

TECHFOCUS

## Unraveling physics mysteries

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AT last after 20 years of preparation the mysterious ring is almost ready with its 1232 superconducting magnets to guide the protons at almost the speed of light. Yes, I am talking about the world's most powerful particle accelerator, LHC- the Large Hadron Collider, which is scheduled to switch on this month at CERN (European Centre For Nuclear Research), the world's largest particle physics laboratory, situated just west of Geneva on the border between France and Switzerland.

Physicists will then combine results from the LHC experiments with insights from their theoretical investigations to explore phenomena whose effects are only detectable at small distances and high energies.

The theory known as the Standard Model of particle physics describes all known matter and the forces through which it interacts. Experiments have thoroughly tested the Standard Model, and its basic ingredients are almost certainly correct. But the Standard Model cannot be the final word: it leaves open important questions about the origin of elementary particle masses and puzzles such as the relative weakness of gravity. The LHC will help to resolve these mysteries, and scientists all over the globe are busily preparing experiments they hope will provide answers to these questions. Perhaps the most exciting proposal for extending and completing the Standard Model involves additional hidden dimensions of space beyond the three dimensions with which we are all familiar: up-down, left-right, and forward-backward.

The premise underlying particle physics is that elementary particles constitute the building blocks of matter.

Peel away the layers, and inside you will always ultimately find elementary particles. Because of Einstein's  $E=mc^2$  equation, which states that energy (E) is equal to mass (m) multiplied by the square of the speed of light (c), we need high energies to create particles with big masses. The LHC will produce enormous amounts of energy that can then be converted into particles we would never find in any other way.

**The LHC**

The collider is contained in a 27 km circumference tunnel located underground at a depth ranging from 50 to 150 metres. The tunnel was formerly used to house the LEP an electron-positron collider. The 3 metre diameter, concreted tunnel actually crosses the border between Switzerland and

France at four points, although the majority of its length is inside France. The collider itself is located underground, with many surface buildings holding ancillary equipment such as compressors, ventilation equipment, control electronics and refrigeration plants.

The collider tunnel contains two pipes enclosed within superconducting magnets cooled by liquid helium, each pipe containing a proton beam. The two

Six detectors are being constructed at the LHC. They are located underground, in large caverns excavated at the LHC's intersection points. Two of them, ATLAS and CMS are large, "general purpose" particle detectors. The other four (LHCb, ALICE, TOTEM, and LHCf) are smaller and more specialised.

**Our achievements**  
21st century physics is still facing some burning questions. Physicists believe that they will be able to answer many of those ques-

Model of particle physics. It is the only Standard Model particle not yet observed, but plays a key role in explaining the origins of the mass of other elementary particles, in particular the difference between the massless photon and the very heavy W and Z bosons. So it is a particle of great importance.

Will the more precise measurements of the masses of baryons (In particle physics, the baryons are the family of subatomic parti-

cles which are made of three quarks. The family notably includes the proton and neutron, which make up the atomic nucleus, but many other unstable baryons exist as well.) continue to be mutually consistent within the Standard Model?

Do particles have supersymmetric ("SUSY") partners? Supersymmetry means every boson has a fermionic super partner Bosons are particles that transmit forces (photon, W, Z and graviton) and fermions makes up matter (electron, quark etc).

Why are there violations of the symmetry between matter and antimatter?

