



Nos 30 & 31 – 27 July & 3 August 2011

Measuring past a micron...



A word from the DG



The start of the harvest

The first major particle physics summer conference has just started this week in Grenoble. After the Quark-Matter conference, the Europhysics Conference on High-Energy Physics marks the start of a promising harvest for the LHC experiments.

For the first time, the collaborations will be presenting their latest results based on all luminosity taken until end of June, which will provide more precise measurements in many areas.

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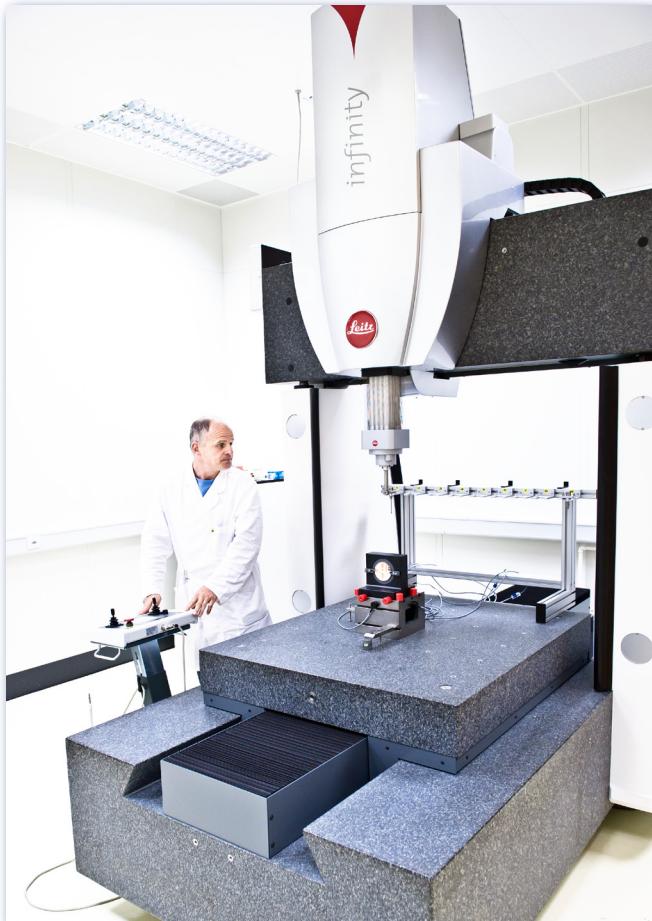
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Infinity, the new, ultra-precise, measuring machine, is currently in operation at the CERN Metrology Service.

The CLIC (Compact Linear Collider) radiofrequency structures will operate under very high electric fields (100 MV/m). They should be manufactured within minimal mechanical tolerances. To validate the quality of these components, they have to be measured with a precision that far exceeds the machining tolerances, i.e. 0.3 microns. No "ordinary" measuring machine can achieve this precision, but Infinity, the newly developed high-

Infinity: That is the name of the new ultra-precision machine used by CERN's Metrology Service to measure the copper components for the CLIC accelerating structures. This project is the result of a collaboration between CLIC and the EN Department. Curious to find out more? Read on because there'll be an opportunity for you to get a very close look at *Infinity!*

precision three-dimensional measuring machine in service at CERN since January can do just that.

Specially adapted by the manufacturer Leitz to meet CERN's requirements, this machine has several trump cards. To counteract vibrations transmitted through the ground, the 7.5 tonne Infinity sits on three vibration dampers. "The entire structure of the

(Continued on page 2)



Measuring past a micron...

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machine has been designed to minimise distortions: the base is made of granite, the gantry of steel and the measuring axis is ceramic," explains Ahmed Cherif, responsible of the metrology service within the MME Group of the EN Department. "And the various mechanical parts move without making contact."

Once a component has been placed on a support adapted to its geometry and after a series of tailor-made checks, it is measured by an arm tipped with a sapphire, silicon nitride or diamond ball called a "probe". Attached to the machine's measuring head, the probe moves in three dimensions. "When it comes into contact with the component, it sends the precise coordinates of its point of contact via optical rulers," explains Ahmed Cherif. These rulers are in vitroceramic and have an expansion coefficient close to zero and a resolution of 4 nm. They make a substantial contribution to Infinity's exceptional performance.

Although the machine itself is one of Leitz's standard products, its head is unique and is the result of a close collaboration between CERN and the manufacturer. "When the probe is in contact with a component, it exerts pressure on it. These pressure points leave marks which may damage the component and reduce its performance once it is installed in the accelerator," explains Germana Riddone, who is in charge of the fabrication of radio-frequency structures for the CLIC project. To minimise such marks, which are of the order of a few nanometres, the core of the head floats in a bath of viscous oil, which dampens the slightest movement. The contact pressure of this new head is a factor 50 times lower than that of an "ordinary" measuring head.

In order to protect Infinity from any external disturbance, the EN Department has conceived a very special environment. Thus it

has been installed in a room in which the humidity and the temperature are kept under close surveillance. As Ahmed Cherif further explains: "In this environment, the temperature variations do not exceed 0.2°C per hour, 0.4°C per day and 0.1°C per metre." Installed in its closely monitored environment, Infinity will operate almost non-stop in the next few years because it will have to measure several hundred components produced by different European manufacturers. "With this machine, we shall be able to test various ultra-high precision machining techniques. It will help us to extend the collaboration between CERN, CLIC, and industry," adds Said Atieh, who is in charge of machining the components.

We wish this record-breaking machine a long and successful career and invite those interested to come and see it at the metrology laboratory (see below). The Bulletin would like to thank the Metrology Service for this open invitation.

Anaïs Schaeffer

Watch the slideshow about the facility at:

<http://cdsweb.cern.ch/record/1365462>

Details of the visit

For those wishing to see Infinity and visit the metrology laboratory, you will have the possibility to sign up either for a visit on August 18 at 10:00 or a visit on September 20 at 15:30. Note that the visit is only open to CERN access-card holders.

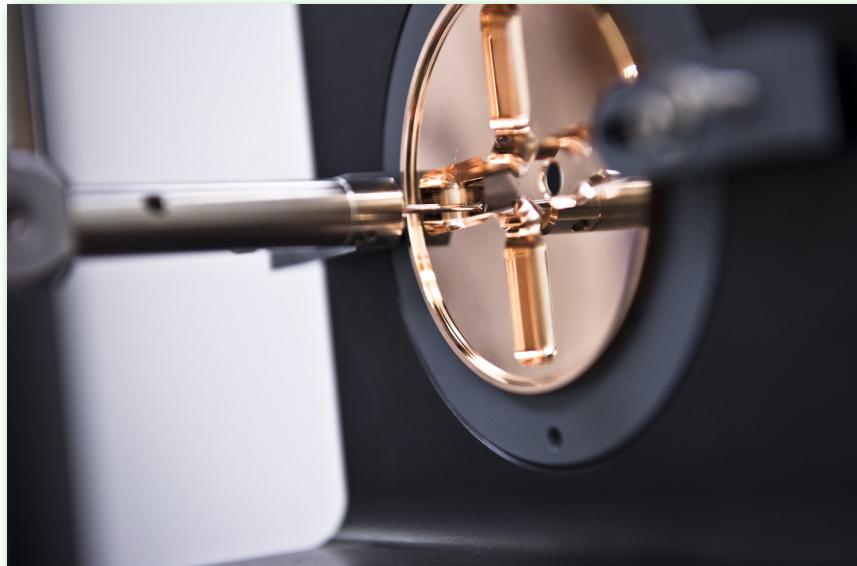
The visit will include:

- an introduction by the experts, lasting about 15 minutes,
- a tour of the premises and the machines lasting about 15 minutes,
- a few minutes for questions.

The number of participants is limited to 10. Don't hesitate to sign up because even if the maximum number of participants is exceeded we can still contact you if people drop out or we organise another visit.

Sign up for the 18 August visit here:

<http://indico.cern.ch/conferenceDisplay.py?confId=145778>



One of the copper pieces from CLIC measured by Infinity.

