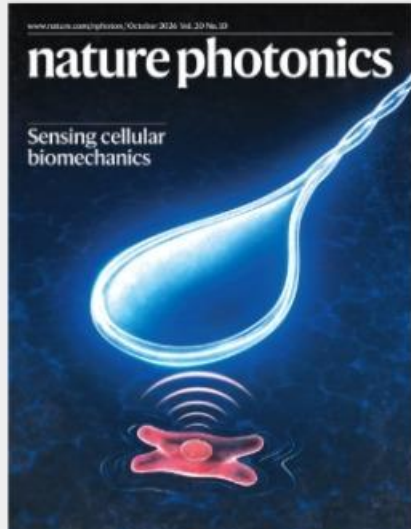




Sensing cellular biomechanics

An artistic impression of an optical microcantilever-enabled cell stethoscope that can monitor the contractions of a living cell with piconewton sensitivity. This platform enables non-invasive, real-time measurement of cellular mechanics, offering new opportunities in mechanobiology and biomechanics.

See [Tu et al.](#)

Image: Xitao Tu, Zhejiang University, Cover design: Bethany Vukomanovic

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Q&A

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SHINE lights up the extremes

The Shanghai High Repetition Rate XFEL and Extreme Light Facility is approaching its first lasing. *Nature Photonics* spoke with Zhentang Zhao, director of the Shanghai Synchrotron Radiation Facility and the SHINE project, about the facility's capabilities and future plans.

Jacopo Fregoni

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News & Views

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Time-stretch spectroscopy breaks temporal aliasing barrier

A temporally super-resolved single-shot method overcomes the long-standing temporal–spectral trade-off in time-stretch spectroscopy. The outcome is continuous measurements of approximately 3 micrometres over more than 5.2 square centimetres at 120 frames per second, substantially relaxing the conventional trade-off between field of view, resolution and imaging speed.

Thomas Godin

News & Views
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Hybrid nanophotonic trap boosts atomic storage and coherence times

A hybrid nanophotonic trap that replaces the attractive red-detuned laser field with atom–surface interactions — Casimir–Polder interactions and electrostatic attraction — achieves record-long storage and coherence times for cold atoms coupled to a nanofibre surface.

Xiao-Dong He

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30 Sept 2026

One super sensor from many

By combining 48 parallel sensors with diffractive multiplexing to recover information from the gaps between the sensors, a new wide-field microscope achieves a spatial resolution of approximately 3 micrometres over more than 5.2 square centimetres at 120 frames per second, substantially relaxing the conventional trade-off between field of view, resolution and imaging speed.

Jiamin Wu & Qionghai Dai

News & Views
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Optomechanics for piconewton force metrology

Of the sensors that can directly sense forces in the pico- and sub-pico-newton ranges, only a few can measure in liquids. Microfibre-based microcantilevers now add to this family, providing a versatile, broad-bandwidth, high-sensitivity optomechanical sensor.

Bartosz Pruchnik

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Delaying light from quantum dots

Förster energy transfer can prolong the photoluminescence decay of a receiving colloidal quantum dot, revealing a possible route to optically control recombination in nanocrystal assemblies.

Eran Rabani

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Strong coupling of photon to an electron on helium

David Pile

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Photonic accelerators for AI across cloud and edge platforms

The merits of photonic accelerators for artificial intelligence applications are discussed, with an emphasis on cloud versus edge systems.

Dmitry Nechipurenko, Abhishek Gautam & Maxim R. Shcherbakov

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Temporally super-resolved dispersive Fourier transformation spectroscopy

Temporally super-resolved time-stretch spectroscopy is developed to sequentially measure non-repetitive spectra in a single shot. Proof-of-concept experiments reveal the spectral evolution of 25-GHz electro-optic comb pulses and distinguish spectra separated by 3 ps.

Qi Wen, Zhaoyang Wen ... Heping Zeng

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Endlessly self-injection-locked photonic integrated lasers

Feedback-phase dispersion in a silicon nitride photonic integrated circuit enables a self-injection-locked laser to maintain its locked state at any drive current, resulting in a robust, low-noise, narrow-linewidth integrated laser.

Mikael Reichler, Simone Bianconi ... Tobias J. Kippenberg

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Hybrid nanophotonic trap for cold atoms using surface forces and a blue-detuned evanescent field

A hybrid nanophotonic trap for cold caesium atoms uses surface forces for attraction and blue-detuned light for repulsion to achieve efficient loading and enhanced storage and coherence times.

