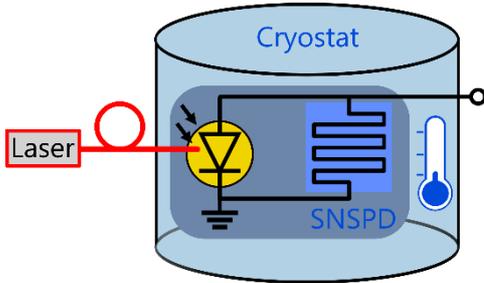


Optical power supply

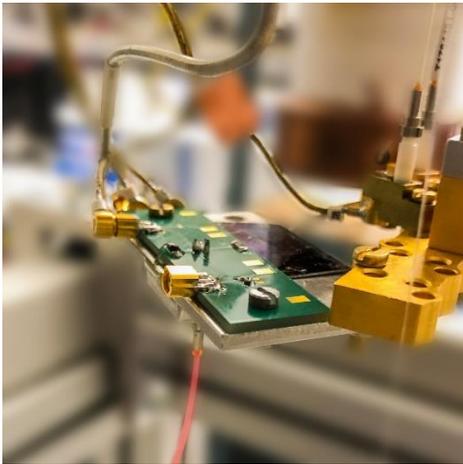
Thermal bridge-free single-photon detection system

Invention

Quantum optical systems are a promising future market. However, the heavy cooling of the superconducting single-photon detectors required to operate them is a significant obstacle to commercial use. Reducing cooling power would improve the practicality of this technology considerably. Since these detectors need to operate at very low temperatures inside cryostats, metal cables routed from the outside act as a thermal bridge that increases the cooling power needed. This invention by Paderborn University supplies the power needed by the cooled electronics from a photodiode inside the cryostat. The idea is to supply the power needed to run the detector optically and to transmit it into the cryostat via optical fibers. Glass or plastic optical fibers are much poorer thermal conductors than conventional metal cables. The photodiode then generates the detector's operating power from the light.



Design principle for a single-photon detector.



Experimental proof-of-concept

Commercial Opportunities

Quantum computing, quantum communication and quantum sensors are projected to become some of the biggest growth markets over the next decade and there already exists a highly dynamic R&D environment. Several concepts have already been realized in the lab. Still, the high equipment costs of operating such systems, e.g., vacuum technology, magnetic fields, cryostats, stand in the way of extensive use in many cases. This new and purely optical photo detector system can substantially improve practicality by avoiding thermal bridges, leading to smaller refrigeration systems. This, in turn, saves space and money.

Current Status

An experimental proof-of-concept has been built that demonstrates basic functionality. An application has been submitted to the German Patent and Trademark Office, with subsequent applications in other countries possible in the priority year or as part of a later PCT application. We are offering interested companies the opportunity to license and continue to develop this technology with the inventors at Paderborn University.

An invention of Paderborn University.

Competitive Advantages

- Optically driven photodetector
- No thermal bridges from cables
- Lower cooling power
- Combining with an optical data cable makes it possible to power the entire system optically.
- For use in quantum computing and communication

Technology

Readiness Level

123456789

Experimental proof of concept

Industries

- Communications technology
- Electronics
- Sensor technology

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