

## Volume 20 Issue 4, April 2026

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## Integrated quantum memories

An artistic impression of an integrated optical quantum memory based on a fibre Fabry–Pérot microcavity coupled to a thin membrane  $\text{Eu}^{2+}\text{SiO}_5$  crystal. Using this cavity enhanced configuration, Zong-Quan Zhou and colleagues achieve a storage efficiency of 80.3%, with a device volume of just  $4 \times 10^{-5} \text{ mm}^3$ .

See [Meng et al.](#)

Image: RR Meng, M Jin, X Liu, PX Liu, ZQ Zhou, University of Science and Technology of China (USTC). Cover design: Bethany Vukomanovic

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## Obituary

Obituary  
08 Apr 2026

## Orazio Svelto (1936–2026)

Orazio Svelto, one of the founding figures of modern laser physics, passed away on 9 January 2026, shortly before his 90th birthday. With his death, the global scientific community loses not only a pioneer whose ideas helped shape more than six decades of laser science, but also a master teacher, an institution builder, and a generous mentor whose legacy will continue to illuminate physics for generations.

Giulio Cerullo, Sandro De Silvestri &amp; Mauro Nisoli

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## News &amp; Views

News & Views  
08 Apr 2026

## Microlaser counts single ions

Weak optical coupling between hydrated ions and dielectric microcavities, together with pronounced drift and noise in liquids, makes optical single-ion sensing notoriously difficult. Now, a plasmon-enhanced microcavity microlaser registers individual metal-ion events in solution via shifts of a self-heterodyned beat note.

Quan-Xin Luo &amp; Yun-Feng Xiao

News & Views  
08 Apr 2026

## Label-free super-resolution imaging of wavelength-scale areas

Limited-size object optical microscopy enables label-free, far-field super-resolution imaging of arbitrarily shaped particles, with limited size of the field of view as the only required prior knowledge.

Vasily N. Astratov

News & Views  
08 Apr 2026

## Non-destructively measuring loss and gain in photonic chips

A non-destructive scanning method harnesses nonlinear micro-ring resonators as on-chip optical power discriminators to directly measure loss and gain of components in photonic integrated circuits with sub-0.1 dB precision.

Simone Iadanza

News & Views  
08 Apr 2026

## Microcombs for the generation of tunable structured microwaves

Structured microwaves emitted by a chip-based microcomb source equipped with an antenna array enable ultrahigh-capacity communications and multi-variable sensing.

Yuanhua Feng &amp; Xuebing Zhang

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## Meeting Reports

Meeting Report  
08 Apr 2026

## Industry eyes up new laser opportunities

Photonic-crystal surface-emitting lasers look set to become the technology of choice for many high-power laser applications.

Oliver Graydon

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## Articles

Article  
25 Mar 2026

## A quantum walk comb source at telecommunication wavelengths

A nearly flat broadband quantum walk comb laser is demonstrated in the near-infrared region. A bandwidth of 1.8 THz with a wallplug efficiency of 6% and an ultra-narrow radio frequency linewidth of 1 Hz is achieved at the fundamental repetition rate of 1 GHz.

Bahareh Marzban, Lucius Miller ... Jérôme Faist

Article  
04 Mar 2026

## Full dimensional control of structured microwaves based on microcombs

Using a chip-based microcomb, full dimensional control of structured microwaves is demonstrated, including vortex-microwave generation, submicrosecond spatiotemporal mode switching, broadband phase-frequency response tuning and wide-angle two-dimensional beam steering. These capabilities are applied in a structured-microwave-based integrated sensing and communication system.

Xiyao Song, Xiangpeng Zhang ... Lin Chang

Article  
03 Feb 2026

## Universal loss and gain characterization inside photonic integrated circuits

A universal, non-destructive and scalable method to precisely characterize loss and gain of optical components inside photonic integrated circuits is discussed.

Haoran Chen, Ruxuan Liu ... Xu Yi

Article  
16 Mar 2026

## Dynamic manipulation of photoluminescence in two-dimensional covalent organic frameworks

Two-dimensional covalent organic frameworks offer new opportunities for dynamic manipulation of photoluminescence, from delayed fluorescence to phosphorescence.

