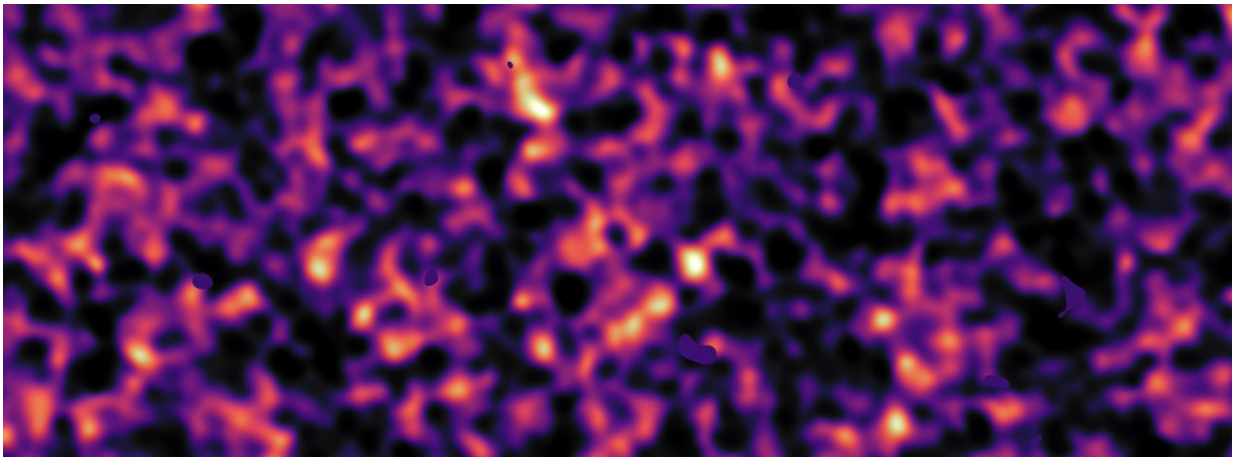


# Best of Last Year—The top Phys.org articles of 2018

December 21 2018, by Bob Yirka

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Dark matter map of KiDS survey region (region G12). Credit: KiDS survey

It was another great year for science, and physics was front and center, as a team at the University of Oxford announced that they may have solved one of the biggest mysteries in modern physics. They came up with [a new theory that could explain the missing 95 percent of the cosmos](#), and in so doing bring balance to the universe. Their theory unites dark matter and dark energy, resulting in a fluid, which they suggest possesses negative mass.

Also, a team at the University of Chicago suggested that [gravitational waves provide a dose of reality about extra dimensions](#). In their study of

data obtained from the team that first reported detecting [gravitational waves](#) last year, they found no evidence of extra spatial dimensions in a universe based on gravitational wave data, quashing ideas of a universe with more than three dimensions.

And a combined team of researchers working at the LHC on the ATLAS and CMS collaboration announced at this year's CERN that [the long-sought decay of the Higgs boson had been observed](#). Coming six years after the discovery of the elusive particle, the new observation was found to be consistent with the hypothesis that the quantum field behind the Higgs also gives mass to the bottom quark.

Also, a team working on the ESO's Very Large Telescope announced that they had conducted [the first successful test of Einstein's theory of general relativity near a supermassive black hole](#). The test involved studying the effects predicted by general relativity on the motion of a star as it passed through the extremely strong gravitational field near the supermassive black hole at the center of the Milky Way galaxy.

And a team at Yale announced that they had found [signs of a time crystal](#). Theory has suggested that a form of matter should exist that "ticks" when exposed to an electromagnetic pulse. Physicists have proposed that such a material would be in the form of a time crystal—a type of crystal whose atoms spin periodically in one direction, then change to spin in the opposite direction, a form of ticking.

And [Einstein was again proved right with evidence from another galaxy](#), by a team of international astronomers who conducted the most precise test yet of gravity outside of our solar system. Using data from Hubble and the ESO VLT, the researchers were able to use a nearby galaxy as a lens to conduct very precise gravitational tests on an astronomical scale—showing on a new scale that massive objects do indeed deform space-time.

It was also a pretty big year for space science, as a team with the National Radio Astronomy Observatory announced that they had seen [a distant eruption as a black hole destroyed a star](#). Using data from the NSF Very Long Baseline Array and other radio and infrared telescopes, the researchers found they were able to track two galaxies as they collided approximately 150 million light years away. One of the galaxies, the researchers noted, had at its core, a massive black hole, which tore apart at least one star.

Also, it was noted that [the moon did something this past year that it had not done in more than 150 years](#). It experienced three unique celestial events on the same night—January 31<sup>st</sup>. It was a full moon, was at its closest to Earth and there was also a total lunar eclipse.

