TROY TECHNICAL

# OPTICAL COMMUNICATIONS & PHOTONICS

## WEEKLY REPORT

October 24 - October 30, 2026 | Issue 2026-W43

**Link budget, packaging, thermal reliability and deployable supply**

| 13 | 10 |
|---|---|
| ANALYZED ARTICLES | PRIORITY THEMES |

Issued 2026-10-30 | English edition | fixed approved cover artwork



# Optical Communications & Photonics: the boundary moved from isolated claims to qualification evidence

13 English articles were reviewed independently from the Japanese edition. Ten themes are retained for management decisions.

SIGNAL 01 | LIGHT SOURCE

## Optical Chiplets: NTT's IOWN Gen 3 Production Roadmap to 2033

NTT and Japan Semiconductor (JSC) are establishing a production line for "optical chiplets" by 2028 to capture 30% of the global market by 2033.

SIGNAL 02 | PHOTONIC DEVICE

## PsiQuantum OCS: Silicon Photonics Specs for AI Data Centers

PsiQuantum has demonstrated an 8×8 optical circuit switch (OCS) leveraging a low-loss silicon photonics platform originally designed for quantum computing.

SIGNAL 03 | PACKAGING

## NVision and HyperLight: Photonic Quantum Chip Roadmap to 2030

NVision and HyperLight are partnering to integrate organic molecular qubits onto thin-film lithium niobate (TFLN) photonic integrated circuits.

SIGNAL 04 | NETWORK SYSTEM

## Van der Waals Quantum Light Source: WSe2/WS2 Purity and Rates

Researchers at the Technical University of Denmark have developed an integrated quantum light source achieving a single-photon purity of g(2)(0) = 0.003.

DECISION

**Focus this week's management attention on link budget, packaging, thermal reliability and deployable supply. Move only when the linked evidence can be reproduced under your own operating conditions.**

THREE MANAGEMENT MOVES

1. Buyers: evaluate optical architectures by reach, power, latency, interoperability and field service.
2. Suppliers: pair optical performance with packaging yield, test, thermal drift and qualified capacity.
3. Executives: track yield, coupling loss, temperature drift, interoperability, volume and cost.

EVIDENCE DISCIPLINE

FACT states what the collected English source reports. BUSINESS READ and ACTION are editorial interpretations. UNKNOWN lists information that the source file does not establish. A linked article is not treated as independent confirmation of every claim.

# Five numbers or evidence anchors that require conditions

**30%**
A07

SOURCE-BOUND CONDITION
NTT and Japan Semiconductor (JSC) are establishing a production line for "optical chiplets" by 2028 to capture 30% of the global market by 2033.

**1.68 MHz**
A11

SOURCE-BOUND CONDITION
The device demonstrates an on-chip generation rate of 1.68 MHz using a van der Waals platform, providing a scalable pathway for photonic quantum information processing.

**750 G**
A06

SOURCE-BOUND CONDITION
NTT East, NTT West, NII, RIKEN, and the University of Tokyo demonstrated ultra-high-speed data transfer exceeding 750 Gbps using the IOWN All-Photonics Network (APN).

**4x**
A05

SOURCE-BOUND CONDITION
The new standard achieves 4x the bandwidth density and 1.3x better power efficiency than previous modules, enabling higher throughput without adding network layers.

**P05**
A04

SOURCE-BOUND CONDITION
The Advanced Photonics Coalition (APC) has released a suite of standards to enable high volume manufacturing of optical networking equipment.

HOW TO USE THESE NUMBERS
Each value is shown with the condition stated in the collected English article. Do not compare values across different test methods, device sizes, operating temperatures or commercial stages without normalizing those conditions.

## Where the value chain moved

Each stage combines one leading theme and one supporting theme. The report treats handoffs as evidence transfers, not decorative arrows.

1

### Light source

P01/P06

NTT and Japan Semiconductor (JSC) are establishing a production line for " optical chiplets" by 2028 to capture 30% of the.

2

### Photonic device

P02/P07

PsiQuantum has demonstrated an 8×8 optical circuit switch (OCS) leveraging a low-loss silicon photonics platform originally.

3

### Packaging

P03/P08

NVision and HyperLight are partnering to integrate organic molecular qubits onto thin-film lithium niobate (TFLN) photonic.

4

### Network system

P04/P09

Researchers at the Technical University of Denmark have developed an integrated quantum light source achieving a.

5

### Operations

P05/P10

The Advanced Photonics Coalition (APC) has released a suite of standards to enable high volume manufacturing of optical.

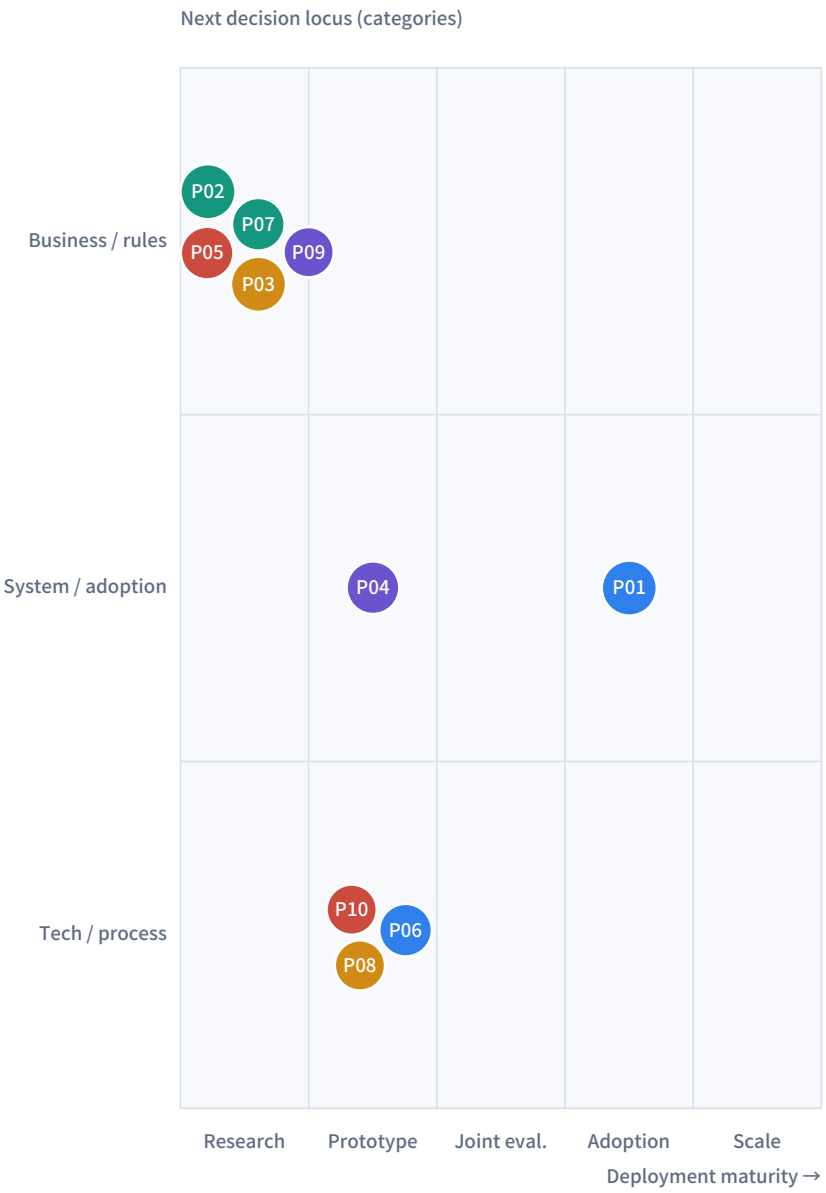
EVIDENCE REQUIRED AT EACH HANDOFF

| | |
|---|---|
| Light source to Photonic device | Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck yield, coupling loss, temperature drift, interoperability, volume and cost. |
| Photonic device to Packaging | Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck yield, coupling loss, temperature drift, interoperability, volume and cost. |
| Packaging to Network system | Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck yield, coupling loss, temperature drift, interoperability, volume and cost. |
| Network system to Operations | Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck yield, coupling loss, temperature drift, interoperability, volume and cost. |

