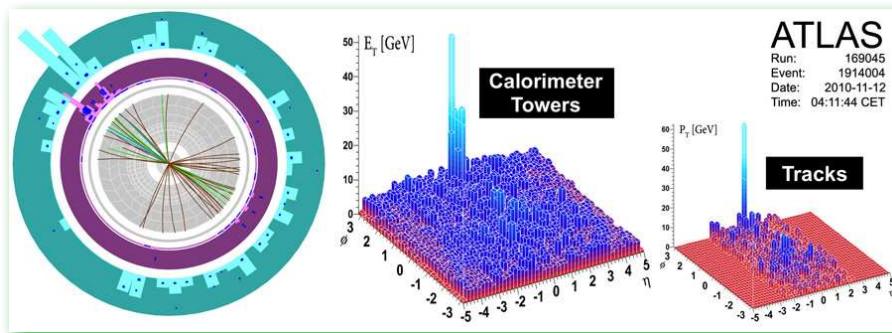


Nos 50,51,52 & 1,2 – 15 December 2010, 5 & 12 January 2011



2010 ion run: completed!



First direct observation of jet quenching.

A seminar on 2 December was the opportunity for the ALICE, ATLAS and CMS collaborations to present their first results on ion physics in front of a packed auditorium.

These results are important and are already having a major impact on the understanding of the physics processes that involve the basic constituents of matter at high energies.

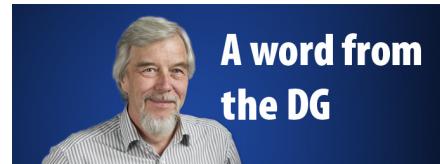
In the ion-ion collisions, the temperature is so high that partons (quarks and gluons), which are usually constrained inside the nucleons, are deconfined to form a highly dense and hot soup known as quark-gluon plasma (QGP). This type of matter existed

After a very fast switchover from protons to lead ions, the LHC has achieved performances that have allowed the machine to exceed both peak and integrated luminosity by a factor of three. Thanks to this, experiments have been able to produce high-profile results on ion physics almost immediately, confirming that the LHC was able to keep its promises for ions as well as for protons.

about 1 millionth of a second after the Big Bang. By studying it, scientists hope to understand the processes that led to the formation of nucleons, which in turn became the nuclei of atoms.

At the recent seminar, the LHC's dedicated heavy-ion experiment, ALICE, confirmed that QGP behaves like an ideal liquid, a phenomenon earlier observed at the US Brookhaven Laboratory's RHIC facility. This question was indeed one of the main points of this first phase of data analysis, which also

(Continued on page 2)



Foundations for the future

Since this is the last Bulletin of 2010, this will be the last word from the Director-General for this remarkable year. I'd like to use it to share some of my reflections on how important it is for CERN, and for science, that the LHC has worked so very well. The scientific results are remarkable, but it's the political legacy of the LHC's first year of running that I'd like to talk about here.

Whenever economies are slow, as they are now, basic science comes under pressure as governments

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2010 ion run: completed!

(Continued from page 1)

included the analysis of secondary particles produced in the lead-lead collisions. ALICE's results already rule out many of the existing theoretical models describing the physics of heavy-ions.

ATLAS presented the first direct observation of jet quenching, a phenomenon indirectly seen at RHIC a few years ago. The experiment has shown an imbalance in the energy distribution of two back-to-back jets (see ATLAS picture) in so-called central collisions. Centrality is a parameter indicating how big the overlap of the two ions is when they collide; it is minimal when they hit each other only in the corner and it's maximum when they overlap completely. ATLAS's result is the first direct demonstration that

when one of the two jets of particles goes through denser regions of QGP, its total energy is distributed in the medium and the jet appears to be almost totally absorbed. The observation of this imbalance and the study of the distribution of the energy are powerful means to study the properties of QGP. Confirmation of the direct observation of jet quenching came from the CMS experiment, which also reported the first observation of the production of Z bosons in heavy ion collisions.

