

Predicting earthquake!

DR. MOFIZ UDDIN AHMED

DEMETER stands for Detection of Electromagnetic Emission Transmitted from Earthquake Region. It is the first satellite for monitoring earthquake from space. It was launched on June 29, 2004 by a rocket from Baikonour. Researchers from many countries have been participating in this study. It is a micro satellite of 130 kilogram placed at an altitude of around 700 kilometres from the earth surface. It makes about 14 rotations around the earth per day. A set of instruments are deployed on the satellite. They are: electric sensor, magnetic sensor, plasma probes, and energetic particle detectors. The DEMETER Science Mission Centre is located at Orleans, France.



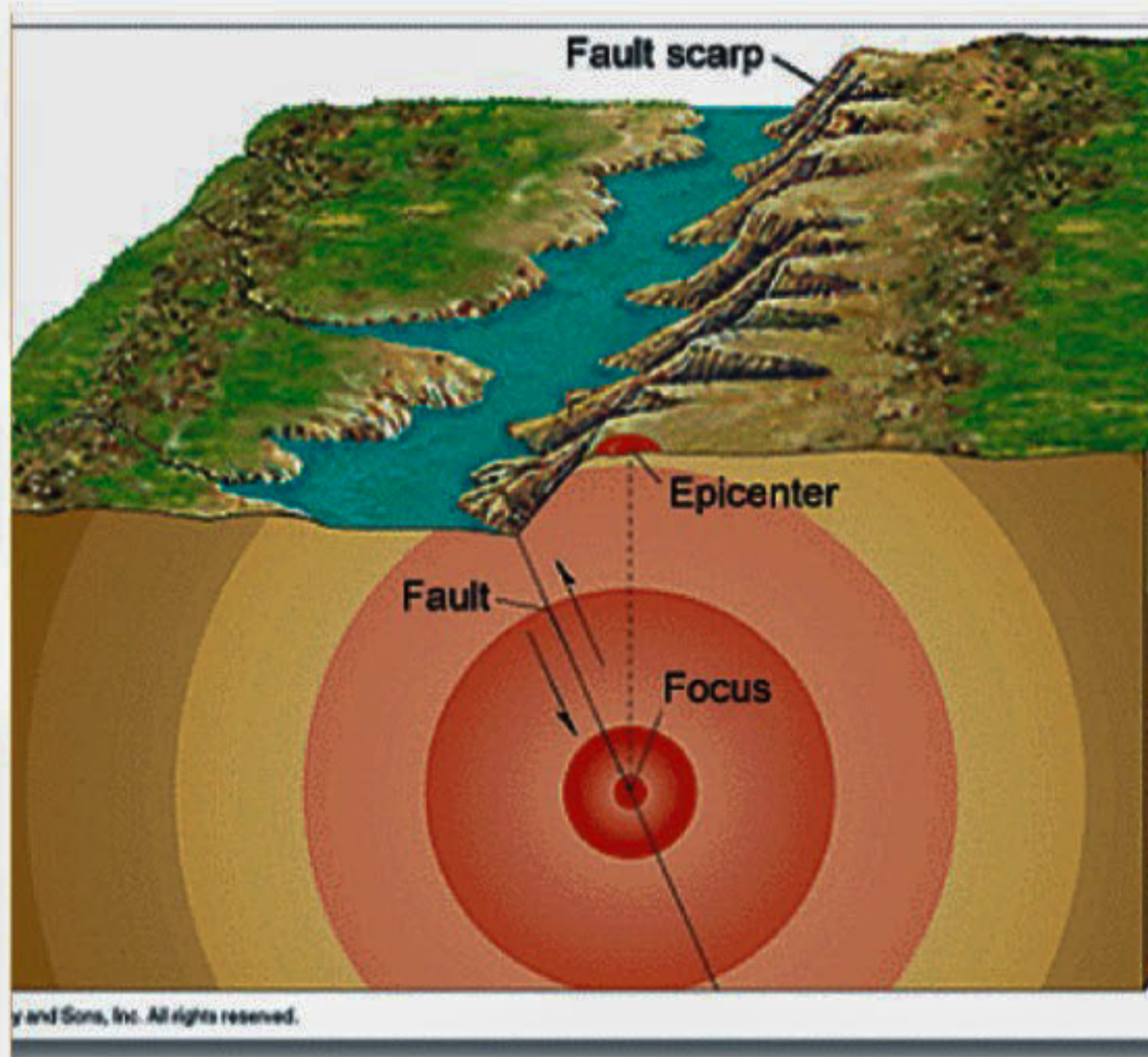
DEMETER satellite

Earthquakes are usually caused when rock underground suddenly breaks along a fault. This causes sudden release of energy in the form of seismic waves that make the ground shake. When two blocks of rock or two plates are rubbing against each other they don't just slide smoothly but they catch on each other. The rocks are still pushing against each other. After a while, the rocks break because of all the

