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**President CERN Council Visits Pakistan**

President CERN Council Prof. Maurice Bourquin visits Pakistan on 29th November. The purpose of his visit was to monitor the progress of projects running under CERN/Pakistan collaborations.

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**3rd Particle Physics Workshop**

NCP organizes the 3rd Particle Physics workshop in Islamabad scheduled on 08 - 11 March 2004, in collaboration with European organization for Nuclear Research (CERN) Geneva, Switzerland.

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**Visit of NCP student to Greece**

Almas Khan, a Ph.D. student visited Greece to participate the school on High Energy Physics by the University of Crete, Greece. There he attended the courses on Field theory, String theories, Supersymmetry and Grand Unified theories.

Details on Page 3

National Centre for Physics, Quaid-i-Azam University, Islamabad.
President CERN Council Visits Pakistan
President CERN Council Prof. Maurice Bourquin made his visit to Pakistan on 29th November 2003 which was concluded on 7 December 2003. The purpose of his visit was to monitor the progress of projects running under CERN/Pakistan collaborations. During his tour he meet with Prof. Atta-ur-Rehman (Minister In-charge for Science & Technology), he also visited different scientific research organizations like NCP (National Center for Physics), NESCOM (National Engineering and Scientific Commission), HMC-III (Heavy Mechanical Complex-III), PINSTECH (Pakistan Institute of Nuclear Science and Technology) and PIEAS (Pakistan Institute of Engineering and Applied Sciences).
He visited NCP on 2nd December 2003. Director NCP, Prof. Riazuddin presented a brief introduction of NCP, motives behind establishing NCP and future perspectives. Prof. Hafeez Hoorani introduced the research students and computing group working here to the Prof. Maurice Bourquin and told him about the current status of CERN Projects.

Particle Physics Workshop
NCP organizes the 3rd Particle Physics workshop in Islamabad from 08-11 March 2004, in collaboration with European organization for Nuclear Research (CERN) Geneva, Switzerland. The conference will comprise of three formal lectures in the morning and afternoon session will be available for exercises, question-answer and informal discussion. The following topics will be cover during the workshop:

- B Meson Physics.
- Physics Beyond Standard Model.
- Physics at Large Hadron Collider.
- Inflationary Cosmology and String Theory.
- Study of Gaseous Detectors.

Following Speakers will attend the workshop:

- Dr. Ahmed Ali DESY, GERMANY
- Dr. Guido Altarelli CERN, SWITZERLAND
- Dr. Daniel Denegari SACLAY, FRANCE
- Dr. Ansar Fayyazuddin STOCKHOLM, SWEDEN
- Dr. Gigi Rolandi CERN, SWITZERLAND

Registration Form for the workshop is available at:
www.ncp.edu.pk/docs/register.pdf
Visit of NCP student to Greece
Almas Khan doing Ph.D. with Prof. Riazuddin, attended the school on High Energy Physics. It was organized by the University of Crete, Greece from September 1 to November 1, 2003. The school was in two sessions. In the first session Prof. R. Woodard from the University of Florida and Prof. Tomaras from the University of Crete taught courses on Field Theory. A course on General Relativity and Brane World Scenarios was taught by Prof. Bakas from Patra University.

In the second session of the school there were courses on String theories, Supersymmetry, Grand Unified theories and experiments in High Energy Physics. Prof. Narain from ICTP, Dr. Carlo from CERN, Prof. Lazarides from Aristotle University, Prof. Lahanas and Prof. Paris Sphicas from Athens covered the second part. A broad spectrum of topics was covered in the second part. The speakers gave a detailed introduction of string theories and the various relation between these different types, called S and T dualities and also discussed the different unification schemes such as SU(5), SO(10) and Pati-Salam model (SU_c(4) x SU_L(2) x SU_R(2)). The problems with these unification schemes were discussed and the proposed solutions were mentioned.

Visitors from Egypt
Two visitors from Cairo University, Egypt, Momen Orabi, Assistant Teacher of High Energy Physics Laboratory, and Omar Ahmed Moussa, Teaching Assistant of Computer Science Department, came to NCP in the first week of December 2003 for two months. The purpose of their visit is to get the details of LHC experiment at CERN and Grid Computing Technology. Their visit to NCP is taken place under the collaboration between CERN/NCP/HEPL and their visit is financed by Egypt part of COMSATS. During their stay, they intend to interact with scientists, physicists and computing group working at NCP for the LHC Experiment.