In about one month of running with ions, the LHC experiments also collected evidence of the production of particles such as J/Psi and Upsilon, which again provide excellent tools to study the properties of

deconfined matter. In future, they will be important in understanding the detailed behaviour of QGP.

Studies of heavy-ion physics have just started at the LHC and a lot of new results are expected from the data analysis that will be done in the coming weeks and months. So far, all the detectors have performed remarkably well, with data taking efficiency as high as 95%. This has translated into several publications that are just the beginning of the LHC's heavy-ion adventure.

CERN Bulletin



A word from the DG

(Continued from page 1)

Foundations for the future

look to applied science for winners. Basic science takes too long to deliver products to market – so the conventional logic goes – and it's much better to concentrate on the applied. There's merit to this logic, but it's no cure-all for the economy. We need a broadly balanced approach to science that includes basic and applied research, that harnesses the power of the new media to ensure open access to knowledge, and that encourages an interdisciplinary approach. These are all things we do instinctively at CERN.

In my opinion, it is precisely in times like these that governments need to reaffirm their commitment to basic science. Earlier this year, our Member States did just that in approving our Medium-Term Plan. Their decision brought a strong endorsement of the CERN model for basic science: a consensus-based model that is as healthy today as it was at the time of CERN's foundation in 1954.

Some technologies, I would contend most, do not come about through government foresight programmes

picking winners, but rather through unpredictable sets of circumstances. Would a foresight panel have picked the World Wide Web? I doubt it. Looking further back, would foresight panels have chosen to invest in Michael Faraday? It's also doubtful, since the lead-time for his innovation was much longer than the political cycle, and therein lies the rub. To get from Faraday's early experiments with electricity and magnetism to commercial electric light took decades. Similarly, to get from Einstein's paper on the photoelectric effect to transistors took years. The examples go on, and all are winners, but on timescales far longer than the political cycle. For innovation to succeed, basic research has to keep churning out results for the applied scientists to get their teeth into. When times are good, private sector R&D reaches out towards the blue-sky end of the spectrum. But even then, the most basic sciences rely on government funding. When the economy is bad, it is firmly the public sector's duty to ensure that

the stream of knowledge running from basic to applied science and on to market is unbroken. That means funding basic science, stimulating knowledge transfer, and making sure that winners are produced in the long run, whether foresight panels spot them or not.

What has this got to do with the LHC's run in 2010? The LHC helps to make science very visible: science is now firmly on the popular agenda, and bright young people are being inspired to follow scientific careers. Continued innovation depends on this, just as it depends on the right balance of pure and applied research. With the LHC so prominent in the public eye, factors like these make our successes today more important than ever.

Rolf Heuer

The latest from the LHC: a well-deserved break

The majority of the year has been dedicated to proton operation, with three distinct phases; (i) a few (up to 13) low intensity bunches; (ii) a few

(up to 50) high intensity bunches; (iii) many (almost 400) high intensity bunches using the bunch train scheme with 150 ns spacing. With peak luminosities of 2×10^{32}

A long and successful period of beam operation came to an end as scheduled on Monday 6 December. Since the first beam of 2010 was injected into the LHC on 28 February, a huge amount of progress has been made. After a technical stop of a few weeks coinciding with the end-of-year break, the LHC hardware systems will be restarted in January to be ready for the first beam of 2011 around 21 February.

$\text{cm}^{-2} \text{s}^{-1}$ and almost 50 pb^{-1} of integrated luminosity delivered to the experiments by late October, attention switched to operation with ions in November.

After a rapid re-commissioning of the machine with ions, the physics run started on 8 November and continued for 4 weeks. The number of bunches was quickly increased to 121 per beam. Most of the run was made with this configuration, until the last weekend when the collider used 137 bunches per beam. During the last week, peak luminosities in excess of $3 \times 10^{25} \text{ cm}^{-2} \text{s}^{-1}$ have been achieved and almost $10 \mu\text{b}^{-1}$ of integrated luminosity has now been delivered to the experiments.