pressure that's built up. When the rocks break, the earthquake occurs. During the earthquake and afterward, the plates or blocks of rock start moving, and they continue to move until they get stuck again. The spot underground where the rock breaks is called the focus of the earthquake. The place right above the focus (on top of the ground) is called the epicenter of the earth-

quake.

It is observed that before a massive earthquake low frequency electromagnetic emissions are produced due to micro-fracturing process of rocks. This fact had been tested experimentally in Russia and in other countries. The emitted low frequency radiation goes to the ionosphere and perturb the plasma (ionized gas) there.



How earthquake happens

The instruments in DEMETER record the low frequency noise in the region of epicentre of an earthquake. Intense theoretical and observational studies are being done at present to find the correlation between the earthquake emission and the plasma noise. In BRAC University at the Department of Mathematics and Natural Sciences, the DEMETER

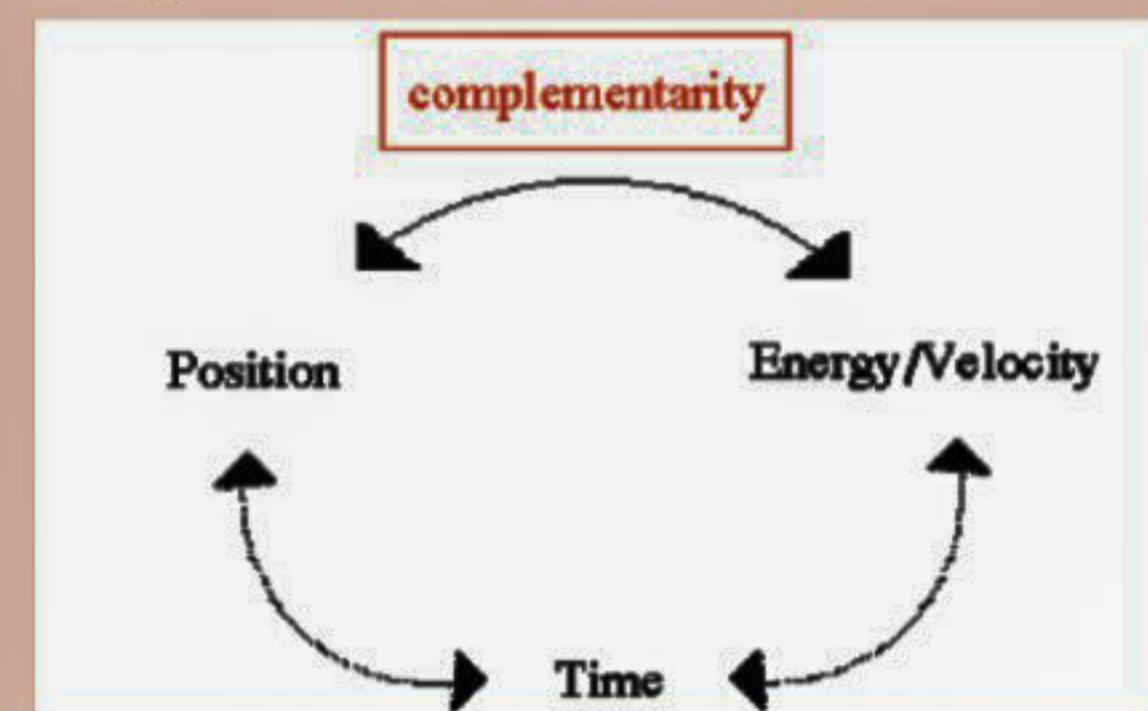
data are being analyzed and theoretical investigations on interaction of earthquake emission with the ionospheric plasma are being carried out which are published in international journals.

