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ALBERT EINSTEIN

A wrinkle in space-time: Math shows how shockwaves could crinkle space

19 JULY 2012 EDITOR

JournalOfSciences (July 19, 2012) Mathematicians at UC Davis have come up with a new way to crinkle up the fabric of space-time -- at least in theory.

"We show that space-time cannot be locally flat at a point where two shock waves collide," said Blake Temple, professor of mathematics at UC Davis. "This is a new kind of singularity in general relativity."

The results are reported in two papers by Temple with graduate students Moritz Reintjes and Zeke Vogler, respectively, both published in the journal Proceedings of the Royal Society A.

Einstein's theory of general relativity explains gravity as a curvature in space-time. But the theory starts from the assumption that any local patch of space-time looks flat...

Clocking an accelerating universe: First results from BOSS

30 MARCH 2012 EDITOR

JournalOfSciences (Mar. 30, 2012) Some six billion light years ago, almost halfway from now back to the big bang, the universe was undergoing an elemental change. Held back until then by the mutual gravitational attraction of all the matter it contained, the universe had been expanding ever more slowly. Then, as matter spread out and its density decreased, dark energy took over and expansion began to accelerate.

Today BOSS, the Baryon Oscillation Spectroscopic Survey, the...

Light from galaxy clusters confirm theory of relativity

Pulsars: The universe's gift to physics

20 FEBRUARY 2012 EDITOR

JournalOfSciences (Feb. 20, 2012) Pulsars, superdense neutron stars, are perhaps the most extraordinary physics laboratories in the Universe. Research on these extreme and exotic objects already has produced two Nobel Prizes. Pulsar researchers now are poised to learn otherwise-unavailable details of nuclear physics, to test General Relativity in conditions of extremely strong gravity, and to directly detect gravitational waves with a "telescope" nearly the size of our...

Light from galaxy clusters confirms general theory of relativity

28 SEPTEMBER 2011 EDITOR

JournalOfSciences (Sep. 28, 2011) All observations in astronomy are based on light emitted from stars and galaxies and, according to the general theory of relativity, the light will be affected by gravity. At the same time all interpretations in astronomy are based on the correctness of the theory of relativity, but it has never before been possible to test Einstein's theory of gravity on scales larger than the solar system. Now...

JournalOfSciences (Sep. 28, 2011) All observations in...

Recalculation of the Potsdam geoid shows time-dependent variation of gravity

29 JUNE 2011 EDITOR

JournalOfSciences (July 1, 2011) The "Potsdam Gravity potato," as this representation of terrestrial gravity has become known, can for the first time display gravity variations that change with time. The seasonal fluctuations of the water balance of continents or melting or growing ice masses, i.e. climate-related variables, are now included in the modeling of the gravity field.

"EIGEN-6C" is the name of this latest global gravity field model...

JournalOfSciences (July 1, 2011) The...

New hope of detecting gravitational waves: Final piece of Einstein's jigsaw puzzle

26 MAY 2011 EDITOR

JournalOfSciences (May 28, 2011) Direct evidence of the existence of gravitational waves is something that has long eluded researchers, however new research has suggested that adding just one of the proposed detectors in Japan, Australia and India will drastically increase the expected rate of detection.

In a study published May 27, 2011 in IOP Publishing's journal Classical and Quantum Gravity, Professor Bernard Schutz, of the Albert Einstein...

JournalOfSciences (May 28, 2011) ...

NASA's Gravity Probe B confirms two Einstein space-time theories

04 MAY 2011 EDITOR

JournalOfSciences (May 5, 2011) NASA's Gravity Probe B (GP-B) mission has confirmed two key predictions derived from Albert Einstein's general theory of relativity, which the spacecraft was designed to test.

The experiment, launched in 2004, used four ultra-precise gyroscopes to measure the hypothesized geodetic effect, the warping of space and time around a gravitational body, and frame-dragging, the amount a spinning

28 SEPTEMBER 2011 EDITOR

JournalOfSciences (Sep. 28, 2011) All observations in astronomy are based on light (electromagnetic radiation) emitted from stars and galaxies and, according to the general theory of relativity, the light will be affected by gravity. At the same time all interpretations in astronomy are based on the correctness of the theory of relativity, but it has been difficult to accurately test Einstein's theory of gravity on scales larger than the solar...

JournalOfSciences (Sep. 28, 2011) All...

Physicists apply Einstein's general theory of relativity to superconducting circuits

10 JUNE 2011 EDITOR

JournalOfSciences (June 11, 2011) In recent years, UC Santa Barbara scientists showed that they could reproduce a basic superconductor using Einstein's general theory of relativity. Now, using the same theory, they have demonstrated that the Josephson junction could be reproduced. The results are explained in a recent issue of the journal Physical Review Letters.

The Josephson junction, a device that was first discovered by Brian David...

JournalOfSciences (June 11, 2011) In recent...

Dark energy is driving universe apart: NASA's Galaxy Evolution Explorer finds dark energy repulsive

19 MAY 2011 EDITOR

JournalOfSciences (May 19, 2011) A five-year survey of 200,000 galaxies, stretching back seven billion years in cosmic time, has led to one of the best independent confirmations that dark energy is driving our universe apart at accelerating speeds.

The survey used data from NASA's space-based Galaxy Evolution Explorer and the Anglo-Australian Telescope on Siding Spring Mountain in Australia.

The findings offer new support for the favored theory...

JournalOfSciences (May 19, 2011) A...

Primordial weirdness: Did the early universe have one dimension? Scientists outline test for theory

20 APRIL 2011 EDITOR

JournalOfSciences (Apr. 20, 2011) Did the early universe have just one spatial dimension?

That's the mind-boggling concept at the heart of a theory that University at Buffalo physicist Dejan Stojkovic and colleagues proposed in 2010.