LHC Report: Rocky Recovery

The cryogenics team had the entire ring cold by Saturday morning and the usual post-technical stop tests with circulating beams started soon after. Unfortunately, they were interrupted by a major perturbation to CERN's electrical network caused by an impressive thunderstorm that swept over the Pays de Gex. There were major knock-on effects, including the loss of cooling to the cryogenics and an inevitable recovery period once normal service had been re-established. The beams were circulating again by Tuesday afternoon and the post-technical stop checks continued, beefed up with further tests to address a number of issues related to the power cut.

Before the stop, the LHC had managed to get 1380 bunches per beam into collisions and the plan was to ramp back up relatively quickly to this level via fills with 48, 264, and 840 bunches per beam. 48 and 264 bunches passed off reasonably

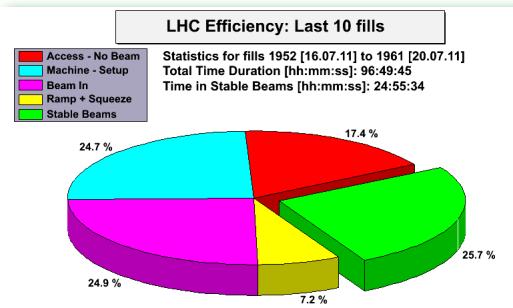
The last technical stop finished on Friday 8 July, but the machine returned to its pre-stop performance level over a week later.

smoothly. However, 840 bunches proved more difficult with three consecutive fills lost at high energy due to UFOs.

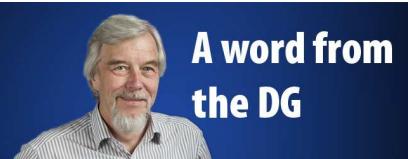
UFOs are a regular feature of operation and they sometimes appear in bursts around one hour after the injection process. Usually these UFOs generate losses below the dump threshold, but following the stop they were stronger than usual. Operations opted to wait at 450 GeV for an hour to let the UFOs pass before ramping and this allowed for three fills - one with 840 bunches and two with 1092 bunches - that led the way back to physics with 1380 bunches. The evening of Monday 18 June saw a 1380 bunch fill go into 'Stable beams' with an initial luminosity of between 1.4 and $1.5 \times 10^{33} \text{ cm}^{-2} \text{ s}^{-1}$ – another new record. The UFOs have since quieted down.

With 1380 nominal bunches, the LHC is now dealing with around half design intensity. There are ongoing issues with UFOs, the effects of radiation on electronics, vacuum activity and so on. Mitigating these effects and learning to live with high intensity is all part of the process, and the current aim is to re-establish stable conditions and realize the potential of the machine to deliver some serious integrated luminosity.

Mike Lamont for the LHC team



Efficiency of LHC fills between 16 July and 20 July, 2011.



A word from the DG

(Continued from page 1)

The start of the harvest

Thanks to the excellent performance of the LHC, the experiments have already accumulated a substantial quantity of data allowing them to push back the known limits and refine measurements in many fields ranging from b physics to the search for the Higgs boson and for dark matter. At the time of writing, the LHC collaborations are about to present these new results in an energy range which has never previously been explored.

I have congratulated all the teams involved in getting the LHC into operation in record time with great efficiency. Today I would like to acknowledge the tremendous work of the experimental physicists who have succeeded in finalising analyses of recently collected data within an unprecedented short period of time.

The collaborations have pulled out all the stops right up to the last minute in order to firm up results for presentation at this conference. This is a remarkable achievement, made possible also by the excellent performance of the Computing Grid.

The majority of the results that are being presented this week might not be regarded as spectacular by the general public. But for physicists, a decimal place in a precision measurement or pushing back limits on new physics represents a significant achievement. These tiny building blocks of knowledge also lead to the gradual accumulation of new scientific knowledge. This long and painstaking work is absolutely essential. It is important that we take account of this difference in perception and address it.

Furthermore, while these results are already very interesting, they provide sound bases for the discoveries to come. The data analysed so far corresponds to one tenth of the total quantity of data that we hope to collect by the end of 2012. Our field of physics, which focuses on very rare phenomena, requires high statistics. So we'll have to wait a bit longer to obtain definitive answers on, for instance, the Higgs boson, or to identify and understand signals pointing to physics beyond the Standard Model such as supersymmetry. I am confident that spectacular discoveries will emerge. For the time being, the physicists are patiently continuing to collect and sort data, and to bring in the harvest.

Rolf Heuer

ELENA prepares a bright future for antimatter research

The Antiproton Decelerator (AD) is CERN's widely recognized facility for the study of antimatter properties. The recent successes of the AD experiments are just the latest in a long list of important

scientific results that started with LEAR (Low Energy Antiproton Ring). The scientific demand for low-energy antiprotons at the AD continues to grow. There are now four experiments running there (ATRAP, ALPHA, ASACUSA and ACE); a fifth, AEGIS, has been approved and will take beam for the first time at the end of the year. Further proposals are under consideration. Thus, CERN's

At its recent session in June, the CERN Council approved the construction of the Extra Low ENergy Antiproton ring (ELENA) – an upgrade of the existing Antiproton Decelerator. ELENA will allow the further deceleration of antiprotons, resulting in an increased number of particles trapped downstream in the experimental set-ups. This will give an important boost to antimatter research in the years to come.

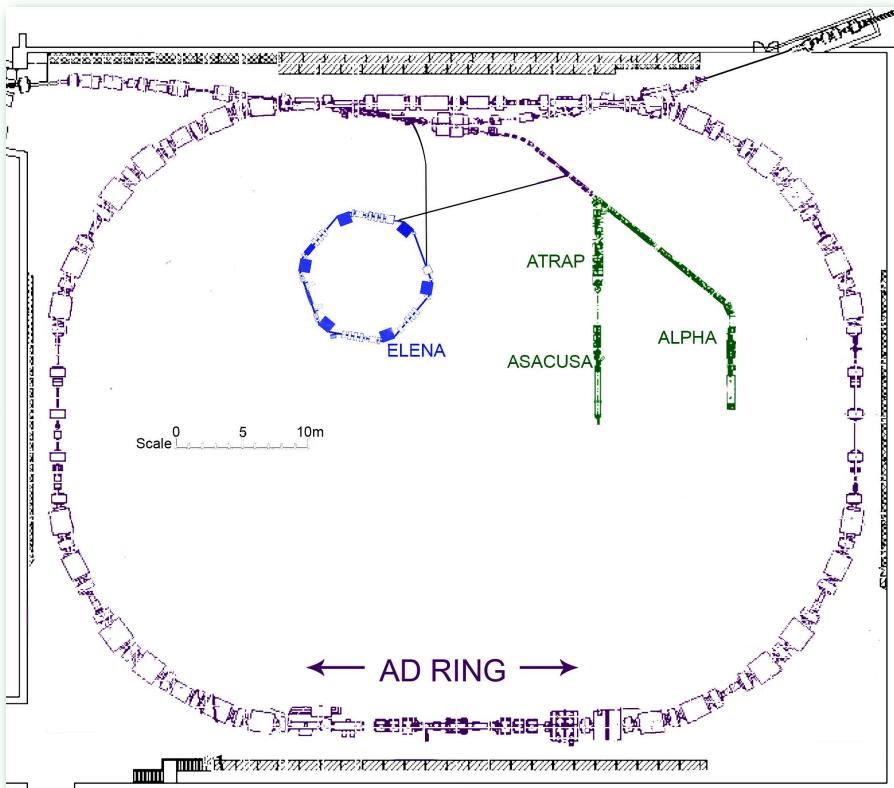
unique Antiproton Decelerator can no longer provide the number of antiprotons needed. As antihydrogen studies evolve into antihydrogen spectroscopy and gravitational measurements, the shortage will become even more acute.

The solution is a small magnet ring that will fit inside the present AD hall – ELENA,

the recently approved upgrade of CERN's antimatter factory. ELENA – a 30 m circumference decelerator – will slow the 5.3 MeV antiprotons from the AD to an energy of just 100 keV. Receiving slower antiprotons will help the experiments improve their efficiency in creating antimatter atoms in order to study their properties. In today's set-up, about 99.9% of the antiprotons produced by the AD are lost due to the experiments' use of degrader foils needed to further decelerate them from the AD ejection energy down to around 5 keV, the energy needed for trapping. ELENA will bring a 10 to 100-fold increase in the experiments' efficiency, as well as the possibility to accommodate an extra experimental area.

