

Quantum Technology and Optical Modules



Article Overview

Optical modules are fundamental components in quantum technology, enabling the generation, manipulation, and detection of quantum states of light for applications in computing, communication, and sensing.

Quantum Technology and Photons

Quantum technology leverages the quantum properties of light, such as superposition and entanglement, to perform tasks that classical systems cannot achieve efficiently. Photons, the quantum units of light, serve as qubits in quantum computing and as carriers of information in quantum communication systems. Their discrete energy and wave-particle duality allow precise control over quantum states, which is essential for secure communication, quantum key distribution (QKD), and high-precision measurements.

Role of Optical Modules

Optical modules are devices that generate, guide, and detect photons in controlled ways. They include components such as beam splitters, mirrors, waveguides, single-photon sources, and detectors. These modules are critical for:

- **Quantum Communication:** Optical modules encode information onto photon states for QKD, ensuring secure transmission by exploiting the fact that measurement collapses quantum states, revealing eavesdropping attempts

Article Content

Sep 13, 2025

Distributed quantum computing across an optical network link

Here we experimentally demonstrate the distribution of quantum computations between two photonically

Dec 02, 2025

What is quantum computing?

Quantum computing is a rapidly-emerging technology that harnesses the laws of quantum mechanics to solve

May 04, 2026

Scaling and networking a modular photonic quantum computer

Photonics offers a promising platform for quantum computing¹⁻⁴, owing to the availability of chip integration for mass

Jun 28, 2026

Quantum Optical Components

The Fraunhofer ILT scientists are developing, among other things, photon sources, photonic components

Jan 05, 2026

Smart quantum technology | Laser Zentrum Hannover

From individual modules for generating entangled photon pairs by spontaneous parametric down

Jun 03, 2026

Top Photonic Quantum Computing Companies in 2026

Beyond the companies building full-stack photonic quantum computers, photonic

May 30, 2026

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Overview Optical and Quantum Electronics is a peer-reviewed journal covering research areas of technology and physics of optical

Mar 27, 2026

Quantum Optics

Quantum optics helped trigger, both directly and indirectly, the birth of quantum technologies, whose aim is to harness non-classical

Mar 16, 2026

A manufacturable platform for photonic quantum computing

In this paper, we describe a technology stack and basic building blocks for photonic quantum computing,

Jan 19, 2026

Miniaturised optical isolators for realising micro-integrated photonic ...

Abstract: At the Ferdinand-Braun-Institut (FBH), we have been using our proven hybrid micro-integration technology for more than a

May 02, 2026

Advancements in Quantum Optics: Harnessing the Power of

Quantum optics has emerged as a dynamic field at the forefront of scientific research and technological innovation.

Jan 18, 2026

Quantum optics

Quantum optics is a branch of atomic, molecular, and optical physics and quantum chemistry that studies the behavior of photons

Jul 03, 2026

Integrated Optics Modules Based Proposal for Quantum Information ...

To address key challenges for both quantum communication and quantum computing applications in a simultaneous

May 01, 2026

Integrated optical modules for quantum communication

As quantum communication moves from the lab to real life, optical integration will be key. Researchers are already preparing for the

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Micro-integrated photonic modules for quantum technology applications

We present our latest development of photonic modules for quantum technology applications and show first results of

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Micro-Integrated Photonic Modules for Quantum Technology

We present our narrow-linewidth micro-integrated diode laser modules that have already been successfully used for quantum

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MSc Optoelectronic and Quantum Technologies

Find out about the University of Bristol's MSc in Optoelectronic and Quantum Technologies, including structure, entry requirements

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Silicon Photonics Networking for Agentic AI | NVIDIA

Powering on NVIDIA Quantum-X InfiniBand Photonics Switch Watch NVIDIA's Quantum-X InfiniBand Photonics switch come to life in

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From Quantum Optics to Quantum Technologies

Quantum optics helped trigger, both directly and indirectly, the birth of quantum technologies, whose aim is to harness non-classical

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Qubits under Control: Scalable Technology for Quantum

The Fraunhofer Institute for Photonic Microsystems IPMS and the Max Planck Institute of

Jun 14, 2026

Quantum optics

Quantum optics articles from across Nature Portfolio Atom RSS Feed Quantum optics is the study of how individual

Aug 28, 2025

POET Technologies and Quantum Computing Inc. to Co-Develop 3.2

About POET Technologies Inc. POET Technologies is a design and development company offering high-speed

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Optical Quantum Memory and its Applications in Quantum ...

Optical quantum memory is a device that can store the quantum state of photons and retrieve it on demand and with high fidelity. It is

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Nonlinear and quantum photonics using integrated optical materials

Harnessing nonlinear optical phenomena using integrated photonics allows for unprecedented control and

Jul 20, 2026

Integrated photonic quantum technologies

This Review covers recent progress in integrated quantum photonics (IQP) technologies and their applications. The

Sep 16, 2025

Quantum Optics: Theory, Methods, and Applications

These results improve the theory, methods, and applications of Quantum Optics and provide interesting suggestions

Feb 14, 2026

POET Technologies and Quantum Computing Inc. to Co-Develop 3.2

POET Technologies is a design and development company offering high-speed optical engines, light source products,

Apr 29, 2026

Using quantum technologies to improve fiber optic communication systems

We discuss the near future impact that recent developments of quantum technologies can have in the field of fiber

Oct 05, 2025

Efficient evaluation of optical quantum modules via two-photon ...

The rapid advancement of quantum information technology has increased the demand for precise testing and calibration of quantum

Contact Us

For more information, pricing, or custom solutions, please contact us:

Website: <https://iiss.co.za>

Email: sales@iiss.co.za

Phone: +27 63 174 2895

Address: Unit 8, Innovation Park, 15 Rivonia Road, Sandton, Johannesburg,
2196, South Africa

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