



Photonic Chern insulators

The cover shows an artistic impression of a photonic Chern insulator — a type of topological material — made from a twisted multicore optical fibre. The platform exploits topological photonics to enable the propagation of disorder-robust edge states. Twisting a honeycomb lattice of cores creates a photonic Chern insulator with chiral propagation and enhanced robustness to fabrication defects.

See [Souslov](#)

Image: Dr Nathan Roberts, National Research Council Canada and University of Ottawa. Cover design: Bethany Vukomanovic

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News & Views

News & Views
06 Mar 2026

Twisted fibre photonic Chern insulator

Photonic topological structures based on solid-state Chern insulators allow light to flow in only one direction along their edges, making them intrinsically resistant to scattering and localization by imperfections. Now, a photonic version of a Chern insulator has been realized in a complex multi-core fibre.

Mikael C. Rechtsman

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News & Views
06 Mar 2026

Topological antennas empower communications

Valley dispersion engineering enables seamless transition between guided and leaky topological edge states, providing a viable route for the application of topological devices in terahertz communications.

Hongyu Shi, Haolong Wang & Zhihao Lan

News & Views
06 Mar 2026

Back-reflection immunity in CMOS photonics via engineered laser feedback

Implementing stable laser operation requires optical isolators to protect against destabilizing back-reflection signals. Now, CMOS optical circuits provide a simple and insensitive pathway towards robust protection.

Louise Schul & Geun Ho Ahn

News & Views
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Sub-100-nanometre quantum-dot LEDs

A capillary-driven nanoimprint technology creates high-efficiency nanoscale quantum-dot light-emitting diodes (QLEDs) with sub-100-nm pixels, enabling ultrahigh resolutions of nearly 170,000 pixels per inch (PPI) for next-generation displays.

Chen Zou & Dawei Di

News & Views
06 Mar 2026

Bragg crystal magnifier enables high-contrast imaging

Anastasia Vasychenkova

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Meeting Reports

Meeting Report
06 Mar 2026

Perovskite–silicon solar cells put to test

Amidst rapid performance improvements and industrial scaling of perovskite–silicon solar cells, researchers wait with bated breath for the outcome of reliable long-term testing. The latest updates, especially from China, were reported in Brisbane, Australia at the recent APSRC conference.

David Pile

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Review Articles

Review Article
19 Feb 2026

Programmable integrated quantum photonics

This Review covers state-of-the-art reconfigurable and tunable optical components and highlights the emergence of a set of materials that offer a new toolkit for tunability and control.

Igor Aharonovich, Kenneth B. Crozier & Dragomir Neshev

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Articles

Article
09 Jan 2026

Encoding and manipulating ultrafast coherent valleytronic information with lightwaves

A method to coherently manipulate excitons and perform all-optical logic operations using the valley degree of freedom in monolayer WS_2 is discussed.

Francesco Gucci, Eduardo B. Molinero ... Giulio Cerullo

Article
05 Feb 2026

Highly stable all-perovskite tandem solar cells with targeted conversion of tin–lead surfaces

Treating the tin–lead surface in perovskite films with caesium hydroxide forms solid metal oxides that stabilize the surface against photothermal degradation. When used in all-perovskite tandem solar cells, a certified power conversion efficiency of 28.56% is achieved, 90% of which is retained after 500 h of testing under ISOS-L-3 conditions.

Nannan Sun, Sheng Fu ... Junfeng Fang

Article
06 Jan 2026

Silicon nitride nanocomposites at the buried interface for stable perovskite solar cells

An amorphous–crystalline silicon nitride nanocomposite at the buried interface of perovskite solar cells enables small-area devices with a certified power conversion efficiency of 26.37%. Modules with an area of 1.252 cm^2 maintain stable output for 6 months of outdoor operation.

Biao Li, Xingtao Wang ... Deren Yang

Article
14 Jan 2026

Photostable donor–acceptor interface for minimizing energy loss in inverted perovskite solar cells

A new self-assembled monolayer at the buried interface of inverted perovskite solar cells improves photostability and favours energy transfer, resulting in devices with a certified power conversion efficiency of 27.19% and 1,500-h stability under the ISOS-L-2 protocol.