COMMON CONTROL POINT

**No theme moves to a commercial commitment until a named owner has reproduced the relevant evidence and documented yield, coupling loss, temperature drift, interoperability, volume and cost.**

# Priority map: maturity and next decision locus




| | |
|---|---|
| P01 | Optical Chiplets: NTT's IOWN Gen 3 Production Roadmap to 2033<br>System / adoption \| cue: market |
| P02 | PsiQuantum OCS: Silicon Photonics Specs for AI Data Centers<br>Business / rules \| cue: infrastructure |
| P03 | NVision and HyperLight: Photonic Quantum Chip Roadmap to 2030<br>Business / rules \| cue: standard |
| P04 | Van der Waals Quantum Light Source: WSe2/WS2 Purity and Rates<br>System / adoption \| cue: integrated |
| P05 | APC Photonics Standards: Roadmap for CPO High Volume Manufacturing<br>Business / rules \| cue: Standards |
| P06 | IOWN APN: 800 Gbps Storage Data Transfer Demo by NTT and NII<br>Tech / process \| cue: no system/business cue |
| P07 | USFP: NVIDIA and Cisco's 12.8Tb/s Optical Module Specs<br>Business / rules \| cue: standard |
| P08 | OptQC Modular Quantum Computing: GKP Interface Error Rates<br>Tech / process \| cue: no system/business cue |
| P09 | Hesai Technology: Robotics Motion and 3D Data Engine Roadmap<br>Business / rules \| cue: infrastructure |
| P10 | Pure-Kerr PDCS: Multimode Squeezing and 20 dB Noise Reduction<br>Tech / process \| cue: no system/business cue |

**REPRODUCIBLE POSITIONING RULE**

Horizontal position uses five discrete stages: Research, Prototype, Joint evaluation, Product adoption and Scale. The vertical bands classify the next decision locus: Tech / process, System / adoption, or Business / rules (including supply systems). Article-title cues take precedence; the overview is used only when the title is silent. These are categories, not impact ranks. Bubble diameter reflects the editorial score.

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

## P01 Optical Chiplets: NTT's IOWN Gen 3 Production Roadmap to 2033

A07 | Light source | Product adoption

Date not stated

**FACT**

NTT and Japan Semiconductor (JSC) are establishing a production line for "optical chiplets" by 2028 to capture 30% of the global market by 2033. The project utilizes a membrane device structure to replace electrical signals with optical signals between semiconductor packages, targeting a significant reduction in power consumption for AI-driven data traffic.

**WHY IT MATTERS**

The decision relevance is link budget, packaging, thermal reliability and deployable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

**BUSINESS READ**

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, pair optical performance with packaging yield, test, thermal drift and qualified capacity.

**ACTION**

Within 30 days, evaluate optical architectures by reach, power, latency, interoperability and field service; record the evidence and owner against P01.

**UNKNOWN**

Still unproven or incompletely stated: yield, coupling loss, temperature drift, interoperability, volume and cost.

EDITORIAL SCORE 21/25 | MATURITY 4/5 | DECISION LOCUS: SYSTEM / ADOPTION

## P02 PsiQuantum OCS: Silicon Photonics Specs for AI Data Centers

A01 | Photonic device | Research

Date not stated

**FACT**

PsiQuantum has demonstrated an 8×8 optical circuit switch (OCS) leveraging a low-loss silicon photonics platform originally designed for quantum computing. The device achieves 1.2 dB insertion loss and sub-3 ms reconfiguration time, providing a scalable connectivity solution for AI infrastructure bottlenecks.

**WHY IT MATTERS**

The decision relevance is link budget, packaging, thermal reliability and deployable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

**BUSINESS READ**

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, pair optical performance with packaging yield, test, thermal drift and qualified capacity.

**ACTION**

Within 30 days, evaluate optical architectures by reach, power, latency, interoperability and field service; record the evidence and owner against P02.

**UNKNOWN**

Still unproven or incompletely stated: yield, coupling loss, temperature drift, interoperability, volume and cost.

EDITORIAL SCORE 21/25 | MATURITY 1/5 | DECISION LOCUS: BUSINESS / RULES

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

## P03 NVision and HyperLight: Photonic Quantum Chip Roadmap to 2030

A08 | Packaging | Research

Date not stated

FACT

NVision and HyperLight are partnering to integrate organic molecular qubits onto thin-film lithium niobate (TFLN) photonic integrated circuits. The collaboration leverages a new individually addressable organic molecular spin-photon interface to enable scalable quantum hardware compatible with standard foundry manufacturing.

WHY IT MATTERS

The decision relevance is link budget, packaging, thermal reliability and deployable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, pair optical performance with packaging yield, test, thermal drift and qualified capacity.

ACTION

Within 30 days, evaluate optical architectures by reach, power, latency, interoperability and field service; record the evidence and owner against P03.

UNKNOWN

Still unproven or incompletely stated: yield, coupling loss, temperature drift, interoperability, volume and cost.

EDITORIAL SCORE 21/25 | MATURITY 1/5 | DECISION LOCUS: BUSINESS / RULES

## P04 Van der Waals Quantum Light Source: WSe2/WS2 Purity and Rates

A11 | Network system | Pilot

Date not stated

FACT

Researchers at the Technical University of Denmark have developed an integrated quantum light source achieving a single-photon purity of g(2)(0) = 0.003. The device demonstrates an on-chip generation rate of 1.68 MHz using a van der Waals platform, providing a scalable pathway for photonic quantum information processing.

WHY IT MATTERS

The decision relevance is link budget, packaging, thermal reliability and deployable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, pair optical performance with packaging yield, test, thermal drift and qualified capacity.

ACTION

Within 30 days, evaluate optical architectures by reach, power, latency, interoperability and field service; record the evidence and owner against P04.

UNKNOWN

Still unproven or incompletely stated: yield, coupling loss, temperature drift, interoperability, volume and cost.

EDITORIAL SCORE 20/25 | MATURITY 2/5 | DECISION LOCUS: SYSTEM / ADOPTION

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

## P05 APC Photonics Standards: Roadmap for CPO High Volume Manufacturing

A04 | Operations | Research

Date not stated

FACT

The Advanced Photonics Coalition (APC) has released a suite of standards to enable high volume manufacturing of optical networking equipment. These standards aim to resolve supply chain silos and mitigate critical component shortages, such as indium phosphide, to support AI scale-up networks.