GRID comes to Pakistan
NCP organized Pakistan’s first GRID Technology workshop on 20-22 October 2003 in Islamabad. The workshop was very well publicized in the local print and electronic media. CERN COURIER also published this news in its December 2003 issue with the heading “GRID Technology goes to Pakistan” by appreciating the technical efforts and their deemed aspirations in the new technologies. The complete article can be accessed at:

http://www.cerncourier.com/main/article/43/10/10
## CMS Production Update

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<th>Production Centre</th>
<th>CPUs</th>
<th>Disk Space (TB)</th>
<th>Network Connectivity (Kbps)</th>
<th>Assigned Events (K)</th>
<th>Total Generated Events (K)</th>
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## Recent Publications

1 - hep-ph/0307347 [abs, ps, pdf, other]
*Title:* Neutrino Mass Matrix with Approximate Flavor Symmetry  
*Author:* Riazuddin (NCP, QAU, Pakistan)  
*Comments:* 8 pages, Latex, The naturalness, finetunning and stability questions of the degenerate neutrino mass are discussed. The implications of the two models are considered in the paper for neutrinoless double beta decay are also discussed.  
*Journal-ref:* JHEP 0310 (2003) 009


2 - hep-ph/0304183 [abs, ps, pdf, other]
*Title:* Ward Identities, B→ρ Form Factors and |V_{ub}|  
*Author:* Amjad Hussain Shah Gilani (NCP, QAU, Pakistan), Riazuddin (NCP, QAU, Pakistan and KFUPM, Saudi Arabia), T.A. Al-Aithan (KFUPM, Saudi Arabia)  
*Journal-ref:* JHEP 0309 (2003) 065

Physics In 2003

**Cosmology**

In 2003, NASA unveiled the first detailed full-sky map of the cosmic microwave background the microwave "echo" of the Big Bang. Scientists created the map using data collected by the Wilkinson Microwave Anisotropy Probe satellite (WMAP) over a period of 12 months. The results provide further support for the inflationary Big Bang model of the universe and reveal when the first generation of stars was created.

The data indicate that the Universe is now about 13.7 billion years old and that the earliest stars in the universe were created just 200 million years after the Big Bang. The results also support the idea of , which is expanding ever faster rather than decelerating and flat universe is made up of 4% ordinary matter, 23% dark matter and 73% dark energy.

**Particle physics**

Finding the Higgs boson and various supersymmetric particles may be the top priority of most high-energy physicists, but that has not stopped several new particles turning up out of the blue at experiments in Japan, the US, Russia and Germany. The new particles, which could have implications for the Standard Model, came as a stunning surprise to the global particle-physics community.

The first new particle was announced in April, when physicists at the BaBar experiment at Stanford, California, reported evidence for a new D-meson that might contain four quarks - although this interpretation has not been confirmed.

Two months later the first evidence ever for a pentaquark - a particle with 5 quarks - was published by US researchers. This new particle was found to have two up quarks, two down quarks and a strange antiquark. Most other particles, in contrast, are either mesons - with a quark and an antiquark - or baryons, which comprise three quarks or three anti-quarks.

**Condensates**

A Bose-Einstein condensate is a novel state of matter in which all the atoms collapse into the same quantum state. A degenerate Fermi gas is the equivalent condensation for atoms that obey Fermi-Dirac statistics.

In July, physicists at Kyoto University in Japan said that they had observed Bose-Einstein condensation in a gas of ytterbium atoms for the first time. Ytterbium differs from most elements that have been condensed because it has two valence electrons rather than one and can be prepared in a non-magnetic state. Such novel condensates could be used in tests of fundamental symmetries.

A few weeks ago, Austrian and American researchers created a Bose-Einstein condensate of bosonic molecules from a gas of fermionic atoms. This breakthrough brings physicists closer than ever to the holy grail of ultracold atomic gas research - to observe superfluidity in a Fermi gas.
Physics In 2003

Quantum information
Researchers made much progress in 2003 towards creating a real quantum computer. "Qubits" - the quantum equivalents of ordinary bits - have been made with trapped photons, atoms and ions, but physicists would prefer to build real working devices with solid-state systems. This still remains a challenge.

In February, one group of physicists reported on "entangling" two qubits in a solid-state device for the first time, while a second team demonstrated a new type of superconducting qubit.

In August, a third group described how they created a logic gate using two electron-hole pairs - also known as "excitons" - in a quantum dot. Most importantly, the researchers showed that the quantum-dot system could behave like a controlled-NOT gate under certain conditions.

Magnetism
In 2003 saw cobalt enter the record books when a team of European physicists found that it has magnetic anisotropy energy (MAE) of about 9.3 meV per atom - the largest ever recorded to date. MAE controls the alignment of the atomic spins that give rise to magnetism in a material.

In contrast, samarium cobalt, which is a widely used permanent magnet, has a MAE of just 1.8 meV per cobalt atom.

Physicists also observed magnetic domain walls moving on subatomic length scales for the first time.

New superconductors
The physicists at the University of Tokyo have discovered a new superconductor made of potassium, osmium and oxygen. The work, which is yet to be published, describes a "pyrochlore" material – KOS₂O₆ - which has a superconducting transition temperature of 9.6 K and remains a superconductor in high magnetic fields.

Earlier in 2003, another group of Japanese physicists found that cobalt oxide could be transformed into a superconductor simply by adding water to it. Researchers suspect that the fundamental physics in both the high-temperature cuprate superconductors and cobalt oxide materials might be the same.