While the LHC has achieved or exceeded all expectations for 2010, it should not be forgotten that this has only been possible thanks to the reliable performance of the injector chain. This is especially true for the ion beams, which underwent almost constant tuning in order to provide the beam quality required for the LHC. In particular, since the source has to be refilled with lead every 20 days, it then needs to be pumped, reconditioned and retuned to retrieve its performance. A shorted electrode in the source jeopardized the end of the run, but this breakdown was mitigated by a careful adjustment of the parameters, and by the implementation of a double injection into the LEIR machine, so that for the last fill of the year, as during most of the run, the bunch intensity was still 50% higher than foreseen in the design report.

LHC Page1	Fill: 1541	E: 0 Z GeV	06-12-2010 20:16:11
SHUTDOWN: NO BEAM			
Comments 06-12-2010 18:13:26 :	BIS status and SMP flags	B1	B2
***** End of run 2010 *****	Link Status of Beam Permits	true	true
	Global Beam Permit	false	false
	Setup Beam	false	false
	Beam Presence	false	false
	Moveable Devices Allowed In	false	false
	Stable Beams	false	false
AFS: 500ns_137b_129_130_0_8bp18injIONS	PM Status B1	ENABLED	PM Status B2
			ENABLED

CERN Bulletin

Happy birthday n-TOF!

Ten years after its first beam, n_TOF is just approaching maturity. Revitalized by the recent renovation of its infrastructures that allowed it to gain the unique label of "Class A" in radio-protection standards, n_TOF has a rich and challenging scientific programme. "One year ago, the beam line and the experimental area were completely rebuilt to comply with the Class A radio protection requirements to allow safe use of almost all radionuclides. This allowed us to carry on waste transmutation studies on radioactive elements that are produced, for example, in nuclear power plants," says Enrico Chiaveri, spokesperson of the n_TOF Collaboration, which involves approximately 90 physicists from some 30 institutions worldwide.

These studies are particularly important for the development of the new generation of nuclear reactors and the so-called accelerator-driven systems, which use accelerator-produced neutron beams to trigger nuclear reactions. "The production and transmutation of the radioactive elements by these new reactors requires careful measurement of the capture and fission cross-section for the so-called 'minor actinides', which constitute the most radiotoxic component of radioactive waste," explains Chiaveri. "The results obtained at n_TOF - in some cases for the first time in the world - are extremely

The "Neutron Time Of Flight" facility (n_TOF) has recently turned ten. A simple ceremony marked the date of the anniversary and provides a nice opportunity to retrace the successful history of this unique facility, whose scientific activity spans a range from astrophysics to the study of nuclear-waste transmutation processes.

accurate and provide important information for the possible *in situ* treatment of these elements and their re-use as an energy source."

Neutrons are involved in virtually all nuclear processes, including star formation and evolution. "We have done very accurate measurements on the formation of some heavy elements such as osmium (Os) and rhenium (Re)", says Chiaveri. Thanks to these studies, with a technique known as "Nuclear Cosmochronometry", the n_TOF collaboration was able to obtain a new estimate of the age of the Universe. These important results earned a special mention as an example of



Did you know?