The new ring is located such that its assembly and commissioning will have a minimal impact on the current AD operation. In fact, the commissioning of the ELENA ring will essentially take place in parallel with the present physics programme, with short periods dedicated to commissioning during the physics run. The AD experimental area layout will not be significantly modified, but the much lower beam energies require the design and construction of completely new electrostatic transfer lines.

The construction of ELENA should begin in 2013, and the first physics injection should follow about 3 years later. The initial phase of the work will include the installation and commissioning of the ELENA ring while using the existing AD beam lines. The old ejection lines in all the experimental areas will then be replaced by the new electrostatic beam lines that will deliver antiprotons at the design energy of 100 keV. In its final configuration, ELENA will be able to deliver beams almost simultaneously to four experiments, resulting in a vital gain in total beam time for each experiment.



Layout of the AD experimental hall: the Antiproton Decelerator ring (the large ring); the ALPHA, ASACUSA, and ATRAP experiments; the ACE experiment (not pictured); and the new ELENA ring (the small ring).

CERN Bulletin

Strengthening the link between science and society

"We need to get away from talking like the dense books we read, and start speaking in 'normal' language," said one of the delegates during the round table. The 19

high-ranking delegates from UNESCO, DOE, WHO, WMO, and OECD – to name but a few – sat over coffee and a working lunch, sharing ideas and opinions in a deliberately informal setting.

Are the benefits of science being appropriately communicated to decision makers? How will basic research cope during these tough economic times? How can the applications of scientific research be more firmly

On Friday 8 July, the lifts in the Main Building filled with directors-general, assistant directors-general, chiefs of staff, and secretaries-general from a veritable alphabet soup of international organisations. They were heading to a round-table discussion about science and society, chaired by CERN Director-General, Rolf Heuer.

linked to basic scientific research? Delegates jumped from topic to topic: from the financial pressure faced by basic research to issues related to climate research. No topic was off-limits, although the DG encouraged delegates to focus on the concerns shared by everyone in the scientific world.

The impetus behind the session came from the CERN DG's address to the UNESCO Science Commission back in 2009. Heuer

described the goal to present the activities of the Organization, its results (fundamental or applied), and its impact in a more effective way to the various sections of society, including policy-makers. "I am firmly convinced that investing in fundamental science is essential and profitable not only for the cultural growth of humankind, but also for the progress of society," he'd said, "without fundamental research there is no science to apply."

Along with calls for a follow-up session, delegates ended the afternoon with two concrete suggestions: organizing a World Science Day, and naming a science ambassador to the United Nations.

Katarina Anthony

BlogForever: Intelligent Blog Preservation

The BlogForever project (<http://blogforever.eu/>) will gather blog content into a safe-guarded, online archive, turning the once temporary into a well-preserved resource. The project is scheduled for completion in 2013, with partners spread across 12 different companies, universities and research organisations, including CERN. While the CERN team is primarily involved in the technical aspect of the project – designing and implementing

A new EU co-funded project, BlogForever, has set its sights on a developing region of the Internet: the blogosphere. With society growing ever more online-oriented, blogs have become rich repositories of cultural, scientific and social information. The BlogForever software platform is designed to manage and distribute this content and preserve it for posterity.

the repository – it will also contribute to the preservation guidelines that will be used to choose what content will be kept.

"Building on the success of Invenio, the digital library software used by the CERN Document Server, the BlogForever software

platform will improve upon our established system," explains Jean-Yves Le Meur, CDS service manager and BlogForever CERN team leader. "In addition, by archiving high-energy physics blogs we will increase the amount of 'casual academic' information at our disposal." High-energy physics blogs have become a valuable source of information for practising physicists; they are venues for discussion and sharing without the formalities of publication.

As well as acting as a digital archive of blog content, BlogForever will also make the repository searchable. "It is often challenging for users to find and access the blog content they are looking for," explains Nikos Kasioumis, who holds a CERN fellowship and is leading the BlogForever software infrastructure work package. "BlogForever software will focus on making this content accessible after only a few clicks, capturing the dynamic and continuously evolving nature of blogs and their developing social structure."

Help shape the digital repository: share your blogging experiences by filling out its online survey. "With the help of bloggers and blog readers, we'll be able to develop a repository that is comprehensive and meets user requirements," says Le Meur. The survey is available in 6 languages and will be online until 8 August.

Katarina Anthony



Looking at CERN from a different perspective

Recently, Jérôme Wohlschlag featured CERN in his dissertation for his Master's degree in architecture at the Ecole Polytechnique Fédérale de Lausanne. Developed with the help of Professor Franz Graf's

TSAM Laboratoire des Techniques et de la Sauvegarde de L'Architecture Moderne, Jérôme's project focused on the preservation and extension of CERN's 'Main Buildings', which were designed and built in the late 1950s by major players in modern Swiss architecture. "Using Peter and Rudolf Steiger's drawings of the first stages of construction, I was able to show that the site has great potential for rehabilitation," he says. "The project revealed a previously unrecognized architectural heritage, and basing construction on these first stages allowed us to propose expansion that meets current architectural requirements."

The CERN site, with its multi-flavoured buildings and unorthodox layout, can seem daunting. "At first, the site was a mysterious labyrinth to me," explains Jérôme. "But as I started studying the history of its urban and architectural planning, it became more familiar and I was able to appreciate the

Although the vast majority of students at CERN study and work on projects in the physics, engineering or IT fields, there are some who come to use CERN as a subject to complement their research in other fields. Larissa Kuchina, a graphic design student, and Jérôme Wohlschlag, an architectural student, completed their degrees and their dissertations on unusual aspects of the Laboratory. Both offer valuable perspectives that are not necessarily the ones we usually encounter.

quality of the original construction." But becoming comfortable with the CERN site is often something that only comes after years of experience.

Larissa Kuchina, however, has provided a possible solution to this problem with a diploma project to complete her Bachelor's degree at the Geneva University of Art and Design. Using fundamental particles – the smallest entities in the Universe – as a starting point, she has proposed 'CERN. Signage and Identity', a new system to both establish identity at CERN and help navigate the confusing maze of workshops, experiments and administrative buildings on the site.

"In graphic design, the smallest entity is the visible point, so I decided to translate the particle into a point to make something invisible into something that is visible and more human," she says. "It is the fundamen-

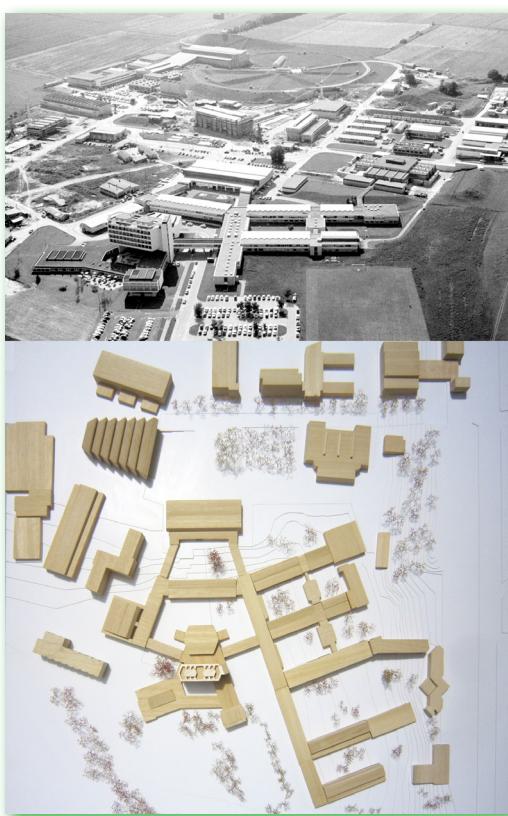
tal particles studied at CERN that create the structures we see all around us, so I designed a pattern comprising different-sized points as the basis for each graphical feature." This pattern forms the background for each of the elements of the way-finding system that Larissa has proposed be erected around the Meyrin and Préressin sites.

