

Best of Last Year: The top Phys.org articles of 2022

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It was a good year for research of all kinds as [three men shared the Nobel Prize in physics](#) for their work that showed that tiny particles separated from one another at great distances can be entangled. Alain

Aspect, John Clauser and Anton Zeilinger won the award for their work showing that the counterintuitive field of quantum entanglement is real and also demonstrable.

A team at the Foundation for Applied Molecular Evolution [made a breakthrough in determining the origins of life on Earth](#), and maybe on Mars as well. They found that ribonucleic acid can form spontaneously on basalt lava glass. Such glass was abundant on early Earth at the time when scientists believe that life came to exist—and basalt lava glass exists on Mars today.

And as the year began, a team with members from institutions in France, Spain, Mexico and Switzerland found that [a spike protein on the SARS-CoV-2 virus activates human endogenous retroviruses in blood cells](#). The finding helped to explain many of the commonly observed pathogenic features of the virus. More specifically, they found evidence indicating that the SARS-CoV-2 spike protein activates the envelope protein encoded by HERV-W in blood cells.

Also, this past spring, a combined team of archaeologists from Germany and Iraq discovered a [3,400-year-old Mittani Empire-era city that was once located on the Tigris River](#). The settlement came into view due to an extended drought in the area around the Mosul reservoir that drastically lowered [water levels](#). Studies of artifacts at the site showed them to have been made by the Zakhiku, ancient people who lived in the area over the years 1550 to 1350 BC.

And last winter, researchers working at the Centre for Polar Observation and with the Modelling and British Antarctic Survey, reported that satellite images showed [a "mega-iceberg" called A68A had released approximately 152 billion tons of fresh water](#) into the ocean as it scraped past the south Atlantic island of South Georgia. They noted that it had snapped off the Larsen-C Ice Shelf.

Also, this past spring, an international team of researchers analyzing audio recordings received from two microphones aboard the Perseverance rover found that, as expected, [sound travels more slowly on Mars than on Earth, and it also has two speeds, depending on pitch](#)—higher sounds travel faster than lower sounds.

In September, a pair of researchers, one with Uppsala University, in Sweden, the other the University of Oviedo in Spain, found that they could [observe evolution in action](#) by studying black frogs in areas impacted by the Chernobyl nuclear plant meltdown. Pablo Burraco and Germán Orizaola found that prior to the release of radiation in the area, the frogs had all been green.

A combined team of researchers from the Florida Museum of Natural History and the Georgia Museum of Natural History studying DNA from a domesticated American horse that once occupied what is now an abandoned Caribbean colony [proved that the horses on Assateague island came from Spanish explorers](#), likely due to a shipwreck.

And just a few months back, a combined team of researchers from Liverpool John Moores University and the University of Montpellier discovered that [massive stars sound a warning when they are about to go supernova](#). They found that stars in the 8 to 20 solar mass range dim precipitously a few months prior to exploding due to the accumulation of materials in the vicinity blocking the view.

Last February, a team of researchers at the University of Massachusetts, Amherst developed a [new material that could absorb and release enormous amounts of energy](#). They described the rubber-like solid as similar to a "super rubber band," storing large amounts of energy when stretched and subsequently releasing it.

An international team of researchers using artificial intelligence routines

[compressed to four equations a quantum problem that previously required 100,000 equations to fully describe](#). They note that in addition to making the problem easier to work with, the approach could revolutionize the way other problems are tackled in the future.

Over the summer, a team of physicists affiliated with several institutions in the U.S. found that by shining a laser at a group of atoms arranged in a sequence inspired by Fibonacci numbers, they could create [a new phase of matter](#) that behaved as if it was running in two time dimensions. This, despite the fact that there was still only a single flow of time in the system.

Last spring, a team at Universiteit Amsterdam, working with a colleague at Amsterdam University Medical Center, [found microplastics in human blood for first time](#). The finding highlights the ubiquity of the tiny particles, many of which are nearly invisible to the naked eye. The team in the Netherlands found particles in almost 80% of samples they tested.

