



January Science News Recap

ICFO's summary of news highlights of the scientific discoveries and stories from the month of January 2026

February 05, 2026

January was packed with different scientific discoveries, results and findings that have sparked different stories to share. We've gathered the most important updates to keep you in the know. Whether you missed a few of them or just want a quick recap, our summary of January's top scientific news has you covered. Dive in and catch up on everything that happened this month.

News 1

Making spatial images of quantum interactions in twisted materials through an innovative nano-optical microscopy tool

Twisted two-dimensional (2D) materials -one-atom-thick layers stacked with a slight rotation between them- host a wide range of correlated quantum phenomena, including superconductivity and exotic ferromagnetism.

In the quest for uncovering the most intricate and fundamental details of correlated quantum

phenomena, ICFO researchers have recently presented a novel tool in Nature Physics called photothermoelectric nanoscopy. Showcased with twisted symmetric trilayer graphene (three graphene layers, with a 1.5° twist between the middle one and the others), the technique could identify strong electron correlations in twisted 2D materials with nanometer-level spatial precision, revealing key details that traditional methods had previously missed

Date: January 2, 2026

Topic: Twisted 2D materials

ICFO Researchers: Dr. Sergi Batlle Porro, Dr. Roshan Krishna Kumar, Dr. Niels C. H. Hesp, Dr. Petr Stepanov, led by ICREA Prof. Frank Koppens.

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News 2:

Quantum imaging reaches the inaccessible

In recent years, quantum physicists have started to explore the potential of quantum light to enhance optical imaging. One of the most striking examples is quantum ghost imaging (QGI), in which photons from entangled pairs that have never interacted with the sample create the image (hence the name *ghost imaging*).

Now, ICFO researchers and collaborators have demonstrated real-time waveguided quantum ghost imaging. The technique, published in *Optica*, employs an optical fiber to illuminate otherwise inaccessible samples and a novel SPAD camera designed to perform real-time imaging without the need for external equipment.

This approach extends the benefits of quantum imaging to applications where direct access to the sample is impractical or potentially damaging, such as biomedical endoscopy or remote industrial inspection.

Date: January 8, 2026

Topic: Imaging

ICFO Researchers: Dr. Alexander Demuth and Dr. Robin Camphausen, led by ICREA Prof. Valerio Pruneri

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News 3:

Chiral thermal emission becomes a reality through twisting

ICFO researchers have generated circularly polarized mid-infrared light through incandescence, which could be used to probe the chiral properties of materials. By employing twisted low-dimensional bilayers, the team introduces a new paradigm to light generation and polarization control in the mid-infrared, removing the need to directly pattern the material's surface via lithography.

The approach, presented in Nature Communications, makes the process simpler and potentially cost-effective, which could be especially useful for sensing, pharmaceutical

analysis and material identification.

Date: January 13, 2025

Topic: Thermal photonics

ICFO researchers: Dr. Michael T. Enders, Dr. Mitradeep Sarkar, Evgenia Klironomou, Dr. Michela Florinda Picardi, Riccardo Bertini, and Aleksandra Deeva, led by Prof. at ICFO Georgia T. Papadakis.

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News 4:

Low-frequency excitations could soon be mapped with nanometer precision

Atoms never remain perfectly fixed, even inside solid materials. Instead, they vibrate around their equilibrium positions, giving rise to collective excitations known as phonons. These and other fundamental excitations are extremely hard to measure with nanoscale spatial resolution, mainly because their frequencies are too low for conventional optical techniques to resolve.

Now, ICFO researchers have theoretically proposed a new technique called wave-mixing cathodoluminescence to map low-frequency (far-infrared to terahertz) excitations in nonlinear materials with nanometer resolution. The approach, reported in *Nature Communications*, relies exclusively on visible light, eliminating the need for specialized low-frequency light sources and detectors.

Date: January 27, 2026

Topic: Nanophotonics

ICFO researchers: Leila Prelat and Dr. Eduardo Dias, led by ICREA Prof. F. Javier Garcia de Abajo.

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News 5:

Direct imaging captures the crystalline vibrations of a supersolid made of atoms and light

In a supersolid, atoms flow without friction like a superfluid, while maintaining the periodic spatial order characteristic of a crystal. For years, scientists have debated whether a crystal-like structure really emerged out of the so-called spin-orbit-coupled Bose-Einstein condensates, questioning whether they were true supersolids.

Now, ICFO researchers, in collaboration with scientists from UAB, have for the first time directly imaged a spin-orbit-coupled supersolid. The direct observations show the cloud of ultracold potassium atoms forming stripes whose spacing oscillates in time, as the spacing of a crystal does. These results, published in *Science*, demonstrate unequivocally the dual superfluid and crystalline nature of such systems, settling the debate.

Date: January 29, 2026

Topic: Ultracold atoms

ICFO researchers: Dr. Craig Chisholm, Dr. Sarah Hirthe, Dr. Vasiliy Makhalov, Dr. Ramon Ramos, and Dr. Remy Vatre, led by ICREA Prof. Leticia Tarruell.

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