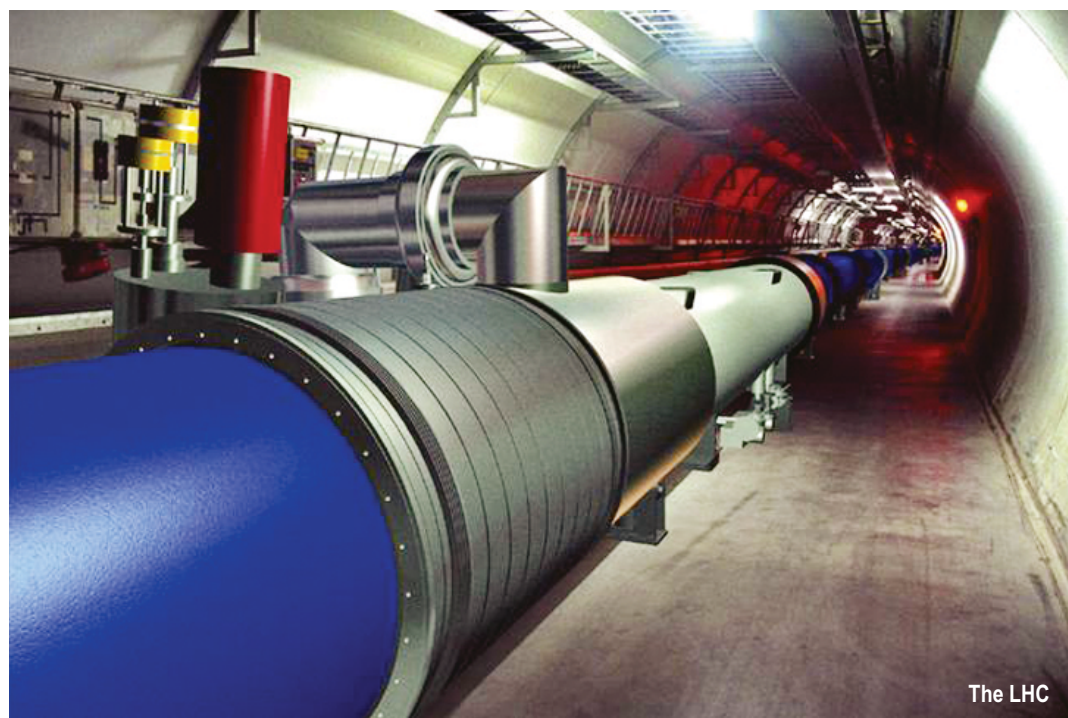
Are there extra dimensions, as predicted by various models inspired by string theory, and can we "see" them?

What is the nature of the 96% of the universe's mass which is unaccounted for by current astronomical observations which is called dark energy and dark matter and dark energy?

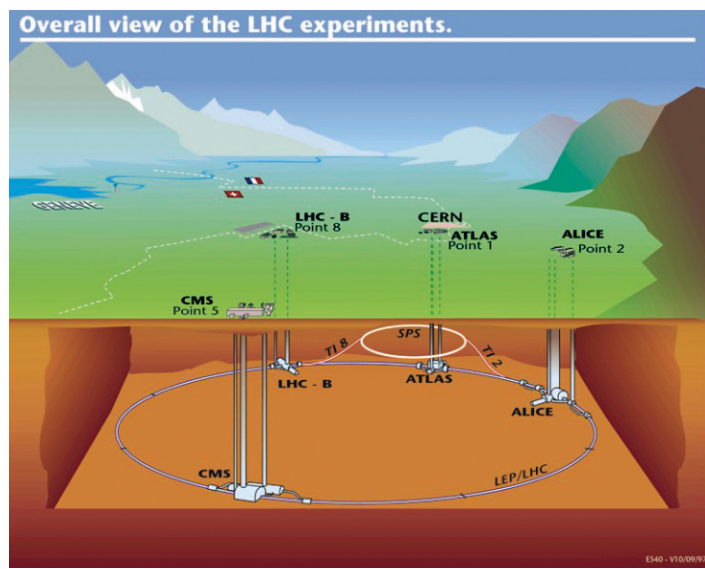
Why is gravity so many orders of magnitude weaker than the other three fundamental forces?

**Is it disastrous for earth and universe?**

References: LHC homepage at CERN ([www.cern.ch](http://www.cern.ch)), In search of god particle- BBC, symmetry magazine, April 2005, The longest journey: the LHC ([www.cerncourier.com](http://www.cerncourier.com))



The LHC



beams travel in opposite directions around the ring. Additional magnets are used to direct the beams to four intersection points where interactions between them will take place.

