this is the first clear demonstration of the inverse four-wave mixing effect of the photon field directly emitted by a conventional laser.

Although the authors make intuitive connections with previous analysis by Marhic and McKinstrie of two-pump parametric amplification[3,7], their results transcend these by clearly recognizing and ultimately exploiting complex propagation dynamics over a long fibre section that is not engineered for parametric generation. In perhaps the most important contribution, they also found the conditions necessary for simultaneous spectral narrowing and stable propagation regime that is critical for the design of a distributed laser system. The narrowing of the emission spectrum required a specific dispersion and power profile that could be achieved with commercial non-zero-dispersion fibre. In contrast, transmission along a conventional single-mode fibre that had a distant zero-dispersion wavelength led to spectral broadening, an effect commonly observed in high-power systems. Interestingly, experiments with the same single-mode fibre (with a zero-dispersion wavelength at 1,310 nm) in the normal dispersion regime with an input laser wavelength of 1,276 nm resulted in spectral compression.

These results point to a new and promising path that could have a direct impact in multiple disciplines. Although Turitsyn and co-workers used a commercial fibre to demonstrate the existence of inverse four-wave mixing, it is likely that significantly better performance could be achieved by specialized fibre designs specifically tailored for the desired zero-dispersion wavelength, modal confinement, dispersion slope and high-order dispersion terms.

Although the initial demonstration of an increase in the spectral brightness of a laser is impressive, it is likely that the most exciting applications will actually lie in optical fibre communications where the possibility of controlling or even inhibiting the interference induced by four-wave mixing is a tantalizing prospect. ❐

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MATERIALS

Magnetic opportunities

The demonstration of a cleverly engineered polymer material that emits light when exposed to a magnetic field could lead to new types of sensors that do not need to be interrogated electrically and can provide a visual response. Jianhua Hao and co-workers from the Hong Kong Polytechnic University in China synthesized a composite material based on the polymer polydimethylsiloxane (PDMS) containing a layer of Fe–Co–Ni alloy particles to create a magnetic elastomer and a separate layer of ZnS microparticles doped with metal ions to act as a piezophotonic phosphor (*Adv. Mater.* **27,** 4488–4495; 2015). When a magnetic field is applied to the material it induces visible light emission due to an induced magnetostrictive strain in the elastomer which in turn induces mechanoluminescence from the phosphor.

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Initial experiments have shown that the material can generate bright white and green light at room temperature when a magnetic field of 3.5 kOe or greater is applied. The efficiency of the light generation is estimated to be around 0.0014 lumens per oersted. The luminescence is reversible and dynamic and shown to be able to respond to a time varying magnetic field at a rate of 50 Hz.

"In principle, other colours including red or blue could be presented when a mechanoluminescent red or blue phosphor is used," commented Hao. "Most recently, we have successfully synthesized a composite capable of emitting red light for an extended time period in our lab." The goal is to achieve full RGB colour emission which would prove useful for roles in displays, lighting and sensors.

As for benefits of the approach, Hao says that in contrast to conventional magnetic sensors, the magnetic-induced luminescence-based devices enjoy the benefits of real-time visualization, remote sensing without making electric contact and non-destructive and non-invasive detection. "Our results offer the possibility to find new device applications, such as remote magnetic–optical sensors, memory devices, energy harvesters, non-destructive environmental surveillance, displays, anti-counterfeiting and stimuli-responsive multimodal bioimaging," he told *Nature Photonics*.

The research team is now working on ways of improving the efficiency of the light generation and developing a wafer fabrication process for the composite materials.

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