Riccardo Pennetta, Antoine Glicenstein ... Arno Rauschenbeutel

Article

18 Aug 2026

Edge-on perovskite detectors with suppressed shallow traps for counting X-ray photons at medical computed tomography fluxes

The researchers use an edge-on device configuration and chloride alloying to increase the response speed of perovskite photon-counting detectors. A response time of 37 ns is achieved, and detectors with a pixel size of 200 × 200 μm² can count 120-kVp X-ray photons at a high flux of 2 × 10⁸ photons s^{−1} mm^{−2}.

Shaojie Wang, Mingze Li ... Jinsong Huang

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Extensible universal photonic quantum computing with nonlinearity

An extensible photonic quantum computing architecture based on a fully programmable, scalable linear-optical network has been realized, and is enhanced by two addressable modules: an inline squeezing module for injecting nonlinear resources as input states and a Kerr interaction module for implementing effective nonlinear operations.

Shang Yu, Jinzhao Sun ... Raj B. Patel

Article

11 Sept 2026

On-chip space–time wave packet laser array

An integrated semiconductor laser array can directly generate incoherent space–time wave packets with propagation-invariant and self-healing characteristics.

Jongheon Lee, Huizhong Ren ... Mercedeh Khajavikhan

Article

21 Jul 2026

Circularly polarized bulk-heterojunction memory-computing organic light-emitting diodes for a neural radiance field-based 3D display

Circularly polarized memory-computing organic light-emitting diodes integrate three-dimensional displays with memory and processing capabilities. Optimized devices achieve luminance of over 22,000 cd m^{−2}, dissymmetry factor of 0.92 and energy consumption down to 1.78 pJ per spike, enabling neural radiance field greyscale three-dimensional scene reconstruction.

Lixuan Liu, Zhengjia Chen ... Huipeng Chen

Article

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Programmable photonic unitary processor enables parameterized differentiable long-haul spatial division multiplexed transmission

A programmable photonic unitary processor for compensating modal dispersion allows long-haul (1,300 km) high-quality data transmission over a three-mode fibre.

Mitsumasa Nakajima, Kohki Shibahara ... Toshikazu Hashimoto

Article

09 Jul 2026

Piconewton-sensitive cell stethoscope using an optical microcantilever

An optical microcantilever sensor achieves piconewton sensitivity for dynamic force measurements in liquid environments, enabling non-invasive monitoring of cellular mechanics. The stethoscope platform captures real-time dynamics for enhanced understanding of biomechanics.

Xitao Tu, Guoliang Hao ... Lei Zhang

Article

29 Sept 2026

Giant phonon-assisted upconversion photoluminescence of in situ photo-carbonized polymer dots for 3D high-definition optical disks

Researchers demonstrate high-capacity 3D optical data storage with high efficiency enabled by anti-Stokes phonon-assisted upconversion photoluminescence via in situ laser writing and reading of upconversion carbonized polymer dots.

Hui Zhang, Simone Lamon ... Min Gu

Article

30 Jul 2026

Modulating p–n transition of two-dimensional perovskites for efficient and stable perovskite/Si tandem photovoltaics

Electronically tunable 2D perovskites optimize charge extraction in wide-bandgap solar cells, enabling perovskite/silicon tandem cells with a certified efficiency of 33.64% and excellent long-term stability.

Jiahao Guo, Zeyu Zhang ... Yixin Zhao

Article

23 Jul 2026

Manipulating spin dynamics via exciton–exciton interactions for bright spin light-emitting diodes

Modulating exciton–exciton interactions in hybrid chiral metal halide heterostructures suppresses spin relaxation, enabling spin light-emitting diodes that directly emit circularly polarized light with a dissymmetry factor of 0.2 and a half-lifetime of 5,000 h at an initial luminance of 100 cd m^{−2}.

Qi Liu, Yanlong Wang ... Shaocong Hou

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28 Jul 2026

Large-scale compressive microscopy via diffractive multiplexing across a sensor array

By combining an array of 48 sensors with a diffractive mask and compressive sensing, researchers developed a 25 gigapixel-per-second computational microscope that can image at micrometre resolution across multi-centimetre areas at 120 frames per second.

Kevin C. Zhou, Chaoying Gu ... Laura Waller

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