And a team at the University of Central Florida made waves when they announced [that new research they had conducted suggested Pluto should be reclassified as a planet](#). They suggested that the reasoning behind the decision to declassify Pluto as a planet was not supported by the research literature. They point out that the requirement for a celestial body to "clear" its orbit to be classified as a planet was found in only one document—one from 1802.

Also, a combined team from the University of California and the University of Southern Queensland announced that they had [identified 121 giant planets that may have habitable moons](#), greatly extending the list of possible places life could exist. Their findings are expected to play a role in future work as new telescopes are developed that are powerful enough to actually see them.

It was a big year for Earth sciences and evolution, too, as a team at the University of Auckland found that [a "sinking" Pacific island nation was actually getting bigger](#). Using satellite images and aerial photographs, the researchers found that eight of Tuvalu's nine atolls and almost three

fourths of its islands had grown larger over the period 1971 to 2014 due to geologic activity, such as volcanos spewing lava.

Also, a large team of researchers found evidence that suggested [toward the end of the Ice Age, humans witnessed fires larger than the dinosaur killer](#), thanks to a cosmic impact. They found evidence that the planet was struck by multiple pieces of a disintegrating comet that showered the planet in fireballs, setting off a cataclysmic event that led to an extension of the Ice Age.

And a pair of researchers, Mark Stoeckle with Rockefeller University and David Thaler with the University of Basel, conducted [a sweeping gene survey that revealed new facets of evolution](#)—such as evidence that far-flung species such as ants, rats and humans are not more likely to become more genetically diverse as time passes, despite logic suggesting it should be so.

Also, a team at the University of Kansas conducted a study of fossil and extant bivalves and gastropods and found evidence that suggested [evolution might favor 'survival of the laziest.'](#) Over the course of five million years, such creatures with higher metabolic rates were found more likely to go extinct.

It was also a good year for technology, as a joint team with members from Monash University and the University of Texas discovered [an efficient and sustainable way to filter salt and metal ions from water](#). Using a metal-organic framework, the team created membranes that mimicked the filtering function or "ion selectively" of organic cell membranes, perhaps setting the stage for a new way to filter sea water.

An international team of researchers announced that they had developed [the world's fastest camera that can freeze time at 10 trillion frames per second](#). They achieved this feat improving the image quality of a

femtosecond streak camera by adding another camera able to capture a static image, and then applying a Radon transformation.

And a team led by Trent University professor Ian Power announced that they had found [a way to make a mineral that removes CO<sub>2</sub> from the atmosphere](#). They used polystyrene microspheres as a catalyst to get magnesite to form within 72 days at room temperature, offering a possible way to remove carbon dioxide from the air.

It was a good year for general science, as well, as a team of mathematicians at MIT announced that they had [solved the age-old spaghetti mystery](#)—if you bend a spaghetti noodle holding it at the ends, can you force it to break into just two pieces? Turns out, the answer is yes, but only if you twist it just right as you are bending it.

Richard Jantz with the University of Tennessee announced that he had found forensic evidence during an analysis of bones uncovered on a remote South Pacific island that [they were the remains of famed pilot Amelia Earhart](#). He reexamined measurements carried out on the bones in the 1940s and used a computer program to first determine the gender of remains, and then to show that they were very similar to Earhart's.

And a team from the University of Copenhagen, University College London and the University of Cambridge announced that they had found [evidence of bread that predated agriculture by 4,000 years](#) at a dig site in northeastern Jordan. The charred remnant of a flatbread baked by hunter-gatherers represents the oldest evidence of bread-making to date.

Also, a team working at a lab at UC Santa Cruz [documented paternal transmission of epigenetic memory via sperm](#) in roundworms. They found evidence supporting theories that a father's experiences prior to conception can influence the health and development of his offspring, and in some cases, their descendants.

And a team at the University of Toledo announced that they had discovered [the means by which exposure to blue light can speed blindness](#). They found that blue light from digital devices and also from the sun can transform important retinal molecules into cells that destroy other cells required for vision. The result is the common vision-impairing medical condition macular degeneration.

Also, a [team](#) at the Howard Hughes Medical Institute combined genomics with gene editing to develop a groundcherry that could possibly be used for mainstream farming. They suggest that [the wild plant could be the next strawberry](#). By making it bigger and changing the shape of the plant and the degree of flower production, they took a wild plant rapidly bred one that could produce food for people in many parts of the world.

And finally, a trio of researchers from several institutions in the U.S. and Canada found evidence that spaghetti-looking nuclear material beneath the surface of neutron stars might just be the strongest material in the universe. Their simulation showed that [the nuclear pasta was 10 billion times harder to break than steel](#).

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