WHY IT MATTERS

The decision relevance is link budget, packaging, thermal reliability and deployable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, pair optical performance with packaging yield, test, thermal drift and qualified capacity.

ACTION

Within 30 days, evaluate optical architectures by reach, power, latency, interoperability and field service; record the evidence and owner against P05.

UNKNOWN

Still unproven or incompletely stated: yield, coupling loss, temperature drift, interoperability, volume and cost.

EDITORIAL SCORE 20/25 | MATURITY 1/5 | DECISION LOCUS: BUSINESS / RULES

## P06 IOWN APN: 800 Gbps Storage Data Transfer Demo by NTT and NII

A06 | Light source | Pilot

Date not stated

FACT

NTT East, NTT West, NII, RIKEN, and the University of Tokyo demonstrated ultra-high-speed data transfer exceeding 750 Gbps using the IOWN All-Photonics Network (APN). The experiment proved that 800 Gbps line bandwidth can be effectively utilized for long-distance transfers between research hubs in Kobe and Kashiwa.

WHY IT MATTERS

The decision relevance is link budget, packaging, thermal reliability and deployable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, pair optical performance with packaging yield, test, thermal drift and qualified capacity.

ACTION

Within 30 days, evaluate optical architectures by reach, power, latency, interoperability and field service; record the evidence and owner against P06.

UNKNOWN

Still unproven or incompletely stated: yield, coupling loss, temperature drift, interoperability, volume and cost.

EDITORIAL SCORE 20/25 | MATURITY 2/5 | DECISION LOCUS: TECH / PROCESS

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

## P07 USFP: NVIDIA and Cisco's 12.8Tb/s Optical Module Specs

A05 | Photonic device | Research

Date not stated

**FACT**

NVIDIA and Cisco have introduced the Ultra-Dense Small Form Factor Pluggable (USFP), a high-density optical module designed for AI factories. The new standard achieves 4x the bandwidth density and 1.3x better power efficiency than previous modules, enabling higher throughput without adding network layers.

**WHY IT MATTERS**

The decision relevance is link budget, packaging, thermal reliability and deployable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

**BUSINESS READ**

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, pair optical performance with packaging yield, test, thermal drift and qualified capacity.

**ACTION**

Within 30 days, evaluate optical architectures by reach, power, latency, interoperability and field service; record the evidence and owner against P07.

**UNKNOWN**

Still unproven or incompletely stated: yield, coupling loss, temperature drift, interoperability, volume and cost.

EDITORIAL SCORE 20/25 | MATURITY 1/5 | DECISION LOCUS: BUSINESS / RULES

## P08 OptQC Modular Quantum Computing: GKP Interface Error Rates

A12 | Packaging | Pilot

Date not stated

**FACT**

Researchers have demonstrated a modular optical interface that reduces quantum error rates to below $10^{-5}$ under specific conditions. By separating resource preparation from online processing using GKP qubits, the architecture addresses critical scalability bottlenecks in fault-tolerant quantum computing.

**WHY IT MATTERS**

The decision relevance is link budget, packaging, thermal reliability and deployable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

**BUSINESS READ**

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, pair optical performance with packaging yield, test, thermal drift and qualified capacity.

**ACTION**

Within 30 days, evaluate optical architectures by reach, power, latency, interoperability and field service; record the evidence and owner against P08.

**UNKNOWN**

Still unproven or incompletely stated: yield, coupling loss, temperature drift, interoperability, volume and cost.

EDITORIAL SCORE 19/25 | MATURITY 2/5 | DECISION LOCUS: TECH / PROCESS

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

## P09 Hesai Technology: Robotics Motion and 3D Data Engine Roadmap

A13 | Network system | Research

Date not stated

FACT

Hesai Technology is pivoting toward physical AI infrastructure by introducing a robotics motion engine and the Kosmo 3D world data engine. The company targets shipments of over 10,000 power modules by Q2 2026, scaling to six-figure volumes by 2027 to support the commercialization of embodied AI.

WHY IT MATTERS

The decision relevance is link budget, packaging, thermal reliability and deployable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, pair optical performance with packaging yield, test, thermal drift and qualified capacity.

ACTION

Within 30 days, evaluate optical architectures by reach, power, latency, interoperability and field service; record the evidence and owner against P09.

UNKNOWN

Still unproven or incompletely stated: yield, coupling loss, temperature drift, interoperability, volume and cost.

EDITORIAL SCORE 19/25 | MATURITY 1/5 | DECISION LOCUS: BUSINESS / RULES

## P10 Pure-Kerr PDCS: Multimode Squeezing and 20 dB Noise Reduction

A09 | Operations | Pilot

Date not stated

FACT

Researchers have developed a multimode quantum description of parametrically driven cavity solitons (PDCS) in pure-Kerr media, achieving quantum noise reduction of up to 20 decibels. This breakthrough enables precise control over quantum states of light, significantly enhancing the potential sensitivity of quantum measurements and metrology.

WHY IT MATTERS

The decision relevance is link budget, packaging, thermal reliability and deployable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, pair optical performance with packaging yield, test, thermal drift and qualified capacity.

ACTION

Within 30 days, evaluate optical architectures by reach, power, latency, interoperability and field service; record the evidence and owner against P10.

UNKNOWN

Still unproven or incompletely stated: yield, coupling loss, temperature drift, interoperability, volume and cost.

EDITORIAL SCORE 19/25 | MATURITY 2/5 | DECISION LOCUS: TECH / PROCESS

# Playbook and 0-5 year roadmap

| STAKEHOLDER | NOW \| 0-30 DAYS | NEXT \| 1-12 MONTHS | LATER \| 1-5 YEARS |
|---|---|---|---|
| **Operating companies** | evaluate optical architectures by reach, power, latency, interoperability and field service | Run production-like qualification with explicit acceptance and stop criteria. | Build a portfolio and architecture that can absorb technology and supplier changes. |
| **Materials, equipment and technology suppliers** | pair optical performance with packaging yield, test, thermal drift and qualified capacity | Create shared reliability, process-window and failure-analysis data with customers. | Standardize interfaces, traceability, lifecycle support and recovery services. |
| **Trading, investment and legal teams** | Map yield, coupling loss, temperature drift, interoperability, volume and cost. | Contract for capacity, quality, change notice, liability, alternatives and exit. | Diversify regional, technical and customer concentration risk. |

ROADMAP

NOW | 0-30 DAYS
**Evidence ledger**
Owner: Strategy + quality
Deliverable: claim, source, condition, owner

NOW | 0-30 DAYS
**Risk screen**
Owner: Procurement + legal
Deliverable: unknowns, alternatives, stop

NEXT | 1-12 MONTHS
**Joint qualification**
Owner: R&D + supplier
Deliverable: process window and failure data

NEXT | 1-12 MONTHS
**Commercial gate**
Owner: Business + finance
Deliverable: unit economics and capacity

LATER | 1-5 YEARS
**Platform strategy**
Owner: Executive team
Deliverable: portfolio and interface roadmap

LATER | 1-5 YEARS
**Service layer**
Owner: Operations + channel
Deliverable: monitoring, maintenance and recovery