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THEN MEETS NOW

Physics of old and new



Newtonian physics is often referred to as classical physics after the development of modern physics in the 1920's

DR. ALI ASGAR

IN the old days physics dealt with those phenomena of the inanimate world which do not involve too deep a change in the structure of matter. Thus in terms of energy concentration, physics was restricted to phenomena at room temperature where the energy exchange per atom was no more than one electron volt which at best modified only the secondary bonds in condensed matter. On the other hand, chemistry dealt with high temperature, where chemical changes were brought about through the changes of covalent bonds involving several electron volts per atom or molecule.

In respect of size of objects dealt with in Newtonian Physics, human size was the limit. Thus atomic objects constituted chemistry, while celestial objects belonged to astronomy. Since Pasteur showed that a living creature can only be derived from other living ones, the living world was separated from the non-living physical world by boundaries never to be crossed. Classified physics was also constrained by a velocity limit which had to be much less than the velocity of light. Physicists are interested in repressing their invented laws in compact general quantitative terms. Mathematicians, too, play an essential role. However, physicists are not as free as mathematicians who can create the whole abstract imaginary world based entirely on postulates and logical deductions without the constraints of verifiability by experimental observations.

The writer is President, Bangladesh Physical Society



THE ANALYST



TWISTED PHYSICS

Berkeley and the Infidel



George Berkeley

DEBASHISH CHAKRABARTY

GEORGE Berkeley, philosopher and Anglican bishop, is best known among mathematicians for "The Analyst" (1734), a critique of the principles of the calculus. This work was addressed to "the infidel mathematician", believed to have been Edmund Halley. Berkeley was upset because Halley had persuaded a mutual friend that Christianity was a myth

Even aside from his impressive foray into the foundations of mathematics, Berkeley was an interesting man. He was born in March of 1685, just seven months after Halley visited Cambridge to ask Newton if he knew how to prove the planets move in elliptical orbits, assuming an inverse square law of gravitation. Berkeley became an Anglican bishop and a fellow of Trinity College, Dublin, where he lectured on Greek, Hebrew, and divinity. He spent time on the continent and also in London, where he associated with Jonathan Swift, Alexander Pope, Joseph Addison, Richard Steele, etc.

At some point he got enthusiastic about founding a college in Bermuda to instruct the American colonists and the Indians. He traveled to Rhode Island and lived there for a few years, trying to find support for the project, but it never got off the ground. For his encouragement of higher education in America during these years he became well enough known that, among other things, the university and town of Berkeley, CA was named after him. He had written of America as "a shining city on a hill", serving to enlighten the world and this image evidently seemed appropriate to the founders of the University of California, perhaps partly because of the geography of the site.

He is most famous for his writings in philosophy; "esse est percipi" (to be is to be perceived) is his most famous doctrine. In other words,

...that the very existence of the immediate objects of sensation consists in their being perceived. The whole corporeal world, then, can exist only as a set of objects of consciousness, as a system of ideas.

Samuel Johnson, when challenged to argue against Berkeley's proof that matter does not exist, impatiently kicked a large nearby rock, saying "I refute it thus!" Berkeley's friendship with Swift and Pope were interesting because of his obvious wit and deft touch for sarcasm. Who, after once reading it, ever forgets his phrase "the ghosts of departed quantities" or his remark that "he who can digest a second or third fluxion need not, methinks, be squeamish about any point in divinity"?

The writer studies in the Dept. of Computer Science and Engineering, BRAC University.

Faster-than-light particle!

THE news that particles called neutrinos may travel faster than light has been met with shock, skepticism and excitement from physicists around the world since it was officially announced this morning (Sept. 23).