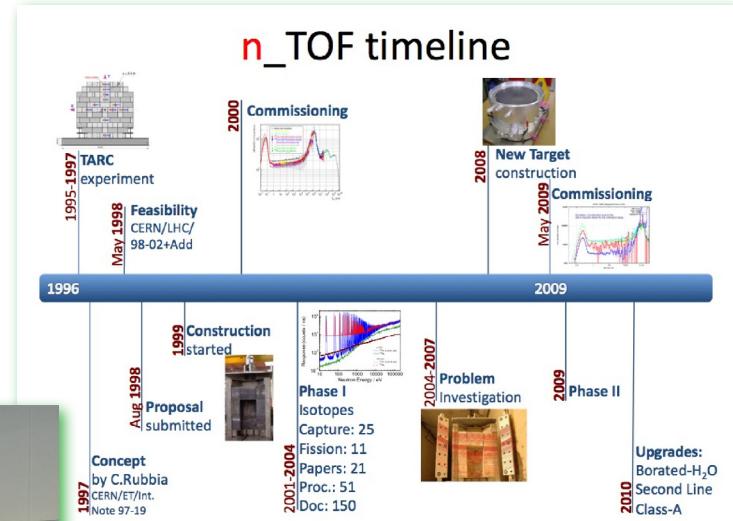
The history of n-TOF

The first neutron beam was produced at n_TOF in November 2000. The beam is produced using a pulsed beam of protons delivered by the PS hitting a lead spallation target. The facility was born from an idea of Carlo Rubbia, Nobel Prize Laureate and former Director-General of CERN.

excellent research by the journal Physical Review C (<http://physics.aps.org/synopsis-for/10.1103/PhysRevC.82.015802>).



From left to right: Enrique Gonzalez-Romero, Chairman of the Collaboration Board, Enrico Chiaveri, Spokesperson of the n_TOF Experiment, and Carlo Rubbia, the creator of the n_TOF experiment.



The celebration marking the ten years of n_TOF took place on 24 November in Restaurant No. 1.

The n_TOF facility has many distinctive features: an extremely high instantaneous neutron flux, equal to 8×10^5 neutrons per cm², a very precise energy resolution, and a wide neutron spectrum with a very broad energy range from the thermal energies up to the GeV region. All together these characteristics make n_TOF extremely competitive in its fields of research. "Looking to the longer term, the n_TOF facility has great potential to further improve the neutron flux intensity by reducing the flight path to a second experimental area. The preliminary estimations made by the CERN n_TOF support team (EN-STI Group) show that the realistic configuration could allow samples with 10-100 lower mass to be used, opening the path to direct measurements that are not possible at any existing facility," adds Chiaveri. The future looks bright for this 10-year-old youngster!

Francesco Poppi

OpenAIRE, a breath of freedom in publishing

The OpenAIRE (Open Access Infrastructure for Research in Europe) project was launched one year ago to create a gateway for easy access to the research results of EU-funded programmes, in support of the EC initiative on open access that was part of the Seventh Research Framework Programme (FP7). "OpenAIRE demonstrates the EU's engagement with the open access philosophy, providing an

On 2 December, the new OpenAIRE portal was launched at Ghent University (Belgium) in the presence of the Vice-President of the European Commission, Dr Neelie Kroes. OpenAIRE will be a central point for the publications of EC-funded researchers. One pillar on which OpenAIRE is built is CERN's Invenio, the digital library system software that also powers CDS and INSPIRE.

infrastructure which removes the obstacles preventing EU researchers from making their EU-funded research results freely available", says Tim Smith, head of the IT/UDS group and leader of the Invenio technical team in OpenAIRE.



Screenshot of the OpenAIRE website.

the CERN IT Department are working together to promote and facilitate Open Access by driving initiatives and providing tools to make it a reality in our community. OpenAIRE enables a similar philosophy to be applied across the research domains at the European level" comments Tim Smith.

The OpenAIRE platform is built upon the Invenio software developed at CERN. "We have deployed, and now support, an adaptation of Invenio as a so-called Orphan Repository for OpenAIRE, for researchers whose institute, subject or country do not provide a repository of reference. This way we ensure that everyone has access across Europe to an Open Access repository", says Smith. Besides being a digital repository for documents, OpenAIRE also provides guidance and assistance to researchers in publishing their research results in Open Access. The portal features a helpdesk system in 27 European countries, consisting of a network of experts as well as online tools.

OpenAIRE is a 3-year project aimed at supporting the FP7 Open Access pilot, which focuses on 7 specific research subjects. The aim of the EU is to open this up to all subjects funded under the successor programme, FP8, and to extend it to include data. OpenAIRE is intended to support this expansion through successor projects.

CERN Bulletin

Style matters!