Laser-based nuclear transmutation
Physicists made history this year by showing that they can transmute radioisotopes with lasers. This breakthrough could prove vital for the safe storage and disposal of radioactive waste in the future. The researchers - from Strathclyde University, Glasgow University, Imperial College, the Rutherford Appleton Laboratory and the Institute for Transuranium Elements in Karlsruhe, Germany, showed that iodine-129 (which has a half-life of 15.7 million years) could be converted into shorter-lived iodine-128 using a laser-based source of gamma rays. Iodine-128 only has a half-life of 25 minutes.
Making the Grid transparent to users
A key objective of the ongoing EU Grid programme is to make available large-scale, distributed resources capable of solving complex processing problems. The environment, energy, health, transport and industrial design are all likely application areas. At the end of 2003 the Grid infrastructure is already a reality, interconnecting national research networks in Europe and across the world. Enabling this access is the task of the 1st GRIDLAB project, scheduled to deliver its results at the end of 2004. Lead by the Poznan Supercomputer and Networking centre (PSNC) in Poland, the 11 partners in GRIDLAB are working to provide Grid users with a simple and robust environment that allows them to develop applications capable of exploiting the full power and capacity of the Grid.

GridLab has already demonstrated Grid Application Toolkit (GAT), and its associated services successfully where users launched production quality Cactus simulations using MPI and Fortran to model the collision in space of two black holes. The purpose of the Cactus application is to study a variety of astrophysical phenomena including black holes, colliding neutron stars, singularities, gravitational waves and similar effects.

Intel Pushes Wireless LANs, Adds Support for 802.11.
Intel Corp. has updated the wireless LAN technology for its Centrino line of notebook computer chip sets. The Santa Clara, California chip introduced the Intel PRO/Wireless 2200BG, a connector for Centrino that supports both 802.11b and 802.11g wireless LANs.

The Intel PRO/Wireless 2200BG network connection consists of a communication and radio chip, both designed and developed by Intel at its wireless networking facilities in Haifa, Israel, and San Diego, Calif. Previous Centrino radios have been manufactured by Philips Semiconductor, which cast some industry doubts about Intel's wireless expertise.

Broadcom and Atheros also offer chipsets that support 802.11a, which offers the speeds of 802.11g, but in a less crowded frequency band. (802.11g runs in the same band as 802.11b, meaning it is backward compatible with existing 802.11b networks.) Intel plans to offer an 802.11a/b/g Centrino radio later this year.

The Intel PRO/Wireless 2200BG will start appearing in notebook PCs throughout the first quarter of 2004. Companies planning to include the connector include Fujitsu Ltc., Matsushita Electric Industrial Co. Ltd., NEC Corp., Sony Corp. and Toshiba Corp. In 10,000-unit quantities, the wireless component will cost $25.

Scheduled for release in mid-February, around the time of the chip maker's Intel Developer Forum, officials pushed the release into the second quarter after a series of validation tests revealed problems that would have affected how the chip was manufactured.

http://www.eweek.com/article2/0,4149,1439099,00.asp
AMD put antivirus tech into chips
AMD technology contained in AMD's Athlon 64 chips, prevents a buffer overflow, a common method used to attack computers. A buffer overflow essentially overwhelsms a computer's defense systems and then inserts a malicious program in memory that the processor subsequently executes. With Execution Protection, data in the buffer can only be read and, therefore, is prevented from doing its dirty work.
In current processors, any programs that go into the memory overflow can be executed. With this, the system only allows read-only in the buffer. It will not execute. The malicious program is then disposed harmlessly when the PC is turned off.
The circuitry is already inside existing Athlon 64 chips, but it can't be activated yet. That will occur when Microsoft releases Service Pack 2 for Windows XP early in the second quarter of 2004.
Security problems have become a multibillion-dollar problem and show few signs of abating. These sorts of technologies could undercut one of the more severe headaches out there, Morris said.
A number of damaging worms from last year relied on buffer overflows. Around 50 percent of the Windows security updates from Microsoft in the last two years may have been rendered. The first full-fledged 64-bit programs for the Athlon 64 will appear first quarter of 2004.


New chip gives PCs supercomputing muscle
A computer chip that will enable personal computers to perform some calculations as fast as some supercomputers developed by ClearSpeed Technologies, based in California, the CS301 chip is capable of 25 gigaflops - 25 billion "floating point" calculations per second. These arithmetical calculations are also a common measure of computing power.
A desktop Pentium processor operates at a few hundred million flops, while some of the most powerful computers in the world operate at few hundred gigaflops. Putting around 20 ClearSpeed chips into a few personal computers could potentially provide the sort of power normally only found in a supercomputer built from hundreds of parallel processors or specialised hardware.
The CS301 works as a supplementary component to a regular processor. A chipset carrying one or two of the chips can be plugged into a normal PC like a graphic card and perform intensive calculations on behalf of the machine's normal processor. The chip is also very power-efficient, consuming only three watts and ClearSpeed is working on a version for laptop computers.