Scientists at the European Organization for Nuclear Research (CERN) in Geneva, Switzerland, have been running an experiment called OPERA that sends neutrinos 454 miles (730 kilometers) underground to the INFN Gran Sasso Laboratory in Italy. Neutrinos, tiny, almost massless particles that very rarely interact with normal matter, pass straight through the Earth as if it were a vacuum.

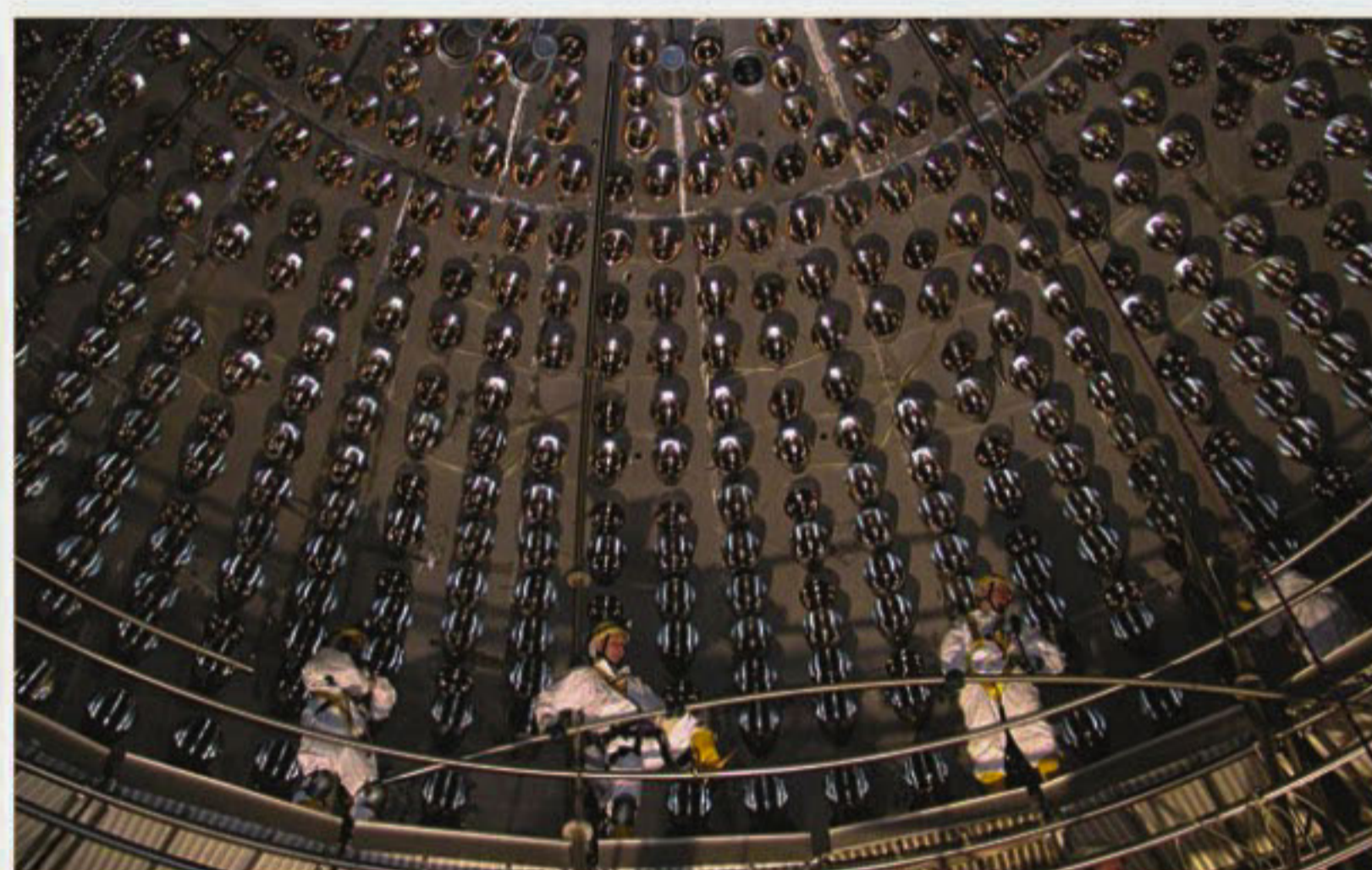
The researchers expected neutrinos to make this trip at about light speed, but found instead that they made it more quickly, arriving 60 billionths of a second before a beam of light would.