Jingjing Guo, Shuai Bi ... Yanli Zhao

Article  
Open Access  
25 Mar 2026

## Single-atomic-ion detection with plasmon-enhanced whispering-gallery-mode microlasers

Plasmon-enhanced whispering-gallery-mode microlasers enable single-atomic-ion detection in solution. Real-time monitoring of transient and permanent interactions of zinc and cadmium ions as well as peak sensitivities with beatnote shifts of 3.7 fm for  $\text{Zn}^{2+}$  and 7.2 fm for  $\text{Cd}^{2+}$  are demonstrated.

Samir Vartabi Kashanian &amp; Frank Vollmer

Article  
Open Access  
17 Mar 2026

## Experimental memory control in continuous-variable optical quantum reservoir computing

Researchers demonstrate a photonic quantum reservoir computing platform that uses spectral and temporal multiplexing in a continuous-variable setting. Real-time memory is implemented, and nonlinear temporal tasks are enabled.

Iris Paparella, Johan Henaff ... Valentina Parigi

Article  
Open Access  
16 Feb 2026

## Super-resolution imaging of limited-size objects

Limited-size object microscopy (LSOM) enables label-free super-resolution imaging of isolated nano-objects with a resolution as low as  $\lambda/8$  under the sole assumption of the limited size of the imaged object.

Taeyong Chang, Giorgio Adamo &amp; Nikolay I. Zheludev

Article  
13 Mar 2026

## Monolithic integration of continuous-variable cluster-state generation, manipulation and measurement

Quantum photonic integrated circuits are fabricated on a  $\text{Si}_3\text{N}_4$  chip. Squeezed light sources, quantum gates and a homodyne detection system are monolithically integrated. Individual qumodes and multi-qumode cluster states with high phase stability and fidelity are generated.

Xinyu Jia, Chang You ... Jianwei Wang

Article  
11 Feb 2026

## Efficient integrated quantum memory for light

Integrated quantum memories based on  $^{151}\text{Eu}^{2+}\text{Y}_2\text{SiO}_5$  crystals coupled with impedance-matched optical cavities are demonstrated. Multiplexed quantum storage efficiencies of 80.3% and 69.8% are achieved for weak coherent pulses and telecom-heralded single photons, respectively.

Ruo-Ran Meng, Pei-Xi Liu ... Guang-Can Guo

Article  
06 Feb 2026

## Super-broadband stimulated Raman scattering spectroscopy and imaging

A stimulated Raman scattering method based on dual-band laser-induced quantum interference enables ultra broadband and rapid hyperspectral Raman imaging of biological tissue and the detection of up to 11 key biomarkers in human serum.

Jin Guo, Mingzhen Wang ... Hanqing Xiong

Article  
26 Mar 2026

## Large exciton longitudinal–transverse splitting enables room-temperature ultrafast coherent polaritonics in layered perovskite crystals

The researchers demonstrate room-temperature control over bulk exciton–polaritons (EPs) in a bare halide perovskite crystal and show that long-range bulk EP propagation occurs in the ballistic regime. Furthermore, slow light is demonstrated across the visible wavelength range.

Rui Cai, Siow Mean Loh ... Tze Chien Sum

Article  
10 Feb 2026

## Heralded high-dimensional photon–photon quantum gate

A general protocol for high-dimensional entangling gates is developed and applied for two four-dimensional qudits encoded in orbital angular momentum (OAM). The phase-locking technique stabilizes OAM sorters, leading to a process fidelity within a range from 0.71 to 0.85.

Zhi-Feng Liu, Zhi-Cheng Ren ... Hui-Tian Wang

Article  
16 Mar 2026

## Degeneracy-locked optical parametric oscillator

Locking of an optical parametric oscillator's degeneracy over a broad bandwidth enables robust operation against both pump detuning and temperature fluctuations.

Fengyan Yang, Jiacheng Xie ... Hong X. Tang

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