GO / NO-GO GATES

| GATE | OWNER | REQUIRED EVIDENCE | NO-GO CONDITION |
|---|---|---|---|
| **G1 Evidence** | **Quality** | Source, test conditions and reproducibility | No traceable evidence |
| **G2 Integration** | **R&D** | Interface, process window and failure analysis | Cannot meet system conditions |
| **G3 Commercial** | **Business** | Capacity, total cost, contract and alternatives | Economics or supply cannot be supported |
| **G4 Lifecycle** | **Operations** | Monitoring, maintenance, change notice and exit | No accountable operating plan |

## ANALYZED ARTICLES | ITEMS 01-13

Every title and URL is displayed in full. URLs wrap without shortening and remain clickable. A verified-reference label means the translated HTML did not retain its original source URL.

| ID | FULL ARTICLE TITLE | FULL SOURCE / VERIFIED REFERENCE URL - CLICKABLE |
|---|---|---|
| A01 | PsiQuantum OCS: Silicon Photonics Specs for AI Data Centers | https://thequantuminsider.com/2026/10/28/psiquantum-optical-circuit-switch-ai-data-centers/ |
| A02 | Lightmatter Optical Interconnects: Technical Roadmap and Specs | https://news.qq.com/rain/a/20261025A046F800 |
| A03 | Silicon Slow-Light Modulator: 200G/λ and Reduced-DSP Specs | https://doi.org/10.1038/s41467-026-78128-1 |
| A04 | APC Photonics Standards: Roadmap for CPO High Volume Manufacturing | https://www.nextplatform.com/connect/2026/10/23/apc-says-let-there-be-light-with-raft-of-standards-to-speed-up-photonics-manufacturing/5304950 |
| A05 | USFP: NVIDIA and Cisco's 12.8Tb/s Optical Module Specs | https://blogs.itmedia.co.jp/business20/2026/10/post_8004.html |
| A06 | IOWN APN: 800 Gbps Storage Data Transfer Demo by NTT and NII | https://prtimes.jp/main/html/rd/p/000001367.000098811.html |
| A07 | Optical Chiplets: NTT's IOWN Gen 3 Production Roadmap to 2033 | https://newswitch.jp/p/50593 |
| A08 | NVision and HyperLight: Photonic Quantum Chip Roadmap to 2030 | https://thequantuminsider.com/2026/10/28/nvision-nature-molecular-qubits-hyperlight/ |
| A09 | Pure-Kerr PDCS: Multimode Squeezing and 20 dB Noise Reduction | https://quantumzeitgeist.com/pure-kerr-solitons-create-quantum-noise/ |
| A10 | Quandela SDQC Protocol: Reducing Quantum Hardware Requirements | https://quantumzeitgeist.com/quandela-protocol-cuts-quantum-hardware-needs/ |
| A11 | Van der Waals Quantum Light Source: WSe2/WS2 Purity and Rates | https://quantumzeitgeist.com/technical-denmark-quantum-light-source-passes/ |
| A12 | OptQC Modular Quantum Computing: GKP Interface Error Rates | https://quantumzeitgeist.com/optical-quantum-computation-low-error-rate-interface/ |
| A13 | Hesai Technology: Robotics Motion and 3D Data Engine Roadmap | https://autonews.gasgoo.com/articles/news/hesai-technology-targets-robotics-motion-and-3d-world-data-engines-2116063315998154753 |

# Photonics — Selected Articles

Date: 2026-10-31

Articles: 13

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#05 USFP: NVIDIA and Cisco's 12.8Tb/s Optical Module Specs

#06 IOWN APN: 800 Gbps Storage Data Transfer Demo by NTT and NII

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#13 Hesai Technology: Robotics Motion and 3D Data Engine Roadmap

# #01 PsiQuantum OCS: Silicon Photonics Specs for AI Data Centers

Published October 28, 2026 The Quantum Insider USA

## OVERVIEW

PsiQuantum has demonstrated an 8×8 optical circuit switch (OCS) leveraging a low-loss silicon photonics platform originally designed for quantum computing. The device achieves 1.2 dB insertion loss and sub-3 ms reconfiguration time, providing a scalable connectivity solution for AI infrastructure bottlenecks.

## IN DEPTH

### Key Findings

PsiQuantum has demonstrated an 8×8-radix optical circuit switching (OCS) vehicle designed to address scaling challenges in AI data center connectivity. The system utilizes a low-loss silicon photonics platform developed over nearly a decade for utility-scale quantum computing. The company is currently sharing demonstration samples with selected prospective customers and is developing commercial products.

### Technical Details

Testing conducted in PsiQuantum's laboratories reported the following performance metrics without the use of optical amplification:

- **Insertion Loss:** 1.2 dB
- **Crosstalk Performance:** 40 dB
- **Reconfiguration Time:** Less than 3 milliseconds

While the current demonstration vehicle relies on the underlying silicon photonics platform, PsiQuantum has also developed barium titanate (BTO) integration at the 300mm wafer scale. The company already employs a 64×64 BTO switch within its quantum systems, representing a path toward faster, more advanced future products.

### Background & Context

The technology stems from PsiQuantum's pursuit of fault-tolerant quantum computing, which requires performance standards that exceed those typically required for AI data center optical switching. In September 2026, the company signed definitive documentation with the U.S. Department of Commerce to accelerate the research, development, and domestic manufacturability of critical components, including high-performance optical switches.

## Significance & Outlook

As AI compute pools grow, the efficiency of data movement between systems has become a fundamental constraint. PsiQuantum positions AI and quantum computing as complementary: efficient AI infrastructure accelerates the operation of quantum systems, while quantum-grade optical breakthroughs remove bottlenecks in AI networks. The company intends to commercialize these OCS products in the coming months while continuing its primary objective of deploying the world's first useful, fault-tolerant quantum computers.

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Source: https://thequantuminsider.com/2026/10/28/psiquantum-optical-circuit-switch-ai-data-centers/

Collected: October 31, 2026 | Automated Research System (AI)

# #02 Lightmatter Optical Interconnects: Technical Roadmap and Specs

Published October 25, 2026 半導体行業観察(腾讯新闻) China

## OVERVIEW

Lightmatter is addressing AI cluster bandwidth bottlenecks through a three-pronged approach involving dense wavelength division multiplexing (DWDM), photonic interposers, and detachable fiber interfaces. The company's roadmap includes the Passage L20 optical engine scheduled for Q1 2027, targeting the NVIDIA NVLink Fusion ecosystem.

## IN DEPTH

### Key Findings

Lightmatter is developing a scalable optical interconnect architecture to overcome the I/O limitations of traditional electrical connections in large-scale AI clusters. The company's strategy focuses on increasing fiber bandwidth density, enhancing chip-to-optical connection density via photonic interposers, and simplifying system maintenance through detachable interfaces and integrated lasers.

### Technical Details

To optimize fiber utilization, Lightmatter employs Dense Wavelength Division Multiplexing (DWDM) and Bidirectional transmission (BiDi). Two platforms demonstrate these capabilities:

- **Passage EVK50:** Uses 16 wavelengths at 56Gbps NRZ per wavelength, achieving 400Gbps bidirectional transmission per fiber over 1km.
- **Passage EVK100:** Uses 16 wavelengths at 112Gbps PAM4 per wavelength, achieving 1.6Tbps unidirectional bandwidth over 1km.