The protons will each have an energy of 7 TeV, giving a total collision energy of 14 TeV. It will take around 89 microseconds for an individual proton to travel once around the collider.

tions through the experiments which will be taken place in LHC. So the LHC is going to find:

Is the popular Higgs mechanism for generating elementary particle masses in the Standard Model violated? If not, how many Higgs bosons are there, and what are their masses? The Higgs boson is a hypothetical massive scalar elementary particle predicted to exist by the Standard

Compact Disc

A Compact Disc (CD) is an optical disc used to store digital data, originally developed for storing digital audio. In 1979 Philips and Sony decided to join forces, setting up a joint task force of engineers whose mission was to design the new digital audio disc. The CD, available on the market in late 1982, remains the standard physical medium for commercial audio recordings as of 2006. Prominent members of the task force were Kees Immink and Toshitada Doi. After a year of experimentation and discussion, the taskforce produced the "Red Book," the Compact Disc standard.



TECHNEWS

## Intel rolls out 'quad-core' processors

AP, San Jose

INTEL Corp., the world's largest computer chip maker, on Tuesday launched a family of chips with four computing engines inside a single micro-processor.

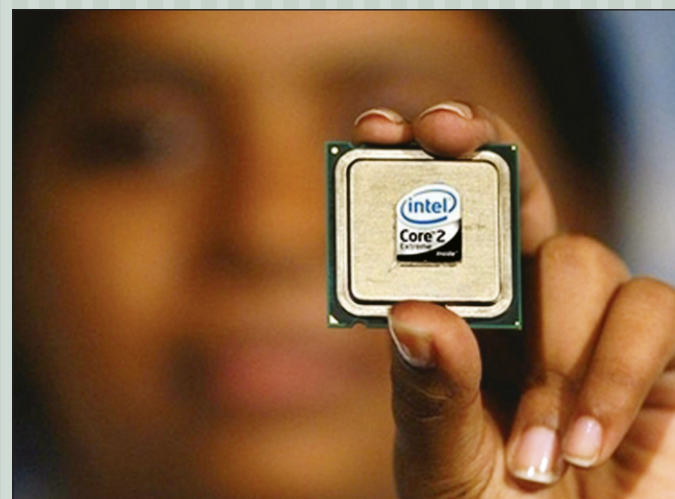
The "quad-core" processors, which boast improved performance over models with just one or two processing cores, could help the company win back market share lost to smaller rival Advanced Micro Devices Inc., analysts said. Processors with multiple cores can handle more complex jobs at once.

Intel rolled out four processors for servers under the Xeon 5300 branding, and another processor under the Core 2 Extreme series aimed at hardcore computer gamers, programmers and other people with heavy-duty computing needs.

The Core 2 Extreme chip is up to 80 percent faster than previous models, the Santa Clara-based company said. The Xeon 5300 chips use roughly the same power as previous generations while boosting performance as much as four times over single-core models.

Intel plans to release three more quad-core processors in the first quarter of 2007, including a more mainstream model for entertainment and multimedia uses under the name Core 2 Quad, and a Xeon processor designed for low-voltage uses and another for single-socket servers and workstations.

Intel, which is locked in a fierce battle for market share with



smaller rival Advanced Micro Devices Inc., had originally promised the quad-core chips for mid-2007 but earlier this year announced it was ramping up production, beating Sunnyvale-based AMD to market by several months.

AMD, which has been stealing market share from Intel with chips that reviewers said were cheaper and faster to run, has said it expects to launch quad-core processors for its Opteron product line by mid-2007.

The battle has had an impact on Intel's financial health. The company announced a massive restructuring in September that called for a 10 percent reduction in staff or 10,500 positions to save \$3 billion per year by 2008.

Intel executives hailed the quad-core launch as another key step toward reversing sinking profits and regaining lost market share. It also follows the launch

this summer of its Core 2 Duo microprocessors, which deliver as much as 40 percent better performance while consuming as much as 40 percent fewer watts than previous models.

"We're back we're running hard and setting the pace for the entire industry," said Pat Gelsinger, Intel's senior vice president. "I think of this as the exclamation point on a wonderful year of products."

AMD executives on Monday promised a smooth transition to quad-core chips while seizing on a major design difference between the two companies' chips.

Intel's design packages together two dual-core chips that plug into a single processor socket, while AMD's will integrate the processors onto a single sliver of silicon, a design that AMD claims will offer higher performance and power efficiency.

TECHNEWS

## Zune music player's slow first day

REUTERS, New York

DONNA Murphy is no fan of the ubiquitous iPod music player so on Tuesday she became one of the first to buy Microsoft's new rival Zune device.