"It's quite astonishing," said CERN physicist Jonas Strandberg, who was not involved in the project. "If it's true it's remarkable, it's something that nobody expected."

The discovery seems to contradict one of the most cherished laws of physics, Albert Einstein's special theory of relativity, which states that nothing can travel faster than the speed of light.

"Perplexity would be the first word that comes to mind," said Robert Plunkett of Fermilab in Batavia, Ill. "It's perplexing, fascinating. There's also a certain amount of healthy skepticism. Any result like this will be greeted with the need for confirmation."

Even the OPERA scientists themselves admit that it's too soon to know for sure if the findings will hold up. They presented their results today in a public seminar to invite outside



The Gran Sasso National Laboratory of the Italian Institute of Nuclear Physics detects tiny particles called neutrinos

experts to inspect their data and suggest errors they might have overlooked.

"There's nothing obvious they haven't done," said Stephen Parke, head of the theoretical physics department at Fermilab. "They've obviously done many of the checks that people would have hoped to see. They've been pretty thorough, I would say."

Other experts also praised the meticulous work and painstaking analysis that went into the OPERA experiment.

"I want to congratulate you for this extremely beautiful experiment," Nobel laureate Samuel Ting of MIT told the researchers after the seminar. "The experiment is very carefully done, with systematic error carefully checked. It's an extremely well-done experiment."

If the neutrinos really are traveling faster than the speed of light, which was thought to be a cosmic speed limit,

the consequences would be far-ranging. The theory of relativity itself, and many other theories that rest on it, would need to be revised.

"If this turns out to be correct, there's a lot of rethinking that has to go on, and that's fantastic," Parke told LiveScience. "To the theoretical physics community that's what we like to do best reinvent the universe every day. If it's correct, I'm going to have a field day writing papers."

The implications could even range to astronomy and our understanding of the universe.