Also, this past autumn, a team of researchers affiliated with multiple institutions in the U.S. detected [the first definitive proof of elusive sea-level fingerprints](#)—where sea levels seesaw between areas close to ice sheet melt and areas far away. The seesawing occurs because of changes and subsequent differences in gravitational pull as ice breaks away from an ice shelf and then melts over time.

An atmospheric scientist with Colorado State University [confirmed his discovery of a bioluminescent "milky sea" event](#) via the testimony of a crew aboard a private yacht. Steven Miller discovered the event while studying satellite images and got confirmation from a crew aboard a yacht that happened to be sailing through the area at the time.

A team at Los Alamos National Laboratory's Computer, Computational, and Statistical Sciences Division found [an error in a paradigm developed](#)

[by Riemann and furthered by Helmholtz and Schrodinger that has been used for more than a century to describe how the eye distinguishes color.](#) Using the corrected version is expected to improve visualization in the electronics and paint industries.

Last summer, a team at the University of Cambridge's Department of Archaeology found that Augustinian [friars living in medieval Cambridge were twice as likely to be infested with intestinal parasites as others living in the same city.](#) The result was surprising because conditions in monasteries of the time were believed to more sanitary than in the city and because the friars used both latrine blocks and handwashing facilities.

Last summer, scientists working with data from the James Webb Space Telescope and NASA began gearing up for [a better look at an exoplanet called 55 Cancri e](#)—a planet that orbits so close to its star that some in the field have compared it to descriptions of Hell in the Bible. At just 1.5 million miles from its sun, it does not rotate; thus, one side is expected always to be burning.

A team at Northwestern University developed a simple method [to quickly and easily destroy so-called forever chemicals.](#) Known as PFAS, the chemicals can be broken down using certain inexpensive reagents at low temperatures, leaving behind nothing but benign end products, according to the researchers.

A team with members affiliated with a large number of institutions in Japan and one in Taiwan [discovered an unknown structure in the galaxy 3C273](#) using high contrast imaging. They found a faint radio emission covering a giant galaxy with an energetic black hole at its center. They also found that the emission was generated as gas from inside the black hole and suggest the technique could be used to learn more about quasars.

In July, [mankind marked a dubious milestone](#)—by the 28th day of that month, humanity had collectively consumed all that the planet could sustainably produce for the entire year. Called "Earth Overshoot Day," the date marked a tipping point that cannot be sustained year after year. It highlights the fact that humans are using more than the planet can produce and unless ameliorative actions are taken, shortages will become the norm.

In that same month, a team of physicists at the University of Edinburgh's School of Physics and Astronomy [used mathematical calculations to show that quantum communications across interstellar space should be possible](#). The finding, they note, suggests that interstellar communications with extraterrestrials should be possible—if any exist.

In August, a team at Cornell University reported on an experiment they had sent to the International Space Station that confirmed a theory by a team member who had recently passed away. The experiments showed that [water droplets oscillate and spread across solid surfaces in microgravity](#)—a finding that could have an impact on the way 3D and other spraying operations are done in applications here on Earth.

And a postdoctoral fellow at Harvard University's Center of Mathematical Sciences and Applications [answered a 150-year-old chess problem last January](#)—how to solve the n-queens mathematical problem. He found that the equation $(0.143n)^n$ could be used to describe the number of ways that queens can be placed on a chessboard such that none are attacking any other on $n \times n$ chessboards.

And finally, miners in Angola announced in July that they had excavated [the largest pure pink diamond found in 300 years](#). The diamond turned out to be 170 carats and was named the Lulo Rose, after the mine in Australia where it was discovered. The find marks one of the rarest and purest forms of a natural stone. Its owners, the Lucapa Diamond

Company and the Angolan government, announced that it will be sold as soon as possible to the highest bidder.

As a **bonus**, there was also a "**top video**" this year. Scientists at Durham University's Institute for Computational Cosmology used a supercomputer to simulate [an alternative explanation regarding the origin of the moon](#). They ran hundreds of simulations and then used the results to create a video showing an object called Theia colliding with early Earth that left a moon-like body orbiting around Earth.

Speaking of videos, we launched our Science X YouTube channel earlier this year. [Feel free to subscribe](#) as we continue to bring you the latest and greatest research news in science, medicine and technology in 2023 and beyond.

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