Each proposed element refers to a redesigned map that allows visitors and staff to locate buildings with greater ease. "I worked a lot on the CERN map, because it is essential to finding your way around at CERN," Larissa explains. "I made it more legible and clear by dividing the Meyrin site into 5 different zones and by colour-coding these zones according to function."

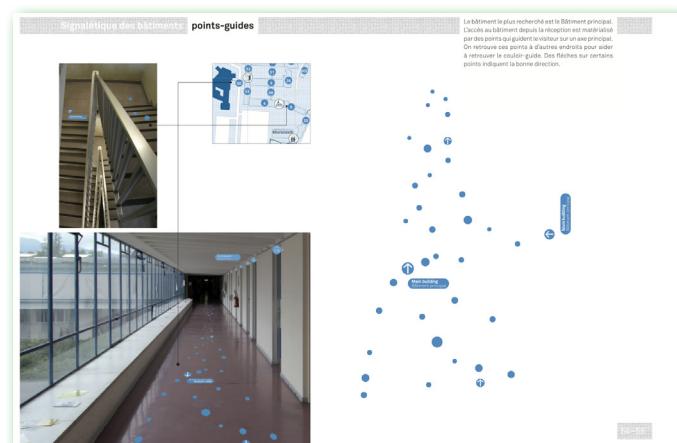
She also proposed an alternative to the 'Black Line' that guides visitors from the Reception to the Main Building – a 'beam' of small blue particles and arrows painted on the floor that keeps visitors on track between the two points.

Creativity is a common feature of many young students. Whatever their specific field of activity and whatever their professional future, they all have the potential to bring a fresh breeze of novelty to our Lab.

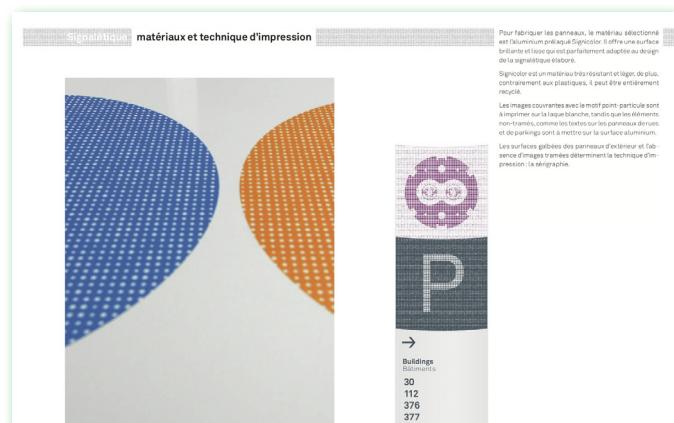
Jordan Juras



Top: Aerial view of the CERN site in 1961 (CERN archive).
Bottom: Photo of the Master's project model.



The dotted 'beam' as seen in the press hallway (Building 50).



An example of a way-finding element that would appear around the CERN site.

The Google Science Fair winner comes to CERN

Despite her young age, Shree Bose is already an experienced researcher.

Indeed, she has already been awarded prestigious prizes in various science fairs and competitions. Aged 17, she found a way to improve ovarian cancer treatment for patients when they have built up a resistance to certain chemotherapy drugs.

The project won the Grand Prize at the Google Science Fair, and together with an amazing 10-day trip to the Galapagos Islands with National Geographic Expeditions, she also won a trip to CERN. "Shree will visit several experimental sites here and will sit next to our physicists and engineers, in the CCC and the Control Rooms, learning every aspect of experimental physics and our quest to discover the mysteries of the Universe," says Silvano de Gennaro from the Communication Group, who is in charge of preparing an interesting visit programme for her.

Shree hopes to visit CERN when the LHC is in operation: "I'm so excited to have the

Shree Bose, the Google Science Fair Grand Prize winner, will come to CERN for a three-day internship. She is looking forward to it and hopes to sit in the CERN Control Room, and to learn more about ALICE and in general the work going on here right now.

opportunity to travel to CERN and actually see something that most people only talk about - namely the Large Hadron Collider.

Silvano mentioned that if the LHC was running at the point when I visit, I might be allowed to sit in the Control Room with the physicists and understand the procedures and what would be going on. Personally, I think that would be such an incredible, once-in-a-lifetime experience and, as of yet, it's pretty much my dream for visiting CERN."

CERN Bulletin



Google Science Fair winners Lauren Hodge (left) Shree Bose (middle) and Naomi Shah (right). (Image Copyright Google)

First 'Gentner Doktor' finishes PhD at CERN

Marcel Schuh became a Gentner student in April 2008, after completing a physics degree in 2007 at the University of Heidelberg. His thesis allowed him to gain exposure to CERN and the LHC, as he

In 2007, the CERN Doctoral Student Programme saw the addition of the Gentner Doctoral Student Programme, named in honour of the celebrated nuclear physicist, Wolfgang Gentner. Four years later, on 22 June 2011, Marcel Schuh finished his PhD with a thesis in the field of accelerator technology and became the very first 'Gentner Doktor'.

worked on monitoring and control systems for trigger and readout electronics on the ALICE detector at the LHC. With the support of university supervisor, Carsten P. Welsch, Schuh applied for a Gentner Doctoral Studentship on the Superconducting Proton Linac (SPL) project. "My task was to evaluate whether dedicated higher order mode (HOM) couplers are needed in the superconducting cavities to ensure stable operation under various conditions," explains Schuh. "I was a member of the BE-RF-LR group and today I am still involved as a project associate. My supervisor, Frank Gerigk, did a fantastic job."

Doctoral Student Programme. "The programme is a unique opportunity to benefit from a high-level education at one of the world's leading institutes in accelerator science and technology," says Schuh. "The key to the success of the programme is Michael Hauschild, who put in a lot of effort in order to set it up, get it funded and continuously improve it."

Schuh began a new position as a research associate at the Karlsruhe Institute of Technology (KIT) on 1st April 2011 and is currently working on beam physics at ANKA, a synchrotron light source in Karlsruhe.

Jordan Juras



Marcel Schuh, first 'Gentner Doktor', celebrates completing his PhD. (Photo by Carsten P. Welsch)

In early 2007, only two German doctoral students were part of the CERN Doctoral Student Programme, but today the Gentner programme has given rise to a total of 35 doctoral students at CERN entirely funded by Germany, plus an additional six German students funded by the regular CERN

Product Lifecycle Management: CERN to host an important international conference

PLM is the activity of managing, in the most effective way, an organisation's products all the way through their lifecycles: from the very first idea for a product until it is retired and disposed of. In addition to the product, PLM also addresses the management of the documents and data related to the product itself, as well as all the processes, IT

systems, people and techniques involved throughout the product's lifecycle, from the very first idea to its disposal.

