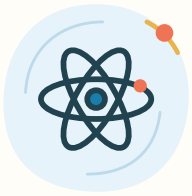
The discovery edition

Historical research sample, based on abstracts and selected source passages. Not a current weekly issue.



01

Physics

Physical Review Letters
2016-02-11

When spacetime rang

What would a collision look like if light could not reveal it? In September 2015, both LIGO detectors recorded a brief signal matching two black holes spiralling together, merging and leaving a final black hole that settled through a ringing phase. What reached the instruments was a tiny distortion of spacetime, of the kind predicted by general relativity. Comparing its shape with theoretical waveforms let the researchers estimate the participants: black holes of roughly 36 and 29 solar masses, producing a remnant of about 62 solar masses. The difference represents energy carried away as gravitational waves, a vivid connection between mass and energy. Published in 2016, the paper reported the first direct detection of gravitational waves and the first observation of a binary black hole merger. Alongside light, there is another way to investigate a massive system during its most dramatic moments. The inferred masses and distance carry uncertainty ranges; this is an analysis of one particular event, not a complete description of every black hole in the universe.

Read the abstract

https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.116.061102





02

Cell and molecular biology

Nature
2021-07-15

From a protein sequence to a three-dimensional shape

A protein begins as a sequence of amino acids, but its three-dimensional arrangement is closely connected to what it can do. Moving from a string of letters to that intricate shape was a longstanding challenge in biology. In their 2021 paper, the AlphaFold team presented a deep-learning system that predicted protein structures with striking accuracy. A crucial test was CASP14, where participants predict structures solved experimentally but not yet disclosed to them. That makes the comparison especially revealing: the answer is unavailable when the prediction is made. In a majority of cases, AlphaFold achieved accuracy competitive with experimental structures, narrowing the gap between sequence information and molecular shape. For researchers, a useful prediction can provide a richer starting point for thinking about mechanisms, comparing related proteins and planning experiments. Accuracy still varies between proteins and between regions within them; a prediction is not a direct measurement of every protein, a complete account of its behaviour or evidence of a clinical benefit.

Read the abstract

https://www.nature.com/articles/s41586-021-03819-2

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03

Mathematics

Combinatorial Theory
2024-06-30

One tile. No repeating pattern.

Imagine covering a floor with copies of just one tile, extending it as far as you like. Familiar tilings usually repeat a basic arrangement; in this work, the shape itself prevents a repeating translation across the whole plane. The researchers described a family of polygons that cover the plane without gaps or overlaps but cannot form a periodic tiling. Their hat-shaped example made a longstanding mathematical question feel almost tangible. Showing an attractive pattern is only the beginning: the proof must establish both that an infinite tiling exists and that no alternative arrangement of the same shape can become periodic. The paper connects larger clusters of tiles, hierarchical construction rules and geometric and computer-assisted arguments to establish those properties. The surprising idea is that a local rule, how neighbouring pieces meet, can constrain order at every scale. The hat in this paper permits reflected copies; the result establishes mathematical aperiodicity, not randomness or a demonstrated engineering application.

Read the abstract

https://arxiv.org/abs/2303.10798

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04

Archaeology

Nature
2019-05-01

An ancient jawbone, high on the Tibetan Plateau

Sometimes a single piece of bone changes the map of the human past. A 2019 study examined a mandible found in Baishiya Karst Cave on the Tibetan Plateau, near Xiahe in China. Analysis of ancient proteins identified it as Denisovan, adding direct fossil evidence for these ancient human relatives beyond the Altai region of Siberia. Time mattered as much as place. Uranium-series dating of carbonate attached to the fossil indicated a minimum age of 160,000 years. That minimum is an important part of the story: the measurement concerns material adhering to the mandible, rather than a direct date for the individual's death. Its setting is equally striking, providing evidence that archaic humans occupied the high, oxygen-poor plateau long before modern humans reached the region. A find like this opens better questions about who lived where and when. One mandible alone cannot supply a complete population map, migration history or explanation of the mechanisms behind high-altitude adaptation.

Read the abstract

https://www.nature.com/articles/s41586-019-1139-x



05

Communication and media research

Science
2018-03-09

Why a false story can travel faster

Why does one story race through a network while another barely leaves its first circle of readers? A study published in 2018 followed news circulating on Twitter between 2006 and 2017. Its data included about 126,000 stories shared more than 4.5 million times by roughly three million people, with truth classifications supplied by six independent fact-checking organisations. The researchers compared speed, distance, depth and breadth of diffusion. Stories classified as false travelled farther and faster overall, with especially pronounced differences for political news. Novelty added an intriguing angle: false stories tended to contain information that was more unusual relative to what people had previously encountered. Replies also showed different emotional patterns, including more fear, disgust and surprise around false stories. Automated accounts complicated the picture rather than resolving it: they accelerated both true and false news at similar rates, so they could not alone explain the observed gap. This is observational research on one platform and period; it does not prove that surprise alone causes sharing or that every false story outperforms every true one.

Read the abstract

https://pubmed.ncbi.nlm.nih.gov/29590045/