News from the Library

Our daily work almost always involves writing - articles, reports and documents of all kinds. And even if CERN's core activity is hard science, this doesn't mean our writing style and the language we use are not important. The CERN Library is here to help.

In addition to the Chicago Manual of Style mentioned some weeks ago in the Bulletin, the CERN Library now also has two paper copies of the latest edition of the Oxford Style Manual, which is an important reference work for the prepa-

ration of manuscripts for publication and includes guidelines on citations, spelling, punctuation and abbreviations.

Thanks to the Library, you can also access important language-related tools in both CERN's official languages such as Oxford Reference Online, giving access to a large choice of dictionaries and handbooks, as well as the Oxford English Dictionary. French speakers can enjoy access to *Le grand Robert*, one of the most important dictionaries for the French language.

All these dictionaries can be consulted online both on and off the CERN site (CERN accounts only).

List of all dictionaries available at CERN:

http://library.web.cern.ch/library/Library/dictionaries_and_encyclopedias.html

CERN Library

CERN has a new cultural policy

The new cultural policy features four main activities: the creation of an honorary advisory board, the launch of an Artist in Residence programme, support for the various cultural events developed at CERN, and a new website which will showcase CERN's significant cultural activities and provide relevant information for both artists and people working at CERN. "The new cultural policy shows how much CERN values its significant role in culture," explains Ariane Koek, the Communication Group's cultural specialist working on this project.

A new cultural policy is to be unveiled at the beginning of 2011. Although CERN has been inspiring the works of artists for decades, the new policy represents the first official framework for CERN's engagement with the arts – presenting "Great Arts for Great Science".

CERN's policy is extremely progressive, as it brings together art and science at the same level – Great Arts for Great Science – also building knowledge and expertise in the arts into the organisation at the highest level."

The new Cultural Advisory Board will be made up by internationally recognised figures in the arts, including Serge Dorny, Director-General of the Lyon National

Opera, Frank Madlener, Director of IRCAM, and Beatrix Ruf, Director of the Kunsthalle in Zurich and listed in ArtReview's Top 20 Most Influential people in the Arts. The board will provide expert advice for the DG and CERN staff, judge arts applications using a newly established formal commissioning process, and provide professional guidance for CERN's larger initiatives – including the Globe Gardens project, currently under development.

The Artists in Residence Programme, Collide@CERN, will bring multi-disciplinary artists to CERN. "This will be CERN's new experiment: an opportunity for creative collisions between the minds of CERN's scientists and the imaginations of artists," says Koek. The cultural policy will also provide support to home-grown initiatives, such as the CinéGlobe film festival, created by CERN's Open Your Eyes Film Club.

"I am currently fundraising and building partnerships with arts funders and cultural organisations to make any additional arts activity, such as the Artist in Residence scheme, happen, because CERN is funded for its science, not for the arts," adds Koek.

Katarina Anthony

Arts@CERN

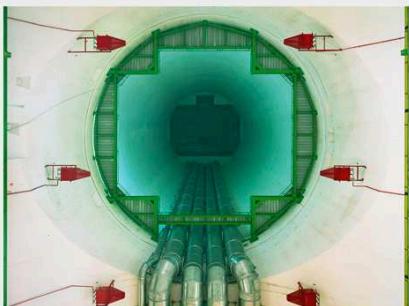
[Home](#) [Gallery](#) [Collide@CERN](#) [Contact](#)

“ CERN is leading our future vision for our human civilisation to understand what we are. CERN's challenge to discover the truth of our existence with revolutionary science provides inspiration to artists and creators everywhere.

Those of the words of Japan's leading artists, Mariko Mori, after she visited CERN. She is one of the most radical and feted rising stars of the international arts world, using cutting-edge technology and materials to create strikingly beautiful visions for the 21st century in sculpture, painting and video, drawing inspiration from her interests in art and science. She is also a patron of Collide@CERN – CERN's own arts residency scheme.

The inspiration of CERN's particle physics and LHC can be seen everywhere - from cutting-edge theatre and opera, novels and films, to stunning photography, sculpture and multi-media dance. CERN often welcomes artists of all kinds at CERN and introduces them to our science and scientists to inspire and inform their work.