Congcong Tian, Anxin Sun ... Chun-Chao Chen

Article
Open Access
04 Feb 2026

Non-local bound states in the continuum for nanoscale alignment

Researchers study the transition from bound states in the continuum (BICs) to quasi-BIC caused by out-of-plane asymmetry and illustrate how quality factors of BIC resonances are valuable tools for precise chip patterning accuracy.

Jing Cheng Zhang, Din Ping Tsai & Stella W. Pang

Article
30 Jan 2026

Ultrahigh-resolution nanoimprint patterning of quantum-dot light-emitting diodes via capillary self-assembly

A nanoimprint technique exploiting capillary forces in nanohole arrays enables patterning CdSe-based quantum-dot LEDs with a resolution of nearly 170,000 pixels per inch while maintaining high average external quantum efficiencies of 17.0%, 10.5% and 5.7% for red-, green- and blue-emitting pixels, respectively.

Wei Cao, Sen Tian ... Yue Li

Article
02 Feb 2026

Dissipative solitons in mode-locked parity–time-symmetric lasers

A mode-locked laser is achieved by coupling two ring resonators in a parity–time-symmetric configuration. Stable pulses emerge through a balance of gain in one cavity and loss in the other, combined with symmetry-breaking induced by the Kerr effect.

Jesus Yelo-Sarrón, François Leo & Simon-Pierre Gorza

Article
12 Jan 2026

On-chip topological leaky-wave antenna for full-space terahertz wireless connectivity

On-chip terahertz topological leaky-wave antennas based on valley photonic crystals achieve beam scanning over 75% of the three-dimensional solid angle. The time-reversal-symmetric topological leaky-wave antenna further enables the simultaneous demonstration of real-time high-definition television streaming and 24 Gbps directional wireless data transmission in opposite directions.

Wenhao Wang, Yi Ji Tan ... Ranjan Singh

Article
Open Access
20 Feb 2026

Twisted optical fibres as photonic topological insulators

In this work, researchers build a scalable photonic Chern insulator by twisting a fibre during fabrication, breaking an effective time-reversal symmetry and inducing a pseudo-magnetic field. The team reveals a ‘Goldilocks’ regime that guarantees topological protection against fabrication-induced disorder of any symmetry class in the fibre cross-section.

Nathan Roberts, Brook Salter ... Anton Souslov

Article
25 Feb 2026

Isolator-free laser operation enabled by chip-scale reflections in zero-process-change silicon-on-insulator

Researchers present silicon photonic circuit that, with an integrated distributed-feedback (DFB) laser, enhances the DFB’s immunity to continuous-wave and modulated parasitic reflections from multiple reflections. The isolator-free operation of the integrated laser in a high-speed optical link was demonstrated, highlighting potential for data communication applications.

Omid Esmaeili, Lukas Chrostowski & Sudip Shekhar

Article
09 Feb 2026

Highly sensitive and stable perovskite detector for ultrahigh-energy radiations via dynamic repair regulation

The researchers exploit lattice-anchoring-enhanced dynamic repair in organic–inorganic hybrid perovskites to demonstrate a single-crystal detector with a sensitivity of $165.6 \mu C mGy^{-1} cm^{-2}$ and radiation stability under high-fluence 6-MeV X-rays (6.4×10^{11} photons cm^{-2}) and 1.2-MeV electrons (6×10^{16} electrons cm^{-2}). The findings may have implications for diverse applications, including radiation therapy, astronomy and nuclear technology.

Hang Yin, Haodi Wu ... Guangda Niu

Article
04 Mar 2026

Multiband wireless systems based on microwave integrated photonics with metasurfaces

A unified optoelectronics platform comprising dual-comb generation, modulation and metasurface-enabled beam steering serves as a transmitter for any standards between 2G and 6G. This architecture reduces power usage and costs, enabling a direct link between edge data-centre devices and the wireless network.

Yujun Chen, Jiahao Gao ... Lin Chang

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