At CERN, the development of the Engineering & Equipment Data

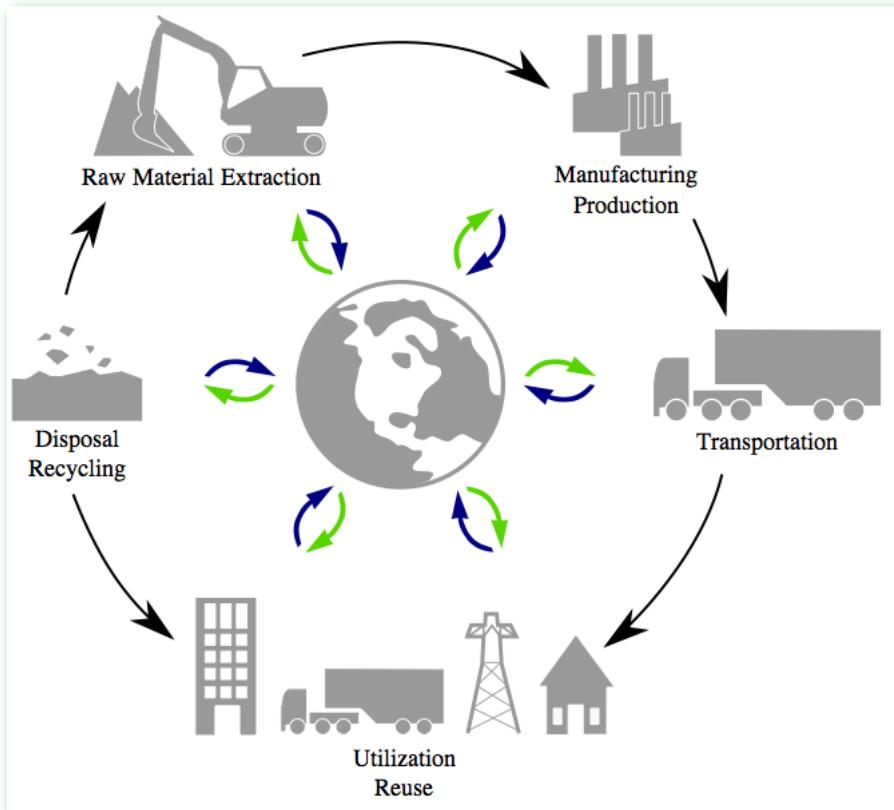
CERN designs, builds and operates machines that contain millions of items of many types, such as software, electronics, and electrical, mechanical and chemical components. It is a challenge to maintain a coherent configuration of everything that has been developed and installed. To do this, CERN developed the EDMS system – an integrated Product Lifecycle Management (PLM) platform that enables management of all the information related to the entire lifecycle of each single component. On 5 and 6 September CERN will host an international PLM conference at which participants will exchange experience and address how best to apply PLM in their organisations.

Management System (EDMS) began in 1997, in particular for support of the LHC. Today, the General Services (GS) Department is in charge of EDMS, and the GS-ASE Group is responsible for support and development. Thousands of people use EDMS, and it con-

tains information about hundreds of thousands of products, components and parts throughout their lifecycle. Many people use it to manage data from CAD systems such as CATIA and AutoCAD. Others use it for office documents created in applications such as word processing, spreadsheets and project management. These documents may address a wide range of subjects such as risk management and safety procedures. All of these are part of PLM. Initially much of the information in EDMS was related to the design of the LHC. In recent years, the information has been increasingly related to operation and maintenance activities. With little time available for maintenance, it's important that exactly the right information is available for maintenance activities so that they are carried out as effectively as possible and don't result in accelerator downtime.

PLM is not just important at CERN. It's become very important for organisations all over the world in the last few years for several reasons. Organisations have to deal with huge volumes of product data. Often the development and production of a product is spread over multiple sites in different countries. Many changes are made to products during their lifecycle to adapt them to particular customer or country requirements. These changes have to be managed correctly, otherwise they will lead to problems. Last but not least, there is an increasing number of regulations with which products must comply.

The September conference will allow participants to exchange experience and help them identify best practices on how to apply PLM in their organisations. In addition to presentations by renowned speakers from numerous organisations and companies, the conference will feature an exhibition, which will enable attendees to see existing PLM solutions in action and find out about new PLM research and development activities. If you are interested in participating in the conference, please visit the dedicated website where you will also be able to register.



Pictogram representation of a typical product lifecycle. Picture by the National Institute of Standards and Technology's Manufacturing Engineering via Wikimedia Commons [Public domain].

CERN Bulletin

CERN takes over the EIROforum Chairmanship

Founded in 2002 to "serve European science", the EIROforum partnership today includes eight

European intergovernmental research organisations - CERN, EFDA-JET, EMBL, ESA, ESO, ESRF, European XFEL and ILL - that cover a wide range of scientific disciplines and have several organisational models and different member states. This diversity has allowed informed debates about almost all areas of importance for the European Research Area and has also meant that the partners, speaking as a group, have been able to legitimately express their views on a whole range of science policy issues with a voice to be heard.

Over the years, a dual function of EIROforum has emerged: on the one hand as a platform for high-level interaction in European science policy, on the other hand as a framework for increasingly intense and valuable cooperation among the partners, e.g. in the fields of training, IT, scientific instrumentation, knowledge sharing, and outreach and education. "Our main priorities broadly align along two main axes: EU-relations and joint activities," said Rolf Heuer, CERN Director-General in a letter to the members of the EIROforum Council. "For the former we need to ensure that our voice continues to be heard in the ongoing preparations for the next Framework Programme (Horizon

On 1 July 2011, CERN took over the chairmanship of EIROforum for a period of one year. The EIROforum calendar of activities for the period of the CERN chairmanship includes the organisation of many events and the launch of new initiatives.

2020) and discussions with EU and Member State decision-makers. When it comes to EIROforum activities, I would like to adopt a more strategic approach to our work in common and our relationship with the European Research Area. This process must include a review of the thematic working groups to ensure that we have the right groups in place to achieve our common objectives. We should also review our current and past activities. For example, I would like to investigate the possibility of reintroducing the joint science conferences that we held during the early years of EIROforum."

Given the challenges that EIROforum is preparing to face, the calendar is rich in activities for the year of CERN's chairmanship. They include participation in the European Contest for Young Scientists (EUCYS) in

Helsinki; the Career Development Symposia for Young Scientists in Heidelberg and Geneva; the organisation of the EIROforum Teachers' School in Grenoble; the organisation of topical workshops on instrumentation; participation in careers fairs; and preparations for the Euroscience Open Forum 2012 (ESOF) in Dublin.

"CERN takes its responsibility as chair very seriously, but EIROforum is a partnership and the contribution from all EIROS is vital to our success," said the Director-General. "With the CERN team in place, I look forward to a fruitful and exciting year for EIROforum. I am sure that, with the constructive participation of all the partner organisations, we will make progress in areas that are important to us all."

CERN Bulletin



Member organisations sign the EIROforum Charter in Brussels, November 2002.



The CERN Director-General speaks about Science and Society at the EC Conference on the Common Strategic Framework for EU Research and Innovation Funding, 11 June 2011.

e-EPS News: Consultation on European Research, Innovation & Gender

EPS members have been invited to take part in a Public Consultation on the Future of Gender and Innovation in Europe. The consultation, which is intended to complement the EC Green Paper 'From Challenges to Opportunities: Towards a Common Strategic Framework for EU Research and Innovation Funding', will be published and discussed during the first European Gender Summit in Brussels on 8-9 November this year. It is hoped that the consultation – which is being coordinated by genSET and the organisers of the European Gender Summit – will create a better understanding of how Europe might benefit from a more effective mainstreaming of the gender dimension in

e-EPS News is a monthly addition to the CERN Bulletin line-up, showcasing an article by the e-EPS – the European Physical Society newsletter – as part of a new collaboration between the two publications.



research, innovation and scientific systems. Responses from the consultation will be used in the upcoming Policy Manifesto on Integrated Action on the Gender Dimension in Research, which will be presented to the European Commission and other key policy makers later this year.

The first European Gender Summit, which is being held in the SQUARE - Brussels Meeting Centre, aims to promote the discussion of how gender is viewed in the culture of research and innovation, and what potential changes could be made in this field.

The summit is being held under the auspices of the Polish Presidency of the Council of the European Union, with support from the Science and Society Programme of the European Commission. The organisers of the event are the European Cooperation in Science and Technology, the European Science Foundation and genSET.

For more information on the European Gender Summit, and to register, please visit the summit website.

<http://www.epsnews.eu/>

The "Theoreticals" Pack

There is only one place in the world where you can buy a smiling Higgs boson and it's not at CERN, although this is where scientists hope to observe it. The blue star-shaped particle is the best seller of Julie Peasley's Particle Zoo – a collection of tens of soft toys representing all sorts of particles, including composite and decaying particles.

Over the years Julie's zoo has grown in size, variety and complexity. The particularly nice feature about the Particle Zoo is the attention that Julie pays to details: the toys are different in mass, each one has a specific tag and they come with an accurate description of their physical properties. Among the particle packs that Julie proposes to those who can't decide is the "theoreticals" pack. It contains the Higgs boson, the tachyon, the graviton, and dark matter. "The Higgs boson is the top seller of the entire collection," Julie says. "I am following the results of your research at CERN very closely because if it exists I can expect requests to increase and if doesn't, I will have to amend the whole pack!"