Both platforms report energy consumption below 3pJ/bit. To address packaging I/O constraints, the Passage M1000 photonic interposer utilizes a 4000 square millimeter area with 1024 channels of 56Gbps NRZ signals and 8 wavelengths to reach a total bandwidth of 114Tbps, incorporating approximately 140,000 through-silicon vias (TSV).

### Infrastructure and Integration

For system maintenance, Lightmatter introduced two detachable fiber interfaces with insertion loss below 1.5dB: eClick (edge-coupled with lens-based expanded beam fiber arrays) and vClick (vertical-coupled, compatible with molding and polishing processes). Additionally, the Guide Very Large Scale Photonics (VLSP) platform uses 300mm CMOS SOI wafer processes to integrate over 128 lasers per chip, with plans to expand to over 64 wavelengths.

## Significance and Outlook

The Passage L20 optical engine is planned for Q1 2027, featuring 32 ports at 200Gbps PAM4 per channel, providing 6.4Tbps unidirectional (12.8Tbps bidirectional) bandwidth with a maximum TDP of 30W. While Lightmatter has developed a 204.8Tbps switch production verification platform with Flex and a 102.4Tbps XPU tray prototype, the company notes that large-scale deployment depends on the coordination of foundries, packaging providers, and fiber suppliers.

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Source: https://news.qq.com/rain/a/20261025A046F800

Collected: October 31, 2026 | Automated Research System (AI)

# #03 Silicon Slow-Light Modulator: 200G/λ and Reduced-DSP Specs

Published October 22, 2026 Nature Communications (Europe PMC)

## OVERVIEW

Researchers have developed a silicon photonic crystal waveguide slow-light modulator featuring a built-in electro-optic (EO) equalizer to achieve 200 Gb/s per wavelength. The device reduces reliance on power-intensive digital signal processing (DSP) and operates with low-voltage drivers compatible with FinFET CMOS technology. This advancement provides a scalable path toward energy-efficient, multi-Tb/s co-packaged optics for AI data centers.

## IN DEPTH

### Key Findings

The developed silicon photonic crystal waveguide (PCW) modulator achieves a data rate of 200 Gb/s per wavelength using a low-complexity 11-tap digital equalizer. Without any DSP, the device maintains a performance of 180 Gb/s using four-level pulse amplitude modulation (PAM4). Additionally, the modulator demonstrated 140-Gb/s on-off keying (OOK) operation with an energy consumption of 26 fJ/bit, utilizing drive voltages compatible with FinFET-based complementary metal-oxide-semiconductor (CMOS) technology.

### Technical Details

The device overcomes the traditional bandwidth-efficiency trade-off by integrating a built-in EO equalizer. Key technical specifications include:

- **Device Dimensions:** A small footprint with a device length of 320 μm.
- **Architecture:** Monolithically integrated optical delay lines and crossings within segmented slow-light phase shifters to synthesize an on-chip feedforward response.
- **Mechanism:** The EO equalizer provides a high-pass response to compensate for intrinsic roll-off, extending the 3-dB bandwidth.
- **Efficiency:** By utilizing a high group index ($n_g > 20$), the modulator reduces the $V_\pi L$ to approximately 0.1 V·cm.

### Background and Context

Conventional silicon Mach-Zehnder modulators are limited by low modulation efficiency ($V_\pi L$ of 2–5 V·cm), requiring millimeter-scale electrodes and high-swing drivers. These factors lead to RF propagation loss and RC time constant bottlenecks, often limiting bandwidth to under 50 GHz. To compensate, current transceivers rely on complex DSPs with nearly 100-tap equalizers that consume Watt-level power. While previous slow-light modulators reduced size, they remained limited by RC time constants ($f_{3dB} < 40$ GHz) or required high-power standalone drivers and neural-network-based DSPs to reach high speeds.

## Significance and Outlook

By integrating the EO equalizer directly into the slow-light modulator, this approach eliminates the need for large footprints and high drive voltages typically associated with EO equalization. This strategy reduces dependence on power-dissipating electronics, offering a potential route for dense multi-Tb/s co-packaged optics in energy-constrained switching systems for AI data centers.

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Source: https://doi.org/10.1038/s41467-026-78128-1

Collected: October 31, 2026 | Automated Research System (AI)

# #04 APC Photonics Standards: Roadmap for CPO High Volume Manufacturing

Published October 23, 2026 The Next Platform USA

## OVERVIEW

The Advanced Photonics Coalition (APC) has released a suite of standards to enable high volume manufacturing of optical networking equipment. These standards aim to resolve supply chain silos and mitigate critical component shortages, such as indium phosphide, to support AI scale-up networks.

## IN DEPTH

### Key Findings

The Advanced Photonics Coalition (APC) has introduced a series of standards designed to facilitate the "high volume manufacturing" of optical networking kit. By establishing common manufacturing, interface, and test practices, the APC intends to eliminate implementation variations and overcome supply chain silos that currently constrain production volume. This move is intended to prevent the market from fragmenting into vertically integrated proprietary solutions, which the APC warns would increase customer lock-in and slow innovation.

### Technical Details

The APC standards portfolio includes the following specifications and guidelines:

- System Level Architecture Overview for Co-Packaged Optics
- Co-Packaged Optics Informative Outlook and Recommended Practices
- Silicon Photonics for Co-Packaged Optics Recommended Test Practices
- 4-Core Multicore Fiber Cable, Connector and Fiber Array Unit Specification
- Silicon Photonics Manufacturing Specification

Regarding Nanosecond-Level Optical Circuit Switching (OCS), the APC is defining the control-plane, optical-interface, and behavioral framework to allow fast, transparent OCS to function as a first-class component of an open AI scale-up fabric.

### Background & Context

The industry is facing a "copper wall" where rising Gbps demands lead to shorter reach, higher heat emissions, and increased energy consumption. While data center operators are shifting toward Co-Packaged Optics (CPO) for higher bandwidth density and lower power, supply constraints are severe. Lumentum Holdings reported that its optical components are completely sold out through to 2029, with inability to meet demand for some products between now and 2028. This is exacerbated by the geopolitical stress of indium phosphide production, which is heavily concentrated in China.

## Significance & Outlook

Standardization is viewed as critical for scaling the photonics ecosystem. Resolight, a member of the APC working group, notes that these specifications enable "native photon routing," which keeps payloads in the light domain and reduces repeated optical-to-electrical-to-optical conversions. This architecture could significantly boost energy efficiency and reduce the total number of optical transceivers required in multi-rack AI networks, reducing reliance on scarce materials like indium phosphide.

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Source: https://www.nextplatform.com/connect/2026/10/23/apc-says-let-there-be-light-with-raft-of-standards-to-speed-up-photonics-manufacturing/5304950

Collected: October 31, 2026 | Automated Research System (AI)

# #05 USFP: NVIDIA and Cisco's 12.8Tb/s Optical Module Specs

Published October 30, 2026 ITmedia オルタナティブ・ブログ(ビジネス2.0の視点) Japan

## OVERVIEW

NVIDIA and Cisco have introduced the Ultra-Dense Small Form Factor Pluggable (USFP), a high-density optical module designed for AI factories. The new standard achieves 4x the bandwidth density and 1.3x better power efficiency than previous modules, enabling higher throughput without adding network layers.