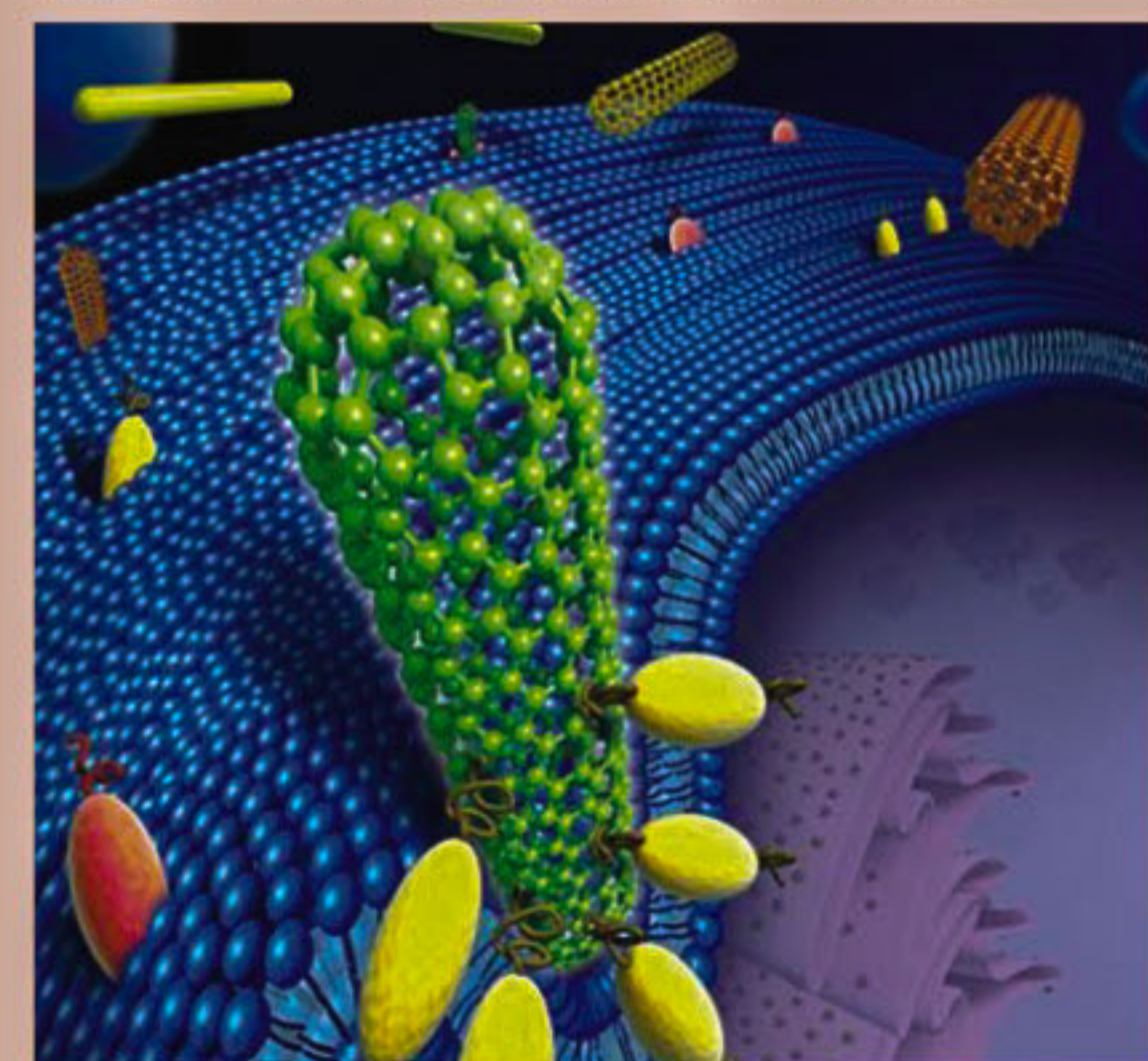
"It is hard to see what aspects of astronomy would not be implicated," astronomer Derek Fox of Pennsylvania State University wrote in an email to LiveScience. "Cosmological models depend on General Relativity being correct on large scales, and this would surely be thrown into doubt."

Source: Live Science



DEADLY MISTAKE

Nanotubes choke cells



A long perpendicular fiber comes near (green) a cell (blue), senses only its tip, mistakes it for a sphere, and begins engulfing something too long to swallow.

CARBON nanotubes and asbestos fibers may seem small, but they can be a big, and deadly, deal to cells. Now researchers at Brown University in Providence, R.I. know why. Cells swallow the long fibers tip-first, the researchers report online September 18 in Nature Nanotechnology. Rounded tips on the fibers cause the cell's machinery to gear up for swallowing a sphere. Once the cell has begun engulfing the tube it's too late to stop, and the cell essentially chokes. Snipping off the rounded tips caused the tubes to lie flat on the cell surface, leading the researchers to speculate that modifying the ends of such fibers could make them safer. Tina Hesman Saey.

Source: Science News



SPONTANEOUS HUMAN COMBUSTION (SHC)

Irishman explodes into fire



Source: Live Science

It sounds like something in a horror film, but some people believe it happens. It's also what an Irish coroner recently concluded about the death of Michael Faherty, a 76-year-old Irishman who burned to death in his home in December 2010. There were scorch marks above and below the body, but no evidence of any gasoline, kerosene, or other accelerant. The coroner, Ciaran McLoughlin, reported: "This fire was thoroughly investigated and I'm left with the conclusion that this fits into the category of spontaneous human combustion, for which there is no adequate explanation."



DID YOU KNOW?

What is a Caracal?



Most abundant in Southern Africa, the Caracal is often referred to as the African Lynx or Desert Lynx, but is not related to the lynx. It grows up to 1m (3ft) in length and the male weighs up to 18 kg. It can survive for long periods without water, obtaining its requirement from the metabolic moisture of its prey such as small buck, sand rats and rock hyrax.

Caracal means 'black ears' in Turkish. Large, tapering ears with five cm erect tufts of black hair, used for communication, are probably the most unique feature of this cat.