operation** at any detection rate
- ▶ **Reliable and robust performance**, with worldwide round-the-clock technical support included
- ▶ **Continuous system operation**
- ▶ **Mix and match up to 16 detectors**, upgrade anytime

Optional

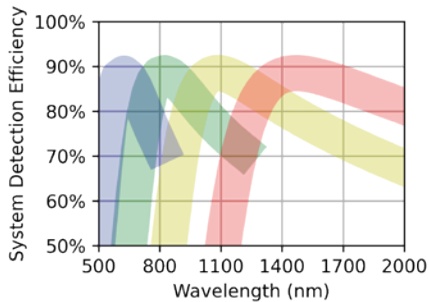
- Self-contained rack-mounted systems
- Advanced time-tagging, coincidence filtering and delay/pulse generation

New

- Polarization Maintaining Fiber coupling option
- Digital output signal option with integrated counter
- Qortex Web UI, remote operation on any OS
- Industry-leading photon-number resolution up to 8 photons

Detectors for any occasion

Endless options, always great performance



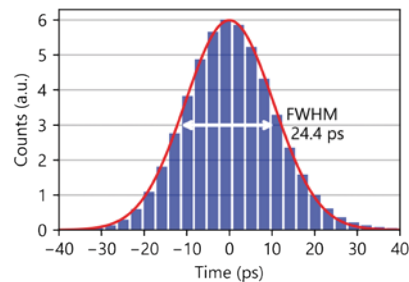
Approximate expected SDE for four ID281 SNSPD designs.

Broad-spectrum near-ideal detection efficiency

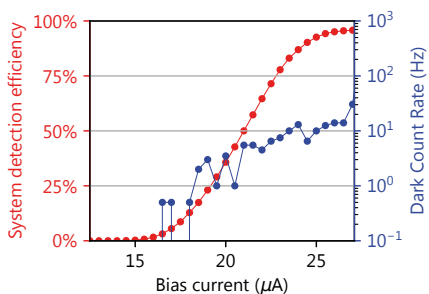
High system detection efficiency (SDE) across hundreds of nanometres

Superb precision

See the best single-photon detection timing jitter with SNSPDs



Timing jitter measurement of an ID281 SNSPD, at 1550 nm, recorded with an ID1000 Time Controller. The raw FWHM of 24.4 ps includes all instrument jitter contributions, such that the real FWHM of the SNSPD is less than 22.3 ps.



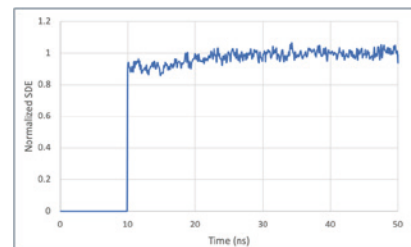
SDE and dark count rate measurement of an ID281 SNSPD, as a function of the applied bias current, tested at 1550 nm.