On demand, Julie also sews heavy supersymmetric particle toys. "I was going to offer particle toys which were larger and heavier than the regular "squishies" to include the as-yet-unobserved supersym-

The Particle Zoo is a colourful set of handmade soft toys representing the particles in the Standard Model and beyond. It includes a "theoreticals" pack where you can find yet undiscovered particles: the best-selling Higgs boson, the graviton, the tachyon, and dark matter. Supersymmetric particle soft toys are also available on demand. But what would happen to the zoo if Nature had prepared some unexpected surprises? Julie Peasley, the zookeeper, is ready to sew new smiling faces...

metric partners: the wino, zino, photino, Higgsino, selectron, stop quark and so on. However, these would be prohibitively expensive to ship overseas and, given the small number of requests, I decided to make them the same size as the regular particles but fill them with gravel to represent their enormous mass," she explains. Again, she plans to keep updating her stock to take account of new discoveries at CERN and other laboratories.

Changes to Julie's zoo might also soon come from satellite experiments, in particular from Planck, the ESA spacecraft that was launched in 2009 and that could soon produce a new image of the Cosmic Background Radiation to replace that of WMAP that Julies uses for her Universe toy. "I am ready to update the image with the



The "Theoreticals" pack in the Particle Zoo.

new one from Planck. I also plan to make a dark energy toy and I have an idea for a black hole," she says.

Whatever the picture of the Universe and its basic constituents in the months (or years?) to come, Julie has all the enthusiasm to keep her zoo up-to-date with the latest findings. So, should you miss a press release, go quickly to The Particle Zoo website and check what has changed in Julie's packs!

Two national teams train at CERN

The two national teams were training at Aix-les-Bains and were invited to come to CERN by the Laboratory's orienteering club. These top athletes had to find their bearings at CERN in the chilly July rain. CERN has a dynamic orienteering club which earned itself an international reputation by getting actively involved in the orienteering world championships last October, which took place in Geneva and Saint-Cergue and for which it prepared the routes. Having proved its worth on that occasion, the club will be helping to organise the next championships in 2012.

"I really enjoyed running on the CERN site but I'd thought it would be a lot more modern," said a member of the Swedish

The Swedish and Czech national orienteering teams trained at CERN on Wednesday, at the invitation of the president of the orienteering club, Lennart Jirdén.

team. "It was very hard to choose which route to take looking at the map as it was really detailed. There were a lot of difficulties because of the areas that were barred." After completing their training exercise, the teams visited various buildings and experiments.

Lennart Jirdén has plenty of plans for the club's future. The club has already started a project involving 9 to 12 year-olds from schools in Geneva and is working on another for 12 to 16 year-olds. "For the second time this year, we organised orienteering days for ten different schools involv-

ing a total of 800 children," explains Lennart. "This was followed by a school championship in Geneva in June for the children of all ten schools." The club intends to repeat the exercise in the future and to get more schools involved, especially French schools in Saint Genis-Pouilly, Ferney-Voltaire and Périon, in order to set up a cross-border challenge.

CERN's orienteering club organises around fifteen competitions every year. The next one is scheduled for Saturday 27 August. For further information go to the club's website at:

club-orienteer.web.cern.ch/club-orienteer/

Alix Marcastel



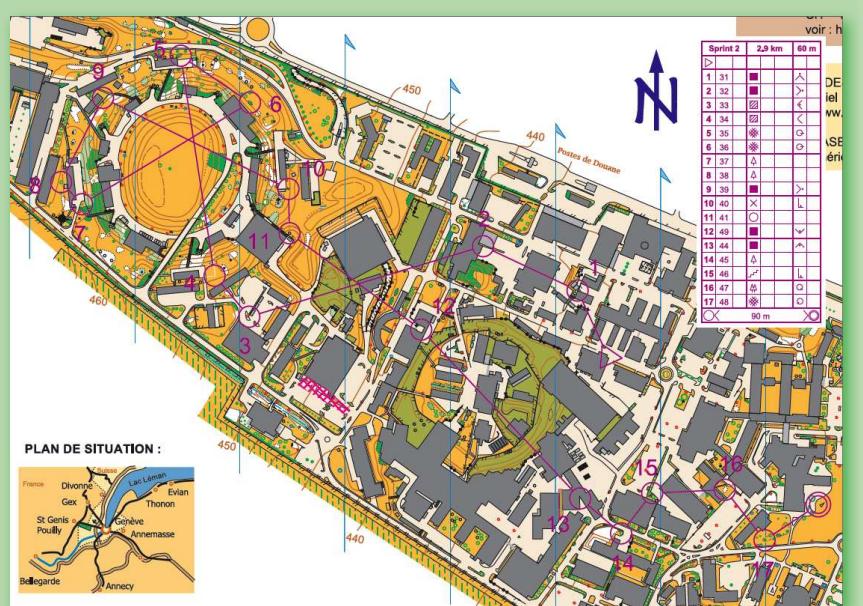
Tove Alexandersson, a junior member of the Swedish team. Three weeks before she won gold, silver and bronze medals at the Junior World Championship.



Three athletes from the Swedish and Czech national teams reach the finishing line.

Drawing given to the runners

The triangle marks the starting line, and the double circle, the finish. The circles represent the control points where the runners' had to get their cards punched. The total distance of the course was 2950m as the crow flies, but the actual distance covered was much further because of the obstacles. The best time recorded during Wednesday's training exercise was 18 minutes and 27 seconds





News from the Library

Ebooks: 15,000 and counting

As you probably know, the CERN Library has greatly expanded its selection of online books. More than 15,000 e-books are now available at CERN, covering a wide range of disciplines - nearly one fourth of the whole book collection is available online.

Recently, a small but very interesting selection of Wiley e-books has been added to our Digital Library, among them some books in high demand. Have you ever tried to get hold of "Introduction to elementary particles" by David Griffiths

After an inspiring lecture of the Summer Student program, would you like to get hold of the books suggested by the speaker? The Library is there to help you.

and found that all copies were on loan, although we had added plenty of them to our collection? Try the online version: we have expanded our collection to infinity!

Similarly, you will be able to read "RF Superconductivity: Science, Technology, and Applications" by Hasan Padamsee online, as well as many more titles here.

If you are already on holiday and wish to enjoy access to ebooks wherever you are,

please remember that remote access service is available at:

<http://library.web.cern.ch/library/library/remote.html>

See all CERN ebooks at:

<http://cdsweb.cern.ch/collection/eBooks?ln=en>

Please send questions or comments at library.desk@cern.ch.

CERN Library



1000 passwords exposed, what about yours?

Unfortunately, recent security checks have revealed a huge area for improvement here. Within a period of only one week, more than 1000 different passwords passed through the CERN outer perimeter firewall in clear text. "Clear text" means that the password was readable to any adversary able to intercept the communication.

Make sure your web connection is secure! This can easily be checked in the address bar of your web browser. If the address starts with "HTTPS", everything is fine. If it

In the last three issues of the Bulletin, we have stressed the importance of the secrecy of your password. Remember: Your password should be treated like a toothbrush: do not share it, and change it regularly! And this is not only valid for your CERN password, but also for any other password you use to log into your university or laboratory, Facebook or Twitter portals, or other web sites.

is only "HTTP" (without "S"), your password is at risk and can be easily sniffed out by an adversary.

Protect yourself! Never type your password into an "HTTP"-only page unless that password is completely unimportant to you and not used anywhere else. If you have done this, change the password as soon as you

can. If you know the owners of those web sites - e.g. the local security team - contact them and inform them of this flaw. They will be happy to make the necessary improvements. Finally, check out our passwords recommendations:

<https://cern.ch/security/recommendations/en/passwords.shtml>

If you have questions, suggestions or comments, please contact Computer.Security@cern.ch or visit us at

<http://cern.ch/security>

Computer Security Team



Ombuds' Corner Le coin de l'Ombuds

In this series, the Bulletin aims to explain the role of the Ombuds at CERN by presenting practical examples of misunderstandings that could have been resolved by the Ombuds if he had been contacted earlier. Please note that, in all the situations we present, the names are fictitious and used only to improve clarity.

Fear of retaliation?