The Arts and Particle Physics are inextricably linked: both are ways of us exploring our existence - what it is to be human and our place in the universe.



Screenshot of the upcoming ARTS@CERN Website.

Research joins forces with industry in the fight against cancer

The Linac for Image-Guided Hadron Therapy (LIGHT) is the innovative linear accelerator designed by ADAM S.A. to revolutionise hadron therapy facilities by simplifying the infrastructure and making them profitable from

an industrial point of view, while ensuring better beam quality. "Today proton beams for advanced cancer radiation treatment are produced either by cyclotrons, which need an energy selection system to adjust the beam energy to the value required by the specific treatment, or complex synchrotrons. When Ugo Amaldi told me that, according to studies carried out by the TERA Foundation, proton beams for hadron therapy could be produced by a 16-metre-long linear accelerator, I decided to accept the challenge to bring the project forward and to industrialise this research," explains Alberto Colussi, director and founder of ADAM S.A., established in December 2007. Requiring only a few milliseconds to change energy and with its 200 Hz repetition rate, the LIGHT accelerator allows a "multi-painting"- treatment of moving organs.

ADAM S.A. took the original ideas of the TERA Foundation and adapted them to the needs of a modern medical centre. "Given

The Geneva-based Application of Detectors and Accelerators to Medicine (ADAM S.A.) has recently completed the first unit of an innovative linear accelerator for hadron therapy applications. The design of the new unit is based on pioneering studies carried out by the TERA Foundation a few years ago. Assembled at CERN in the framework of a partnership agreement with the company, this first module is now ready to leave Switzerland for Rome, where it will undergo some important performance tests.

the dimensions and the modularity of the LIGHT system, the new centres will be designed to house equipment which will be much less bulky," confirms Colussi. In addition, the innovative concept developed by ADAM S.A. includes the absence of rotating gantries, the heavy devices used to direct the beam exactly to the target. "We have replaced the gantry with a mobile bed of novel design that allows operators to adjust the position of the patient to the needs of the treatment. This will reduce the costs compared to a traditional hadron therapy facility, allowing a larger number to be constructed," adds Colussi.

LIGHT has its roots in fundamental research but it is now ready to be developed on an industrial level and will eventually be opened up to the worldwide market. "Working in collaboration with CERN has been very exciting: here there are no limits to the imagination, while in industry it is always necessary to deal with profit," says Colussi.



The first unit of LIGHT was unveiled on 20 November. The ceremony was attended by Sergio Bertolucci, CERN Director for Research, Rolf Heuer, CERN Director-General, Alberto Colussi, Director of ADAM SA, President Carlo Lamprecht and Domenico Campi, ADAM SA Board Members, and Ugo Amaldi, President of the TERA Foundation.

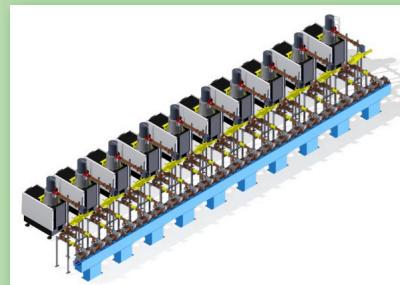
Francesco Poppi

Once all the tests with radiofrequency at CERN have been completed, the first unit of LIGHT will be heading to Rome, where it will undergo performance tests. If all goes well, ADAM S.A. plans to retail the first industrially produced LIGHT modules within two years.



Did you know?

The First Unit of LIGHT is designed for a 30 MeV injected proton beam produced by either a linac or a cyclotron, and its energy gain is 12 MeV. Since the LIGHT concept is a modular one, the output energy of three similar units is 65 MeV, used to treat eye tumours.



The output energy can be increased by adding other units. In a typical 230 MeV installation, corresponding to an 18m long medical linac, the radiofrequency (RF) power sources are each physically positioned along its length. The accelerating modules are longer as the beam progresses down the linac, because of the increasing beam velocity.