Ultra-low noise

Negligible detector dark counts in the SNSPDs' cryogenic environment

Ultrafast single-photon counting

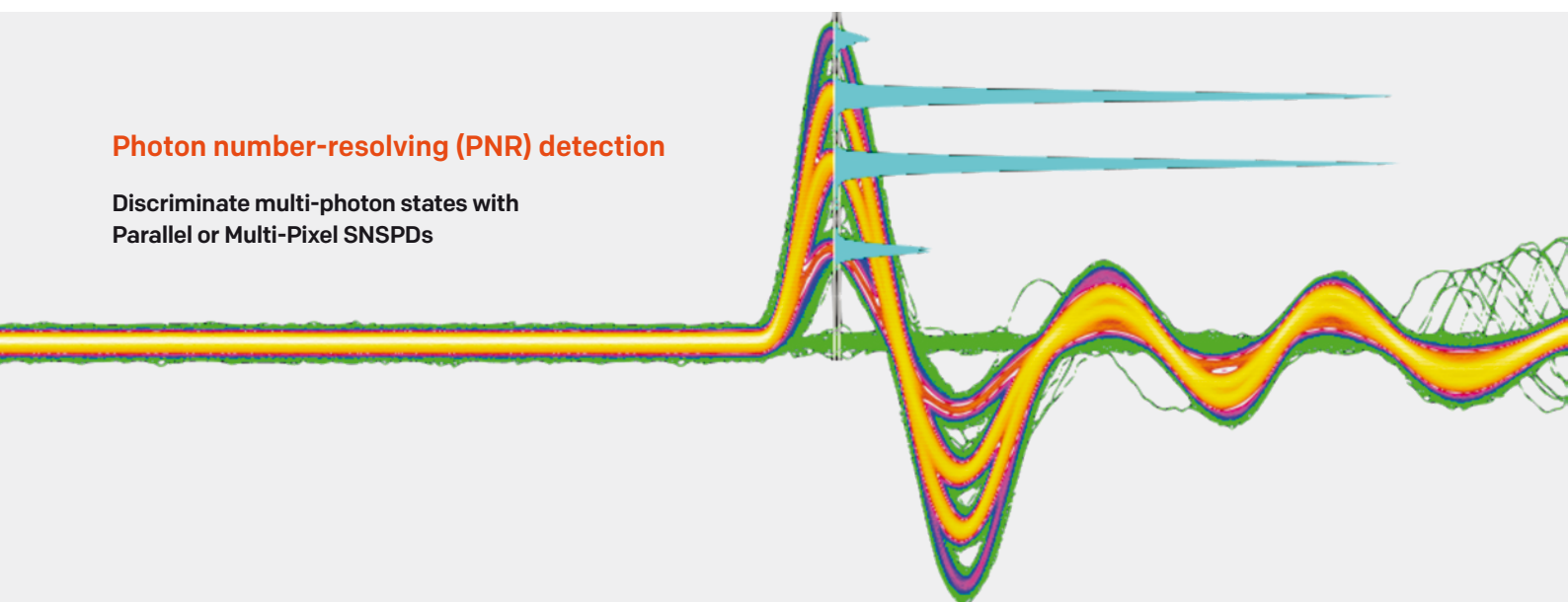
Parallel and Multi-Pixel designs to beat the photon pile-up effect



Recovery time measurement of an ID281 Parallel SNSPD, tested at 1550 nm.

Photon number-resolving (PNR) detection

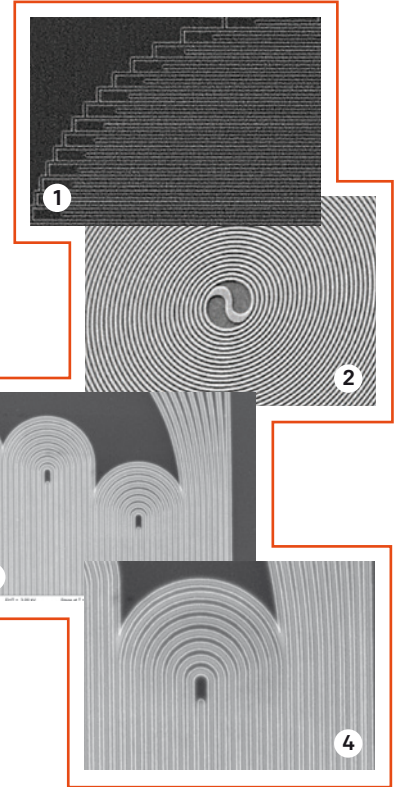
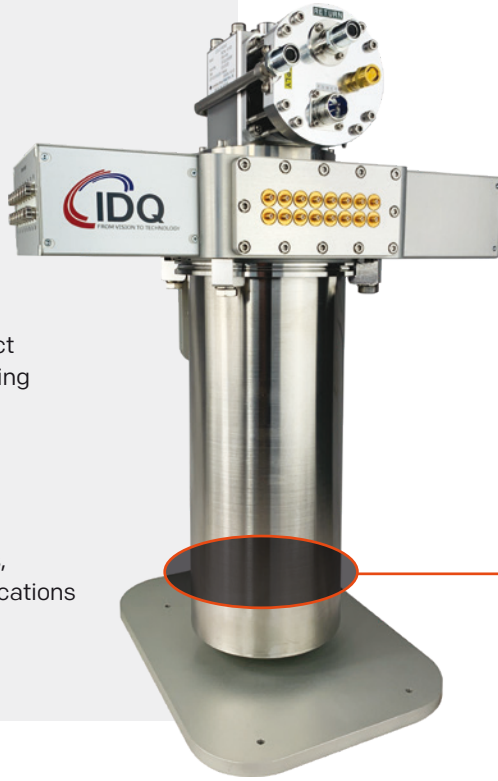
Discriminate multi-photon states with Parallel or Multi-Pixel SNSPDs



The ID281 system

ID281 SNSPDs are integrated in an automated and compact closed-cycle cryostat, providing ease-of-use and continuous system operation, with latch-free detection by design.

In a single ID281 system, mix and match up to 16 detectors, available in a range of specifications customizable to each user.