## IN DEPTH

### Key Findings

NVIDIA and Cisco announced the Ultra-Dense Small Form Factor Pluggable (USFP) on October 12, 2026, at the Open Compute Project (OCP) in Santa Clara, California. This new form factor is designed to support 400Gb/s electrical signals per lane, enabling a maximum capacity of 12.8Tb/s for both switches and SuperNICs. By maintaining the same footprint as the existing OSFP (Octal Small Form Factor Pluggable) while increasing bandwidth density by 4x and power efficiency by approximately 1.3x, the USFP allows data centers to scale capacity without increasing network hierarchy.

### Technical Details

The USFP architecture incorporates several engineering innovations to handle increased signal attenuation and heat:

- **Lane Configuration:** The initial plan features 16 full-duplex lanes, with design headroom to expand to 32 or more lanes in the future.
- **Connectivity:** A new 2D array connector and a two-stage insertion method reduce contact wear and improve signal quality.
- **Thermal Management:** The module supports heat dissipation of up to 100 watts without requiring separate dedicated cooling circuits.
- **Optical Design:** Simplified signal processing is used to reduce latency and power consumption.

### Background and Context

The shift toward USFP is driven by the need to allocate limited power budgets to compute resources rather than network overhead. By increasing the number of 1.6Tb/s endpoints connected to the Ethernet AI fabric without adding switch layers, operators can reduce latency and costs. To avoid vendor lock-in and ensure supply chain stability, NVIDIA and Cisco are pursuing an open industry standard. This ecosystem already includes connector specialists TE Connectivity and Amphenol to ensure mass production capabilities.

## Significance and Outlook

The adoption of USFP allows infrastructure operators to maintain the maintenance advantages of pluggable modules over integrated solutions. Future milestones include the finalization of open specifications via a multi-source project and the transition from 16-lane to 32-lane configurations. For the Japanese industry, the requirement for high-precision optical components and heat-dissipating materials to support 400Gb/s per lane presents a strategic opportunity for electronic component and material manufacturers.

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Source: https://blogs.itmedia.co.jp/business20/2026/10/post_8004.html

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# #06 IOWN APN: 800 Gbps Storage Data Transfer Demo by NTT and NII

Published October 30, 2026 PR TIMES(NTT東日本) Japan

## OVERVIEW

NTT East, NTT West, NII, RIKEN, and the University of Tokyo demonstrated ultra-high-speed data transfer exceeding 750 Gbps using the IOWN All-Photonics Network (APN). The experiment proved that 800 Gbps line bandwidth can be effectively utilized for long-distance transfers between research hubs in Kobe and Kashiwa.

## IN DEPTH

### Key Findings

The demonstration achieved a maximum transfer speed of approximately 775 Gbps, representing about 97% of the 800 Gbps line bandwidth. This performance was recorded by simultaneously running two practical applications. The researchers confirmed that speeds exceeding 750 Gbps could be maintained for several minutes, proving the feasibility of ultra-high-speed transfers over long distances.

### Technical Details

The experimental setup connected the RIKEN Center for Computational Science (R-CCS) in Kobe and the University of Tokyo's Kashiwa campus. The network architecture consisted of:

- An 800 Gbps APN line connecting NTT West's Osaka office and NTT East's Kashiwa office.
- 400 Gbps x 2 lines connecting these offices to the respective RIKEN and University of Tokyo sites.
- A comparison with SINET, which showed that APN reduced latency by approximately 20%.

Two applications were used for file transfer: the HPCI shared storage (using a second-generation verification environment) and MMCFTP, a tool developed by NII. For MMCFTP, NII servers equipped with multiple NVMe SSDs were used, connected via one 400GbE and four 100GbE ports.

### Background and Context

The project addresses the increasing need to transfer massive datasets between physically separated research hubs for AI, IoT, and big data analysis. Key infrastructure involved includes the SINET6 network operated by NII and the computational resources at RIKEN, such as the "Fugaku" supercomputer and the "ROQUO" GPU supercomputer. The University of Tokyo and RIKEN also operate HPCI shared storage, with approximately 100 petabytes of storage at each the Kashiwa and Kobe sites.

## Significance and Outlook

The partners will continue joint research on data synchronization and the expansion of research data utilization environments. A further experiment is planned for November 2026 at the SC26 conference in Chicago. This will involve extending the 400 Gbps segment to the US, marking the first time a file transfer experiment using 400 Gbps or higher across all sections, including international lines, has been attempted between Japan and the US.

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Source: https://prtimes.jp/main/html/rd/p/000001367.000098811.html

Collected: October 31, 2026 | Automated Research System (AI)

# #07 Optical Chiplets: NTT's IOWN Gen 3 Production Roadmap to 2033

Published October 24, 2026　ニュースイッチ(日刊工業新聞社)　Japan

## OVERVIEW

NTT and Japan Semiconductor (JSC) are establishing a production line for "optical chiplets" by 2028 to capture 30% of the global market by 2033. The project utilizes a membrane device structure to replace electrical signals with optical signals between semiconductor packages, targeting a significant reduction in power consumption for AI-driven data traffic.

## IN DEPTH

### Key Findings

NTT, Japan Semiconductor (JSC), Furukawa Electric, and Shinko Electric Industries are collaborating to establish a mass production line for optical chiplets at the JSC Iwate plant by 2028. The initial production capacity is set at 10,000 units per year, with plans to scale to 100,000 units by 2031 and 1 million units by 2033. This initiative is supported by a NEDO grant covering approximately 160 billion yen of a total project cost of 240 billion yen.

### Technical Details

Optical chiplets replace electrical signal transmission between semiconductor packages, such as CPUs and GPUs, with optical wiring. The technology employs a "membrane device" approach, integrating thin-film indium phosphide (InP) onto silicon photonics substrates to create high-efficiency optoelectronic fusion devices. Performance targets for mass production include:

- Transmission speed: 400 gigabits per second or higher.
- Power consumption: 2 picojoules per bit or lower.
- Production efficiency: A target increase of over 10 times compared to the research and development phase.

The production roles are divided among the partners: JSC handles silicon wafer technology; Furukawa Electric manages thin-film related technologies; NTT Innovative Device and JSC oversee back-end-of-line (BEOL) implementation and inspection; and Shinko Electric Industries manages the final assembly into semiconductor packages.

### Background and Context

The rise of AI has led to a surge in data traffic between GPUs. While electrical transmission consumes significantly more power as transmission distances on circuit boards increase, optical communication maintains lower power consumption regardless of distance. This technology represents the third generation of NTT's IOWN (Innovative Optical and Wireless Network). NTT previously commercialized the first generation for data center and server connections in 2023 and introduced second-generation optoelectronic fusion switches for board-to-board connections in 2025.

## Significance and Outlook

NTT aims to reduce power consumption to 1/100th of conventional levels by the 2030s. With overseas IT giants like Nvidia increasing their presence in optoelectronic fusion, the establishment of a rapid, low-cost, and stable mass production supply chain is critical for securing a 30% global market share.