They suggested that the early universe -- which exploded from a single

object pulls space and...

JournalOfSciences (May 5, 2011) NASA's...

Probing the laws of gravity: A gravity resonance method

18 APRIL 2011 EDITOR

JournalOfSciences (Apr. 19, 2011) Quantum mechanical methods can now be used to study gravity. At the Vienna University of Technology (TU Vienna), a new measurement method has been developed, which allows scientists to test the fundamental theories of physics.

The world's most precise measurement methods are based on quantum physics. Atomic clocks or high-resolution magnetic resonance, which is used in medicine, rely on accurate measurements of...

JournalOfSciences (Apr. 19, 2011) ...

Large Hadron Collider could be world's first time machine, researchers' theory suggests

15 MARCH 2011 EDITOR

JournalOfSciences (Mar. 16, 2011) If the latest theory of Tom Weiler and Chui Man Ho is right, the Large Hadron Collider -- the world's largest atom smasher that started regular operation last year -- could be the first machine capable of causing matter to travel backwards in time.

"Our theory is a long shot," admitted Weiler, who is a physics professor at Vanderbilt University, "but it doesn't violate any laws of physics or experimental..."

JournalOfSciences (Mar. 16, 2011) If the...

Wave-generated 'white hole' boosts hawking radiation theory, physicists find

18 JANUARY 2011 EDITOR

JournalOfSciences (Jan. 20, 2011) A team of UBC physicists and engineers has designed an experiment featuring a trough of flowing water to help bolster a 35-year-old theory proposed by eminent physicist Stephen Hawking.

In 1974, Hawking predicted that black holes--often thought of having gravitational pulls so strong that nothing escapes from them--emit a very weak level of radiation. According to the theory, pairs of photons are torn apart by...

JournalOfSciences (Jan. 20, 2011) A...

Distribution of gravitational wave sources predicted

02 DECEMBER 2010 EDITOR

point and was very, very small at first -- was one-dimensional (like a straight line) before expanding to include two dimensions (like a plane)...

JournalOfSciences (Apr. 20, 2011) ...

Physicists discover new way to visualize warped space and time

11 APRIL 2011 EDITOR

JournalOfSciences (Apr. 11, 2011) When black holes slam into each other, the surrounding space and time surge and undulate like a heaving sea during a storm. This warping of space and time is so complicated that physicists haven't been able to understand the details of what goes on -- until now.

"We've found ways to visualize warped space-time like never before," says Kip Thorne, Feynman Professor of Theoretical Physics, Emeritus, at the...

JournalOfSciences (Apr. 11, 2011) When black...

Black holes: A model for superconductors?

02 MARCH 2011 EDITOR

JournalOfSciences (Mar. 3, 2011) Black holes are some of the heaviest objects in the universe. Electrons are some of the lightest. Now physicists at the University of Illinois at Urbana-Champaign have shown how charged black holes can be used to model the behavior of interacting electrons in unconventional superconductors.

"The context of this problem is high-temperature superconductivity," said Phillips. "One of the great unsolved problems in..."

JournalOfSciences (Mar. 3, 2011) Black...

Neutron stars and string theory in a lab: Chilled atoms give clues to deep space and particle physics

09 DECEMBER 2010 EDITOR

JournalOfSciences (Dec. 11, 2010) Using lasers to contain some ultra-chilled atoms, a team of scientists has measured the viscosity or stickiness of a gas often considered to be the sixth state of matter. The measurements verify that this gas can be used as a "scale model" of exotic matter, such as super-high temperature superconductors, the nuclear matter of neutron stars, and even the state of matter created microseconds after the Big Bang.

Th...

JournalOfSciences (Dec. 11, 2010) ...

Mathematical problems recast as physics questions, provide new tools for old quandaries

16 NOVEMBER 2010 EDITOR

JournalOfSciences (Dec. 3, 2010) A pair of neutron stars spiraling toward each other until they merge in a violent explosion should produce detectable gravitational waves. A new study led by an undergraduate at the University of California, Santa Cruz, predicts for the first time where such mergers are likely to occur in the local galactic neighborhood.

According to Enrico Ramirez-Ruiz, associate professor of astronomy and astrophysics at UC...

JournalOfSciences (Dec. 3, 2010) A pair...

Pair of aluminum atomic clocks reveal Einstein's relativity at a personal scale

23 SEPTEMBER 2010 EDITOR

JournalOfSciences (Sep. 24, 2010) Scientists have known for decades that time passes faster at higher elevations -- a curious aspect of Einstein's theories of relativity that previously has been measured by comparing clocks on the earth's surface and a high-flying rocket.

Now, physicists at the National Institute of Standards and Technology (NIST) have measured this effect at a more down-to-earth scale of 33 centimeters, or about 1 foot,...

JournalOfSciences (Sep. 24, 2010) Scientists...

JournalOfSciences (Nov. 20, 2010) A Princeton scientist with an interdisciplinary bent has taken two well-known problems in mathematics and reformulated them as a physics question, offering new tools to solve challenges relevant to a host of subjects ranging from improving data compression to detecting gravitational waves.

Salvatore Torquato, a professor of chemistry, has shown that two abstract puzzles in geometry -- known as the "covering"...

JournalOfSciences (Nov. 20, 2010) A...

Researchers discover how to conduct first test of 'untestable' string theory

01 SEPTEMBER 2010 EDITOR

JournalOfSciences (Sep. 2, 2010) Researchers describe how to carry out the first experimental test of string theory in a paper published September 2 in Physical Review Letters.

String theory was originally developed to describe the fundamental particles and forces that make up our universe. The new research, led by a team from Imperial College London, describes the unexpected discovery that string theory also seems to predict the behaviour of...

JournalOfSciences (Sep. 2, 2010) ...