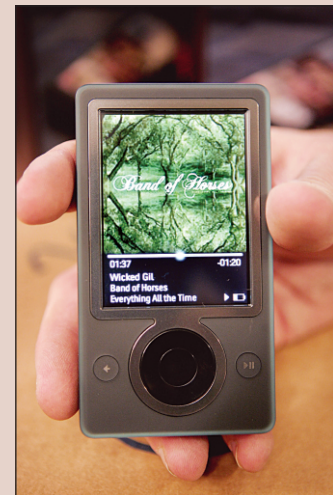
"I just needed a new MP3 player to play my music and watch videos," said Murphy, who bought a Zune at Best Buy's midtown Manhattan store. "I'm not an Apple fan, not an iPod fan. So I wanted to try something different."

Microsoft on Tuesday hit store shelves with Zune, touted in the media as the most likely candidate yet to challenge Apple Computer Inc.'s market-dominating iPod.

The world's largest software maker hopes to capitalize on consumers who may have wearied of the iPod, which has sold nearly 70 million devices and commands about 75 percent of the portable music player market.

But initial shopper interest suggested the Zune media player - heavily promoted in gadget reviews and television talk shows - was in for a slow building process.

An employee at the Best Buy store said two shoppers entered the place as it opened



and purchased Zune players, and that about 20 were sold within the first three hours.

Customers touched and tapped Zune players on display, asking employees about the differences between Zune and iPod.

However, at the Virgin Megastore in New York's Times Square two circular displays sporting Zune players with earphones attached were unmanned that morning, save for store employees restocking supplies.

**'NOT ABOUT THE FIRST GENERATION'**  
Microsoft itself has acknowl-

edged that the Zune investment may take years to bear fruit, and analysts upheld the expectation.

"Apple will not feel any bit of discomfort from Zune, certainly this holiday season and a good part of next year," said IDC analyst Danielle Levitas.

"Microsoft is going to put tons of money in this over time, much like they did with the Xbox" video game console, she said. "It's not about the first generation (of devices)."

Digital music players, also called MP3 players, let consumers save thousands of songs to a pocket-sized device. Models with color screens also display snapshots and play television shows and movies that are loaded from a computer.

Zune comes with a 30-gigabyte hard drive for saving music files and connects to an online music store called Zune Marketplace, which will compete with Apple's iTunes. The player sells for \$249, the same as an iPod with a similar-sized memory.

Gadget reviewers have criticized the device for being larger and heavier than the iPod, as well as describing its song download service as more complicated than iTunes.

PHOTOTECH



### BOT TASTES THE NEW BEAUJOLAIS

Japan's NEC System Technology researcher Kaori Kobayashi demonstrates the company's Sommelier Robot to determine the brand of wine with an infrared sensor and to give advice as to what dish would taste the best with it at NEC's laboratory in Ikoma city in Nara prefecture, western Japan, on October 3. Japan is set to crack open another record batch this year of Beaujolais Nouveau as even robots take part in the country's growing love affair with wine.

PHOTO: AFP

TECHNEWS

## Computer Source unveils CSM notebooks

STARTECH DESK

COMPUTER Source Limited has introduced its own brand of notebooks - the CSM Cheval recently, says a press release. CSM Cheval is one of the most price-competitive among the available notebooks with Core 2 Duo technology.

Currently there are five different models of CSM Cheval available in the market: CSM Cheval S62FP, SW1, SW1 with DVD writer, EL81 and the TW3M.

Standard configuration of CSM Cheval includes Intel Core 2 Duo Processor T2300, Hitachi 40GB HDD and Kingston

512MB RAM. The CSM Cheval S62FP, SW1 and SW1 with DVD writer have 14.1" non-glare displays while the CSM Cheval EL81 and TW3M have 15.4" display. Apart from CSM Cheval SW1 with DVD writer; all models of CSM Cheval come with Combo-drive. A key advantage of the CSM Cheval is that the customer can customize the processor, HDD and RAM component according to their requirements.

Price of CSM Cheval notebooks based on the basic configuration are ranged between Tk. 77,900/- and Tk.

82,400/-

