IDQ an IonQ company

IONQ

ID281 Pro

Superconducting Nanowire Series

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

SWISS MADE

Introducing our next-generation rack mountable SNSPD system – bringing IDQ's industry-leading single-photon detection to a compact, plug-and-play package.

The ID281 Pro represents a leap forward in reliability and ease-of-use, simplifying integration while retaining the outstanding performance of our ID281 line: high efficiency, ultra-low noise, broadband operation, superb timing precision, and fast recovery times.

Forget about your detectors and focus on your science with our most intuitive system yet.

Applications

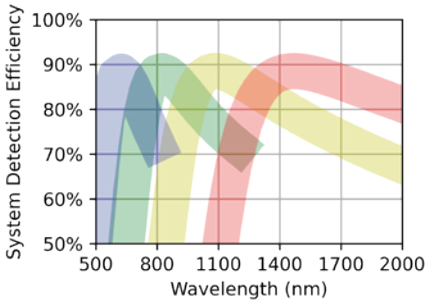
- **Quantum computing**
- **QKD and quantum communication**
- **Single-photon source characterization**
- **Fluorescence lifetime imaging and TCSPC**
- **Single emitters and color centers analysis**
- **LIDAR, remote sensing and environmental monitoring**

Key Features

- **System characteristics:**
  - Fully autonomous 24/7 continuous operation
  - Plug-and-play installation
  - Qortex Web UI, automated, remote single-button operation from any OS
  - Compact, 8U form factor
  - Rack-mounted, automated vacuum pump available
- **IDQ's promise:**
  - Reliable and robust performance, with worldwide round-the-clock technical support
- **Detector performance:**
  - Near-perfect detection efficiency
  - Ultra-low noise: as low as < 1 cps dark count rate
  - Superb timing precision with built-in cryogenic amplifiers
  - High count rates: ultrafast detectors with maximum detection rates above 200 Mcps
  - Hardware-based true latch-free operation at any detection rate
  - Mix & match up to 16 detectors, upgrade anytime
- **Innovation highlight:**
  - Polarization Maintaining Fiber coupling option, stabilize and simplify your system
  - Digital or Analog signal, integrate to your application in complete freedom
  - Industry-leading photon-number resolution up to 8 photons

Detectors for any occasion

Endless options, always great performance



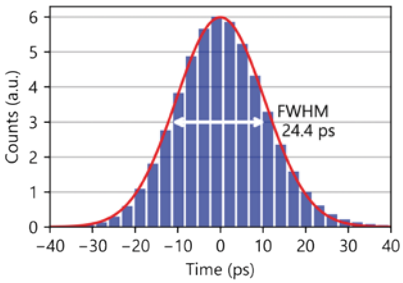
Approximate expected spectral response for four cavity designs. Max efficiency depends on detector grade.

Broad-spectrum near-ideal detection efficiency

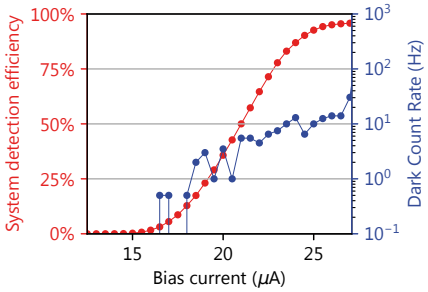
High system detection efficiency (SDE) across hundreds of nanometres

Superb precision

See the best single-photon detection timing jitter with SNSPDs



Timing jitter measurement of a standard IDQ SNSPD at 1550 nm, recorded with an ID1000 Time Controller. The plot shown is the raw data, including all instrument jitter contributions. The contribution of the SNSPD is less than 22.3 ps FWHM.



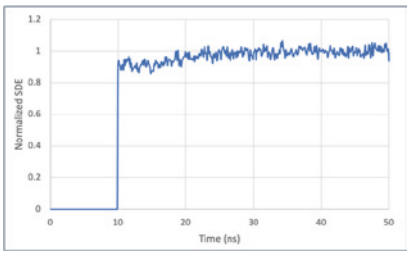
SDE and dark count rate measurement of an ID281 SNSPD, as a function of the applied bias current, tested at 1550 nm.