Val* joined CERN a few years ago on a limited duration contract. He is now entering his fourth year at CERN and hopes - given his excellent results, his important technical responsibilities and his good periodical assessments - to be granted a long-term contract. The position he holds is considered essential in his Department and must be filled either by someone on an indefinite contract or by rotating personnel with limited duration contracts. Given his capacities and experience, Val considers his chances of getting an indefinite contract for the position quite high, should such an opportunity arise.

Recently, while giving a presentation in front of a large audience, his supervisor Brian* publicly criticized the validity of his work and his commitment to the Organization. Val was very surprised and did not react on the spot, and decided to let the comments go.

His surprise only increased when Winston*, his Group Leader, called him in the next week to tell him that such events could jeopardize his future should something similar happen again. Val tried to explain the event from his point of view. Although Winston heard him out

he did not add anything to the discussion, giving the impression that he was unconvinced by Val's reasoning.

Val started to seriously worry about his future and began to feel that his hierarchy was looking for a reason – unknown to him – to push him aside. Thus he decided not to settle this point with them directly. Unavoidably, his preoccupation with his job status grew to the point where it affected his efficiency; this only served to escalate his worry and very soon Val began to suffer from depression.

His close colleagues advised him to go and discuss the matter with the Ombuds. Val hesitated for a long time: Would his visit be public knowledge? Would his supervisors see a visit to the Ombuds as an attack against their hierarchical power? Would he be able to stay in charge of whatever actions would be taken? Wouldn't he just end up being caught between a rock and a hard place? Could he inadvertently cast doubt on his intentions, which could be harmful in an interview for an indefinite position? All the questions spun through Val's head as he decided that his present situation could not continue.

The Ombuds listened to Val's concerns and reassured him about the confidential nature

of the meeting. They then discussed several options that Val could follow by himself. They agreed that if new elements or pitfalls presented themselves whilst Val took a new approach to his work environment, he would get back in touch with the Ombuds..

Conclusion

The Ombuds mandate says: "Attempted or actual retaliation against a person who contacted or cooperated with the Ombuds shall not be tolerated and may result in disciplinary action." In addition, the Ombuds keeps names and cases strictly confidential, and does not start any action without the agreement of the person who called on his services. Everyone stays in control of the actions he/she would (or would not) like to take. Retaliation for visiting the Ombuds is thus avoided. Abandon your fear of retaliation, as it will not occur at CERN – come get advice from the Ombuds.

Contact the Ombuds early!

<http://cern.ch/ombuds>

Vincent Vuillemin

* Names and story are purely fictitious.



Official news

Members of the personnel shall be deemed to have taken note of the news under this heading. Reproduction of all or part of this information by persons or institutions external to the Organization requires the prior approval of the CERN Management.

PREVENTING THEFTS AND WILFUL DAMAGE

The best means of preventing crime is to make it difficult to commit. As the summer holidays begin, in everybody's interest we advise the following precautions:

1. MONEY, VALUABLES & KEYS

Never leave money or objects of value unattended in offices or changing rooms, even locked.

Keys and spares must always be taken away or kept in a safe place. Supposedly "safe" hiding places such as drawers, even locked, metal boxes and flower pots, are well known to burglars and should be avoided.

Change lock codes regularly.

2. DOORS & WINDOWS

Offices, workshops and meeting-rooms, etc. should be locked when vacated. Care should also be taken that windows are properly shut, especially if they are easily accessible from the outside.

3. VANDALISM

If you witness an act of vandalism of public or private property, please report all the facts and your observations immediately to the CERN Fire Brigade (74444).

4. REPORTING INCIDENTS

Every misdemeanour solved increases the chances of others being prevented. All thefts, disappearances and other serious incidents must be reported immediately to the relevant services (e.g. Fire Brigade, Reception and Access Control Service, Cards Office, Users Office, cf. <http://hoststates.web.cern.ch/hoststates/fr/Misc/13100.html>).

Any information that might facilitate investigations, in particular the colour, manufacturer and registration number of vehicles, or descriptions of individuals, should be carefully noted.

Any important developments (e.g. objects found or new clues) should be reported to the relevant services.

5. PENALTIES

The CERN Management will not hesitate in applying the appropriate penalties or reporting incidents to the police in its efforts to fight theft and other misdemeanours.

Relations with the Host States Service
<http://www.cern.ch/relations/>
relations.secretariat@cern.ch
 Tel. 72848



Language training



FRENCH COURSES FOR BEGINNERS

We are now offering a French course for beginners. If you are interested in following this course, please enrol through the following link:

[https://cta.cern.ch/cta2/
 f?p=110:9:4314988246421131:::X_
 STATUS,XS.Course_Name,XS.
 PROGRAMME,XS.SubCategory,X_.
 COURSE_ID,XS.Language,XS.Session:
 D%2C1%2C4251%2CB%2C](https://cta.cern.ch/cta2/f?p=110:9:4314988246421131:::X_STATUS,XS.Course_Name,XS.Programme,XS.SubCategory,X.Course_ID,XS.Language,XS.Session:D%2C1%2C4251%2CB%2C)

or contact:

Kerstin Fuhrmeister, tel. 70896.

SUMMER ORAL EXPRESSION ENGLISH COURSE

An English Oral Expression course will take place between 15 August and 30 September 2011.

Schedule: to be determined (2 sessions of 2 hours per week).

Please note that this course is for learners who have a good knowledge of English (CERN level 7 upwards).

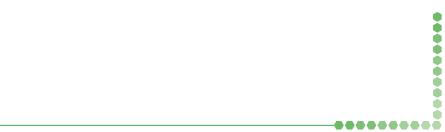
If you are interested in following this course, please enrol through the following link

[https://cta.cern.ch/cta2/
 f?p=110:9:1576796470009589:::X_
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 Programme,Xs.SubCategory,X_.
 Course_Id,Xs.Language,Xs._
 Session:D,,1,,4368,B,](https://cta.cern.ch/cta2/f?p=110:9:1576796470009589:::X_Status,Xs.Course_Name,Xs.Programme,Xs.SubCategory,X.Course_Id,Xs.Language,Xs.Session:D,,1,,4368,B,)

Or contact:

Kerstin FUHRMEISTER (70896)

Tessa OSBORNE (72957)





Take note

PUBLICATION OF THE BULLETIN IN AUGUST

During August, there will be one issue of the Bulletin (No. 32-33-34/2011) covering the weeks of 10, 17 and 24 August.

The deadline for articles for this issue will be midday on Tuesday 2 August.

The deadline for articles for the following issue of the Bulletin, No. 35-36/2011, will be midday on Tuesday 23 August.

The Bulletin team

CERN MOBILITY SURVEY

The Institute of Shipping and Transport of the University of the Aegean and the National Technical University of Athens are partners with CERN in a study of mobility patterns between and within CERN sites and to that effect have realized a mobility survey dedicated to the CERN community.

The study aims to understand:

1. How you presently get around the CERN sites;
2. What problems you encounter regarding mobility;
3. What your needs are;
4. What improvements you'd like to see;
5. What measures you would like to see implemented most.

The replies we receive will enable us to define a general policy promoting the diversity of mobility at CERN and to establish and quantify the strategic actions to be implemented for both the short and medium term.

The objectives of the transport mobility plans are to:

1. Facilitate the mobility within and between the CERN sites by identifying adequate solutions in response to individual needs according to individual profiles, activities and preferences;
2. Prepare the Organization to accommodate an increasing number of Users and visitors and to define appropriate mobility policies; and
3. Favour green transport alternatives.

A mobility policy largely relies on successfully collaborating with the users. This survey will help identify ideas and user needs regarding the Organization's mobility plan. It will also enable us to identify and define future mobility patterns and a strategy for successfully addressing increasing mobility needs.

You are all part of this mobility plan, so please let us have your opinions!

<http://euclid.aegean.gr/~surveys/cern/>

Thank you in advance for your help.

Nb: Your replies will remain confidential.