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Source: https://newswitch.jp/p/50593

Collected: October 31, 2026 | Automated Research System (AI)

# #08 NVision and HyperLight: Photonic Quantum Chip Roadmap to 2030

Published October 28, 2026 The Quantum Insider USA

## OVERVIEW

NVision and HyperLight are partnering to integrate organic molecular qubits onto thin-film lithium niobate (TFLN) photonic integrated circuits. The collaboration leverages a new individually addressable organic molecular spin-photon interface to enable scalable quantum hardware compatible with standard foundry manufacturing.

## IN DEPTH

### Key Findings

NVision has published peer-reviewed research in Nature demonstrating the first individually addressable organic molecular spin-photon interface. To commercialize this breakthrough, NVision is partnering with HyperLight Corporation to integrate these molecular qubits as thin films directly onto HyperLight's thin-film lithium niobate (TFLN) photonic integrated circuits (PICs). The companies aim to deliver the first prototype integrated chips in Q4 2026.

### Technical Details

The architecture utilizes engineered carbene molecules that function at cryogenic temperatures between 2K and 4K. These molecules emit photons at precise optical frequencies, allowing for direct intra-chip and inter-chip quantum entanglement. Key technical specifications include:

- **Connectivity:** Optical links decouple qubits from local spatial constraints, reducing crosstalk and thermal bottlenecks compared to monolithic architectures.
- **Manufacturing:** Molecular qubits are deposited as thin films, similar to OLED materials, onto TFLN Chiplet™ technology.
- **Resilience:** The platform is designed to tolerate up to 70% photon loss, allowing it to operate with standard silicon photonics.
- **Development:** The final carbene system was selected after computational screening of over 150 candidate molecules and the laboratory synthesis of 40.

### Background & Context

Previously, molecular spins could not be individually and coherently controlled, which prevented their use as true qubits. By achieving single-molecule level control, NVision moves its Photonic Integrated Quantum Circuits (PIQC) platform from foundational physics into hardware development. This approach avoids the need for multi-billion-dollar proprietary fabrication facilities by utilizing existing foundry infrastructure.

## Significance & Outlook

The partnership establishes a path toward high-density, chip-scale quantum connectivity. NVision targets a live demonstration of on-chip performance by the end of 2026. The long-term commercial roadmap specifies a scale-up to 1,000 physical qubits, eventually progressing to 1,000 logical, fault-tolerant qubits on a chip by 2030, housed within a deployable data-center form factor.

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Source: https://thequantuminsider.com/2026/10/28/nvision-nature-molecular-qubits-hyperlight/

Collected: October 31, 2026 | Automated Research System (AI)

# #09 Pure-Kerr PDCS: Multimode Squeezing and 20 dB Noise Reduction

Published October 28, 2026 Quantum Zeitgeist

## OVERVIEW

Researchers have developed a multimode quantum description of parametrically driven cavity solitons (PDCS) in pure-Kerr media, achieving quantum noise reduction of up to 20 decibels. This breakthrough enables precise control over quantum states of light, significantly enhancing the potential sensitivity of quantum measurements and metrology.

## IN DEPTH

### Key Findings

The study demonstrates that pure-Kerr parametrically driven cavity solitons (PDCS) can generate highly squeezed states, reducing quantum noise by up to 20 decibels. This level of squeezing is limited only by experimental factors, specifically intrinsic losses and overcoupling. The researchers confirmed that these results are achievable using experimentally routine parameters, suggesting that existing setups can be adapted without substantial technological advancements.

### Technical Details

The researchers utilized a microresonator with an intrinsic loss rate (Γ i) coupled to a waveguide (Γ c), employing bichromatic pumping with opposite phases at frequencies ω ±. This configuration produces two coherent soliton pulses in the temporal domain. Key technical observations include:

- **Multimode Squeezing:** The team demonstrated both single- and two-mode squeezing, the latter associated with degenerate and non-degenerate optical parametric amplifiers.
- **Quantum Dispersive Waves (QDWs):** Above a certain threshold, the system exhibits QDWs, which serve as a quantum analog to soliton Cherenkov radiation.
- **Dispersion Requirements:** Simulations indicate that quartic dispersion is essential for the emergence of QDWs, as these waves are absent in cases of purely quadratic dispersion.
- **Pseudo Two-Mode Squeezing:** The team identified regimes where the dominant squeezed supermode is spectrally localized at the QDWs.

### Background & Context

Previous studies often relied on simplified models that failed to capture the multimode nature of the system. This work introduces a comprehensive "multimode quantum description" of the interactions within pure-Kerr media. Additionally, the analysis of oscillatory solitons—those with a periodic temporal profile—showed that their squeezing spectrum remains robust and similar to that of stable solitons, despite having more asymmetrical excited supermodes.

## Significance & Outlook

The ability to manipulate multiple modes simultaneously is critical for quantum communication and computation, which require entanglement between multiple quantum states. These findings provide a pathway for advancing quantum sensing and frequency-domain information processing by allowing for the precise generation and control of quantum states of light.

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Source: https://quantumzeitgeist.com/pure-kerr-solitons-create-quantum-noise/

Collected: October 31, 2026 | Automated Research System (AI)

# #10 Quandela SDQC Protocol: Reducing Quantum Hardware Requirements

Published October 29, 2026 Quantum Zeitgeist France

## OVERVIEW

Researchers at Quandela have developed a Secure Delegated Quantum Computation (SDQC) protocol that significantly lowers hardware demands for both clients and servers. By utilizing attenuated laser pulses and interacting quantum emitters, the system achieves information-theoretic composable security, facilitating more practical remote quantum computing.

## IN DEPTH

### Key Findings

Quandela has introduced a new protocol for Secure Delegated Quantum Computation (SDQC) that drastically reduces the technological requirements for clients and servers. The most significant advancement is the reduction of the client's role to sending attenuated laser pulses, eliminating the need for the single-qubit sources or measurements typically required in previous SDQC schemes.

### Technical Details

The protocol utilizes Measurement-Based Quantum Computing (MBQC), which employs a large entangled "graph state" to perform computations via adaptive measurements. Key technical features include:

- **Server-Side Architecture:** The server manages interacting quantum emitters capable of generating spin-photon entanglement, bypassing the need for complex operations such as isolating single photons or performing polarisation-preserving photon-number quantum non-demolition measurements.
- **Client-Side Operation:** The client prepares encrypted qubits as attenuated laser pulses. Security is enhanced through a phase-randomisation technique, where the polarisation angle of each pulse acts as a secret key.
- **Security Framework:** The protocol provides information-theoretic and composable security within the Abstract Cryptography framework. This ensures that security guarantees remain intact even if parts of the protocol are reused in other cryptographic constructions.
- **Error Rates:** The probability of information leakage to the server and incorrect state generation decreases exponentially as the number of pulses sent increases.

## Background & Context

Existing SDQC protocols aim to allow users to access remote quantum servers without compromising data or algorithm integrity. However, these often impose substantial hardware burdens on the user and struggle with complex server-side procedures. Quandela's approach builds upon an efficient protocol for Blind Delegated Quantum Computing (BDQC) with weak coherent pulses, extending it into a fully secure SDQC protocol that allows for blind computation, where the server learns nothing about the input, algorithm, or result.