1. Standard single pixel for excellent overall performance
2. Polarization-intensive spirals
- 3, 4. Interleaved Parallel and Multi-Pixel devices for ultrafast counting and photon-number resolution



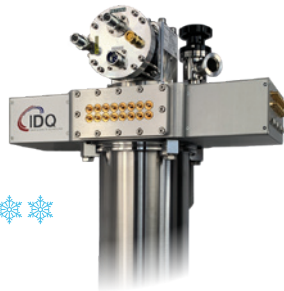
ID281 SO SOorption

- Full catalogue of SNSPDs, lowest jitter possible
- Extended system lifetime
- Even longer periods between maintenance

ID281 CO

Continuous Operation

- True 24/7 continuous operation
- High-speed and low-jitter SNSPDs



A complete package

- Rack mounting customization for safety and mobility
- ID281 Control Box for plug-and-play operation



ID1000 Time Controller series

Each ID281 system optionally includes our Time Controller Series, for high-speed and high-resolution time-tagging, letting you react to and control your experiment in real time.

- All-in-one time-tagger & pulse generator
- Record up to 300 Mcps unique detection timestamps per device, with 1 ps precision
- Multi-device synchronisation for over 64 input channels



Specifications

Detectors		
Peak system detection efficiency (SDE)	80% to 95% (or better)	
Detector wavelengths	< 500 nm to > 2000 nm	
Broadband detection efficiency ⁽¹⁾	High SDE over > 100 nm range	
Maximum dark count rate ⁽¹⁾	< 500 nm to 950 nm: < 5 cps to < 1 cps 950 nm to 1300 nm: < 20 cps to < 1 cps 1300 nm to > 1600 nm: < 100 cps to < 1 cps	
Maximum detection rate ^{(1) (2)}	Standard SNSPDs: > 30 Mcps (recovery time typ. < 30 ns) Parallel SNSPDs: > 250 Mcps (recovery time < 10 ns) Multi-Pixel SNSPDs: > 1 Gcps across all pixels	
Timing jitter (FWHM) ⁽³⁾	< 20 ps to < 40 ps (typ. < 30 ps)	
Output pulse width, voltage	> 5 ns, > 100 mV	
Fibre type ^{(1) (4)}	Single mode fibre	
Cryostat		
Cryostat Model	ID281 SO ⁽⁵⁾	ID281 CO ⁽⁶⁾
Detector base temperature	< 1 K	> 2 K
Runtime at base temperature	≥ 24 hours ⁽⁵⁾	Indefinitely ⁽⁶⁾
Number of detector channels	1 to 16	
Cryostat dimensions	63 cm x 45 cm x 30 cm	

⁽¹⁾ Detector specifications are wavelength-dependent, please contact us for further information.

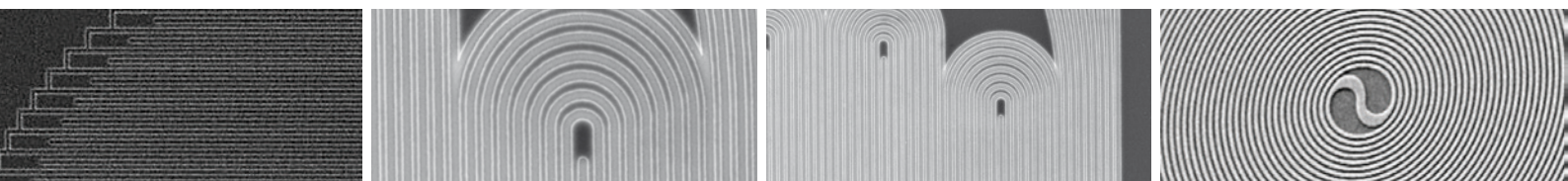
⁽²⁾ Recovery time defined as the time for the detection efficiency to recover 50% of the maximum after a detection event. Call us for details about the interplay between detection rate and efficiency.

⁽³⁾ Timing jitter varies depending on detection wavelength, detector design, and detector composition. Lower jitter values can be prioritised on request.

⁽⁴⁾ Multimode fibre coupling is available upon request.

⁽⁵⁾ The ID281 SO (SOption) system achieves the highest SNSPD performance, with longer system lifetimes, compared to the ID281 CO system. Automated operation of the ID281 SO system gives indefinite continuous operation with a scheduled helium condensation cycle every day.

⁽⁶⁾ The ID281 CO (Continuous Operation) system achieves true uninterrupted and indefinite SNSPD operation, while still reaching the performance listed in the specifications table above.



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