GS Department

<http://cern.ch/security>

Computer Security Team



Seminars

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MONDAY 25 JULY

SUMMER STUDENT LECTURE PROGRAMME

Main Auditorium, Bldg. 500

09:15 - Beyond the Standard Model (Theoretical Physics) (1/6)

G. GIUDICE / CERN

10:15 - Beyond the Standard Model (Theoretical Physics) (2/6)

G. GIUDICE / CERN

11:15 - Standard Model and Higgs Physics at Hadron Colliders (Experimental Physics) (1/4)

P. MATTIG / ATLAS-UNIVERSITÄT WUPPERTAL

12:00 - Discussion Session

R. LANDUA, G. GIUDICE, P. MATTIG

TUESDAY 26 JULY

SUMMER STUDENT LECTURE PROGRAMME

Main Auditorium, Bldg. 500

09:15 - Antimatter in the Lab (Experimental Physics) (1/3)

R. LANDUA / CERN

10:15 - Beyond the Standard Model (Theoretical Physics) (3/6)

G. GIUDICE / CERN

11:15 - Standard Model and Higgs Physics at Hadron Colliders (Experimental Physics) (2/4)

P. MATTIG / ATLAS-UNIVERSITÄT WUPPERTAL

12:00 - Discussion Session

R. LANDUA, G. GIUDICE, P. MATTIG

WEDNESDAY 27 JULY

SUMMER STUDENT LECTURE PROGRAMME

Main Auditorium, Bldg. 500

09:15 - Antimatter in the Lab (Experimental Physics) (2/3)

R. LANDUA / CERN

10:15 - Antimatter in the Lab (Experimental Physics) (3/3)

R. LANDUA / CERN

11:15 - Standard Model and Higgs Physics at Hadron Colliders (Experimental Physics) (3/4)

P. MATTIG / ATLAS-UNIVERSITÄT WUPPERTAL

12:00 - Discussion Session

R. LANDUA, G. GIUDICE, P. MATTIG

WEDNESDAY 27 JULY

TH THEORETICAL SEMINAR

14:00 - TH Auditorium, Bldg. 4

Particle Astrophysics with High Energy Neutrinos

F. HALZEN / UNIVERSITY OF WISCONSIN-MADISON

ISOLDE SEMINAR

14:30 - Bldg. 26-1-022

Experimental evidences for low-lying octupole isovector excitations

M. SCHECK / IKP TU-DARMSTADT

THURSDAY 28 JULY

SUMMER STUDENT LECTURE PROGRAMME

Main Auditorium, Bldg. 500

09:15 - Beyond the Standard Model (Theoretical Physics) (4/6)

G. DVALI / CERN AND MPI FÜR PHYSIK MUNICH AND NY UNIVERSITY

10:15 - Beyond the Standard Model (Theoretical Physics) (5/6)

G. DVALI / CERN AND MPI FÜR PHYSIK MUNICH AND NY UNIVERSITY

11:15 - Standard Model and Higgs Physics at Hadron Colliders (Experimental Physics) (4/4)

P. MATTIG / ATLAS-UNIVERSITÄT WUPPERTAL

12:00 - Discussion Session

G. DVALI, P. MATTIG

COLLIDER CROSS TALK

11:00 - TH Auditorium, Bldg. 4

Micro black holes and classicalons (for LHC)

G. DVALI

TH BSM FORUM

14:00 - TH Auditorium, Bldg. 4

Improved discovery of nearly degenerate model: MUED using MT2 at the LHC

K. TOBIOKA / IPMU

CERN COLLOQUIUM

16:30 - Main Auditorium, Bldg. 500

The Cosmological Standard Model and Its Implications for Beyond the Standard Model of Particle Physics

R. KOLB / UNIVERSITY OF CHICAGO

FRIDAY 29 JULY

SUMMER STUDENT LECTURE PROGRAMME

Main Auditorium, Bldg. 500

09:15 - Beyond the Standard Model (Theoretical Physics) (6/6)

G. DVALI / CERN AND MPI FÜR PHYSIK MUNICH AND NY UNIVERSITY

10:15 - Nuclear Physics (Experimental Physics) (1/3)

S. PÉRU / CEA/DAM/DIF, FRANCE

11:15 - What is String Theory? (Theoretical Physics)

L. ALVAREZ-GAUME / CERN

12:00 - Discussion Session

G. DVALI, S. PÉRU, L. ALVAREZ-GAUME

MONDAY 1 AUGUST

TH INSTITUTES

08:00 - TH Auditorium, Bldg. 4

LPCC Summer Institute on LHC Physics - THLPCC11

HR SEMINAR

08:30 - Globe 1st Floor

INDUCTION PROGRAMME - 1st Part

N. DUMEAUX, S. LYNNE HOBSON, E. MACARA, D. SERAFINI / CERN

SUMMER STUDENT LECTURE PROGRAMME

Main Auditorium, Bldg. 500

09:15 - Nuclear Physics (Experimental Physics) (2/3)

S. PÉRU / CEA/DAM/DIF, FRANCE

10:15 - Nuclear Physics (Experimental Physics) (3/3)

S. PÉRU / CEA/DAM/DIF, FRANCE

11:15 - Beyond Standard Model searches at LHC (Experimental Physics) (1/3)

P. SPHICAS / CERN

12:00 - Discussion Session

S. PÉRU, P. SPHICAS



Seminars

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TUESDAY 2 AUGUST

SUMMER STUDENT LECTURE PROGRAMME

Main Auditorium, Bldg. 500

09:15 - Physics and CP Violation (Experimental Physics) (1/4)

G. RAVEN / NIKHEF, AMSTERDAM

10:15 - Beyond Standard Model searches at LHC (Experimental Physics) (2/3)

P. SPHICAS / CERN

11:15 - Beyond Standard Model searches at LHC (Experimental Physics) (3/3)

P. SPHICAS / CERN

12:00 - Discussion Session

G. RAVEN, P. SPHICAS

14:00 - COLLOQUIA - Latest results from the LHC

TH STRING THEORY SEMINAR

14:00 -TH Auditorium, Bldg. 4

AdS/CFT and the cosmological constant problem

K. PAPADODIMAS

WEDNESDAY 3 AUGUST

TH THEORETICAL SEMINAR

08:00 -TH Auditorium, Bldg. 4

Precision calculations for Higgs Physics

M. GRAZZINI / ETH, ZURICH

SUMMER STUDENT LECTURE PROGRAMME

Main Auditorium, Bldg. 500

09:15 - From Heavy Ions to Quark Matter (Experimental Physics) (1/3)

F. ANTINORI / INFN PADOVA/CERN

10:15 - From Heavy Ions to Quark Matter (Experimental Physics) (2/3)

F. ANTINORI / INFN PADOVA/CERN

11:15 - Neutrino Physics (Theoretical Particle Physics) (1/3)

A. ROMANINO / SISSA TRIESTE, ITALY

12:00 - Discussion Session

F. ANTINORI, A. ROMANINO

THURSDAY 4 AUGUST

SUMMER STUDENT LECTURE PROGRAMME

Main Auditorium, Bldg. 500

09:15 - Physics and CP Violation (Experimental Physics) (2/4)

G. RAVEN / NIKHEF, AMSTERDAM

10:15 - From Heavy Ions to Quark Matter (Experimental Physics) (3/3)

F. ANTINORI / INFN PADOVA/CERN

11:15 - Neutrino Physics (Theoretical Particle Physics) (2/3)

A. ROMANINO / SISSA TRIESTE, ITALY

12:00 - Discussion Session

G. RAVEN, F. ANTINORI, A. ROMANINO

COLLIDER CROSS TALK

11:00 -TH Auditorium, Bldg. 4

Event generation with Pythia 8/Torbjorn Sjostrand (Lund University)

FRIDAY 5 AUGUST

SUMMER STUDENT LECTURE PROGRAMME

Main Auditorium, Bldg. 500

09:15 - Physics and CP Violation (Experimental Physics) (3/4)

G. RAVEN / NIKHEF, AMSTERDAM

10:15 - Neutrino Physics (Theoretical Particle Physics) (3/3)

A. ROMANINO / SISSA TRIESTE, ITALY

11:15 - Medical Physics

U. AMALD / TERA FOUNDATION MILANO, ITALY

12:00 - Discussion Session

G. RAVEN, A. ROMANINO, U. AMALD