Ultra-low noise

Negligible detector dark counts in the SNSPDs' cryogenic environment

Ultrafast single-photon counting

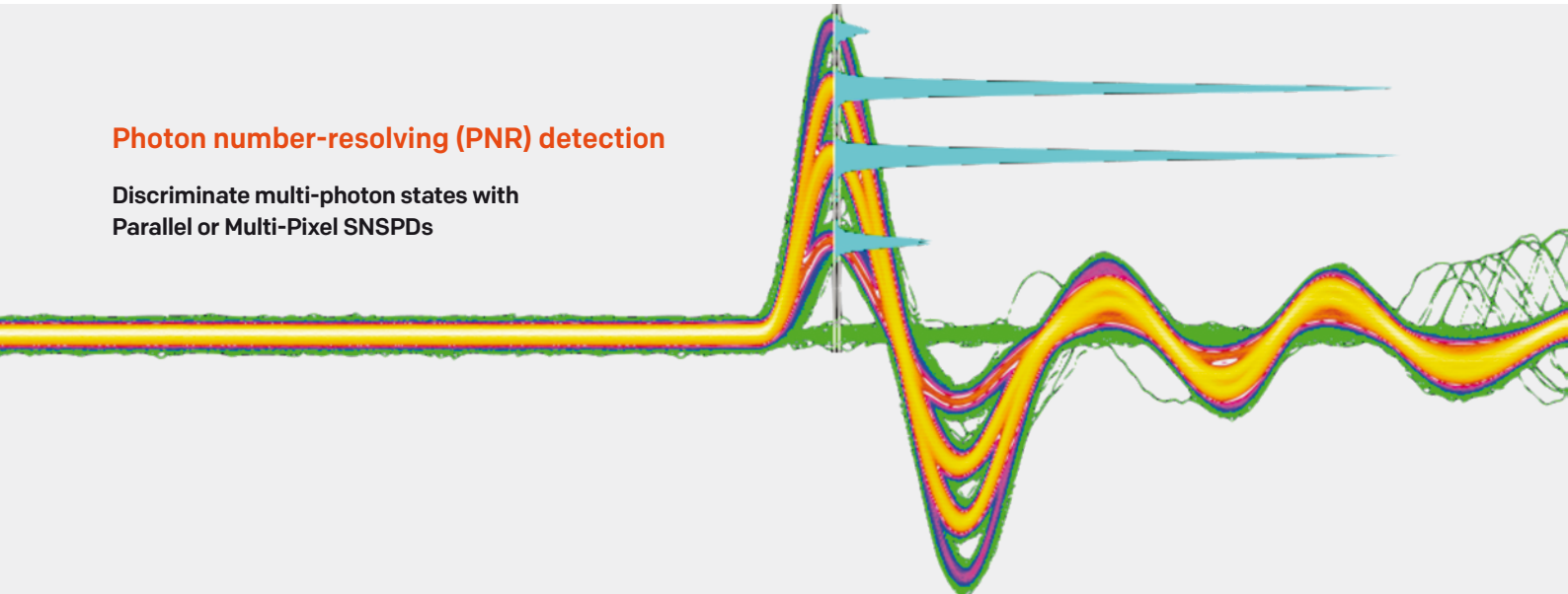
Parallel and Multi-Pixel designs to beat the photon pile-up effect



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

Photon number-resolving (PNR) detection

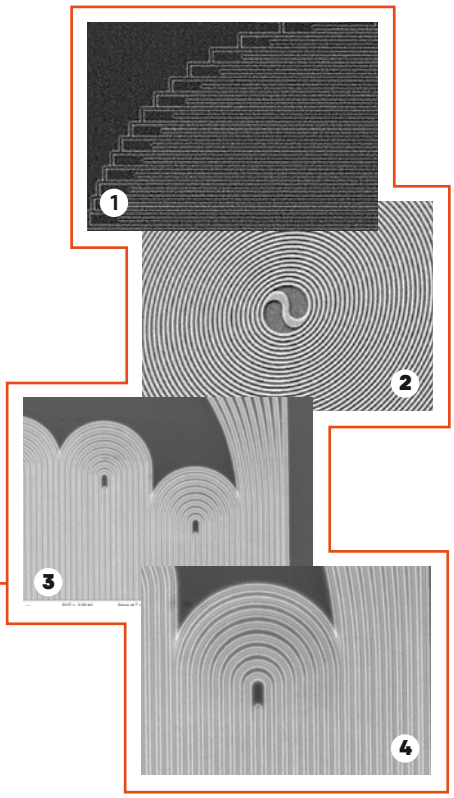
Discriminate multi-photon states with Parallel or Multi-Pixel SNSPDs



The ID281 Pro system

ID281 Pro 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 Pro 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-intensitive spirals
3, 4. Interleaved Parallel and Multi-Pixel devices for ultrafast counting and photon-number resolution

ID281 Pro

- Fully autonomous 24/7 continuous operation
- Plug-and-play installation
- Qortex Web UI for remote operability
- Compact, 8U form factor
- Optionally include a rack-mounted vacuum pump, rack-mounted compressor, and time controller for a fully integrated solution.

A complete package

Fully integrated system shown with a rack-mounted compressor (6U) and IDQ's rack-mounted vacuum pump (4U). Other options for the compressor and vacuum pump are available.

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]	< 30 ps to < 40 ps
Output pulse width, voltage	> 2 ns, > 100 mV
Fibre type [1] [4]	Single mode fibre
ID281 Pro System	
Overall system runtime	24/7 continuous operation
Detector base temperature	< 3 K
Number of detector channels	Up to 16
Dimensions [5]	Compatible with 19" rack Cryo unit: 8U Rack-mounted vacuum pump option: 4U Rack-mounted compressor option: 6U
Power consumption [5]	Cryo unit: < 0.2 kVA Rack-mounted vacuum pump option: < 0.32 kVA Rack-mounted compressor option: < 1.4 kVA
Interface	Optical inputs: FC/PC RF outputs: SMA female
Operating temperature [6]	10°C – 30°C

[1] *Detector specifications are wavelength-dependent, please contact us for further information.*

[2] *Recovery time defined as the time for the detection efficency 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] *Specs shown are for an air-cooled, rack-mounted compressor option and rack-mounted vacuum pump option. Non-rack-mounted options are also available, with different specs; please contact us for details.*

[6] *Cooling capacity may be reduced if environment exceeds 23°C. This can lead to elevated base temperature and DCR.*

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