## Significance & Outlook

By addressing the trade-off between security and practicality, this protocol enables the delegation of classical input and output BQP computations with exponentially-low security error. The researchers analyzed the trade-off between correctness and security regarding photon loss after emission to ensure real-world viability. This reduction in hardware barriers may accelerate the adoption of remote quantum computation in fields such as financial modeling, materials science, and drug discovery.

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Source: https://quantumzeitgeist.com/quandela-protocol-cuts-quantum-hardware-needs/

Collected: October 31, 2026 | Automated Research System (AI)

# #11 Van der Waals Quantum Light Source: WSe2/WS2 Purity and Rates

Published October 28, 2026 Quantum Zeitgeist デンマーク

## OVERVIEW

Researchers at the Technical University of Denmark have developed an integrated quantum light source achieving a single-photon purity of g(2)(0) = 0.003. The device demonstrates an on-chip generation rate of 1.68 MHz using a van der Waals platform, providing a scalable pathway for photonic quantum information processing.

## IN DEPTH

### Key Findings

The Technical University of Denmark has demonstrated a high-purity single-photon emission device achieving a second-order correlation function of g(2)(0) = 0.003. The system utilizes a "van der Waals platform" that integrates strain-engineered bilayer WSe2 quantum emitters with multimode WS2 waveguides. The device recorded an out-coupled single-photon rate of approximately 357 kHz, which translates to an estimated on-chip generation rate of at least 1.68 MHz.

### Technical Details

The architecture employs several specific material and design optimizations to enhance performance:

- **Material Integration:** Hexagonal boron nitride was used as a spacer during transfer to limit the fracturing of the WSe2 bilayer.
- **Waveguide Configuration:** Finite-difference time-domain models indicate that the use of multimode WS2 waveguides optimized light propagation and collection, contributing to the increased photon rates.
- **Emission Control:** Discrete-state excitation was used to minimize spectral background noise, resulting in brighter photoluminescence and higher purity.
- **Measurement:** Purity was verified through single-port and cross-correlated photon stream analysis. Confocal measurements of the emitter alone, prior to waveguide coupling, showed a g(2)(0) value of 0.043±0.027.

### Background and Context

Current quantum photonic implementations typically rely on combining disparate material systems, such as silicon or silicon nitride for photonics, III-V semiconductors for emitters, and superconducting materials for detectors. This requires complex fabrication processes. The developed platform seeks to replace this with a monolithic integration of transition metal dichalcogenides (TMDs), where WSe2 serves as the emitter and WS2 provides low-loss photonic circuits including couplers and beam splitters.

## Significance and Outlook

The ability to achieve MHz-level rates and high purity within a single material system represents a step toward scalable quantum communication networks. The researchers noted optimized transmittance between 750-850 nm with the grated structure, peaking around 800 nm. Future implementations aim for a fully integrated circuit incorporating niobium diselenide nanowires as fast single-photon detectors.

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Source: https://quantumzeitgeist.com/technical-denmark-quantum-light-source-passes/

Collected: October 31, 2026 | Automated Research System (AI)

# #12 OptQC Modular Quantum Computing: GKP Interface Error Rates

Published October 26, 2026 Quantum Zeitgeist USA

## OVERVIEW

Researchers have demonstrated a modular optical interface that reduces quantum error rates to below $10^{-5}$ under specific conditions. By separating resource preparation from online processing using GKP qubits, the architecture addresses critical scalability bottlenecks in fault-tolerant quantum computing.

## IN DEPTH

### Key Findings

The OptQC team has achieved logical error upper bounds below one in one hundred thousand ($10^{-5}$) at a signal strength of 15.6 dB. This performance was reached through two levels of concatenation (refinement) within a modular optical architecture. Simulations confirmed that the system supports essential quantum operations, including CNOT, SWAP, and Hadamard gates, while maintaining efficient processing speeds.

### Technical Details

The architecture utilizes GKP qubits—physical qubits encoded on the properties of light waves—on a common Gaussian processor. A central feature of this design is the separation of the system into two distinct stages:

- **Offline Resource Factory:** Produces verified entangled pairs, known as Bell resources, using recursively layered error correction.
- **Online Processor:** Performs calculations via measurement-based quantum computation using the pre-verified resources.

The interface between these two stages allows for tracked permutations and finite-level logical Bell-error ordering. The researchers noted that the low error rates are heavily dependent on the use of these pre-verified resources.

### Background & Context

Building modular optical fault-tolerant quantum computers has traditionally been hindered by the bottleneck of generating high-quality entangled states. This research, involving NTT researchers, proposes a "prefabrication" approach similar to conventional engineering, where essential components are created before assembly to improve scalability.

## Significance & Outlook

By defining the interactions between pre-prepared components and ongoing calculations, the team has demonstrated a viable method for managing errors in complex optical systems. While the construction of a fully functional optical quantum computer remains a massive undertaking, this interface provides a path toward scalable systems. Future work will focus on expanding parallel resource preparation by increasing concatenation levels to further enhance performance.

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Source: https://quantumzeitgeist.com/optical-quantum-computation-low-error-rate-interface/

Collected: October 31, 2026 | Automated Research System (AI)

# #13 Hesai Technology: Robotics Motion and 3D Data Engine Roadmap

Published October 30, 2026 Gasgoo Automotive News China

## OVERVIEW

Hesai Technology is pivoting toward physical AI infrastructure by introducing a robotics motion engine and the Kosmo 3D world data engine. The company targets shipments of over 10,000 power modules by Q2 2026, scaling to six-figure volumes by 2027 to support the commercialization of embodied AI.

## IN DEPTH

### Key Findings

Hesai Technology is expanding its business model from lidar manufacturing to becoming a physical AI infrastructure provider. The company has introduced two primary pillars for this transition: a robotics motion engine focused on high-performance actuators and the Kosmo 3D world data engine for spatial reconstruction.

### Technical Details

On the motion side, Hesai has developed a new power module that triples power density while reducing volume by 37%. This technology is currently utilized in Sharpa's dexterous hands:

- **W01:** Features 22 active degrees of freedom and is integrated into NVIDIA's Isaac GR00T humanoid robot reference design.
- **W02:** Scheduled for release at IROS 2026, this model features 21 active degrees of freedom and reduces overall hand size by approximately 30%.

The Kosmo 3D data engine utilizes a spatial reconstruction engine capable of simultaneously generating depth maps, mesh, and 3DGS. In a deployment at a DQ ice cream shop, the system scanned the environment in roughly 15 minutes, which resulted in the Sharpa robot achieving a task success rate of 99%.

### Background and Context

CEO Li Yifan states that physical AI is entering a "2.0 phase" characterized by general-purpose robots. According to Li, the primary bottlenecks for this era are high-quality real-world data and high-performance hardware. Hesai intends to leverage a decade of experience in opto-mechatronics and software-hardware integration from its lidar business to address these gaps.

## Significance and Outlook

Hesai views these two engines as a second growth driver for the company. The product roadmap involves expanding from dexterous-hand modules to full-body joint actuators. In terms of delivery timelines, Hesai expects to ship more than 10,000 robotic power modules by the end of Q2 2026, with forecasts projecting six-figure shipment volumes by 2027.

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Source: https://autonews.gasgoo.com/articles/news/hesai-technology-targets-robotics-motion-and-3d-world-data-engines-2116063315998154753

Collected: October 31, 2026 | Automated Research System (AI)