To accelerate protons by 200 MeV in less than twenty metres, the chosen frequency is 3GHz, which is standard for electron linacs but has never been used before for protons.

The RF power pulses produced by the klystron are transmitted through a waveguide. The beam energy modulation needed to correctly cover the target tumour depth is obtained electronically by changing the peak RF power applied to the accelerating modules. The pulsed klystron-modulators provide this change of RF power in a few milliseconds.

The First Unit equipment is computer controlled from two desk-top computers connected to the control system.

Accelerator	Beam always present during treatments	Energy variation by electronic methods	Time needed for varying the energy	LIGHT Parameters	Value
Cyclotron	YES	NO	80-100 ms (*)	Typical LIGHT output proton beam energy	230 MeV
Synchrotron	NO	YES	1-2 seconds	Typical LIGHT input beam energy	30 MeV
Linac	YES	YES	2-3 milliseconds (**)	Typical number of acceleration module assemblies	10
(*) With movable absorbers					Electronic beam energy variation range up to maximum energy
(**) The energy is changed by adjusting the RF power to the modules					70%
					Time required to change beam energy
					2-3 msecs
					Pulse repetition rate
					200 Hz
					Proton Linac typical length
					20 metres

LHC on the bus

The good relationship between Geneva International Airport and CERN started several years ago. In

2004 the airport put advertising space in the arrivals area at CERN's disposal free of charge. Now, starting on 15 December, a 40-foot long bus will display a giant sticker advertisement depicting CERN as it takes passengers over the airport tarmac to their planes.

This is no ordinary sticker, and it was no mean task to attach it to the bus. The task of producing and attaching it was entrusted

On 15 December, an airport bus will be transformed in the image of CERN. The bus will be seen by the thousands of travellers arriving in Geneva, informing them of the possibility to visit CERN.

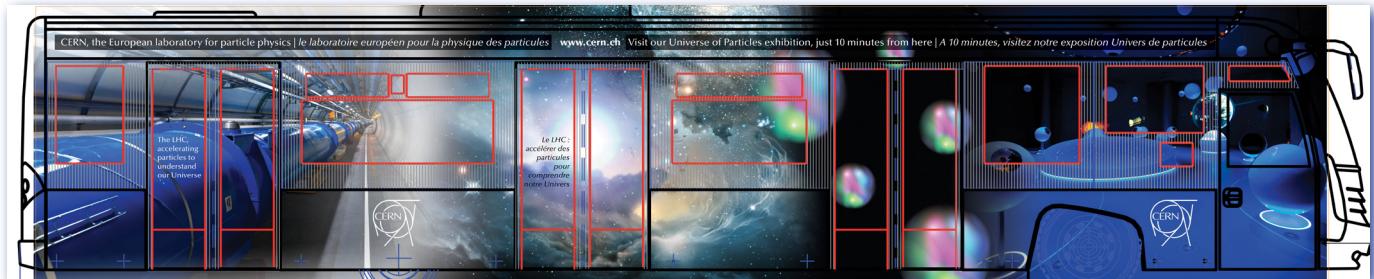
to Geneva-based specialists Mathys SA. With the ski season opening on 15 December, there will be many travellers arriving at the airport, and the bus will be ready to receive them.

When one thinks of CERN, the subjects that naturally come to mind are the LHC, the mysteries of the Universe, and sub-atomic particles. All of these themes have been brought together in the artwork. "The chal-

lenge was to come up with a visual scheme that would reflect the concept of the LHC, which is all about accelerating particles to understand our Universe," explains Fabienne Marcastel, the graphic designer behind this creation. Thus, the viewer will see pictures of the LHC, the Globe exhibition and the particles in one continuous image (see sketch).

In addition to spreading the message about the LHC as a resource for scientific research, the bus will inform visitors about the "Universe of particles" exhibition, located just minutes away from the airport. (That's assuming there's no snow, and it's not during rush hour!)

Laëtitia Pedroso

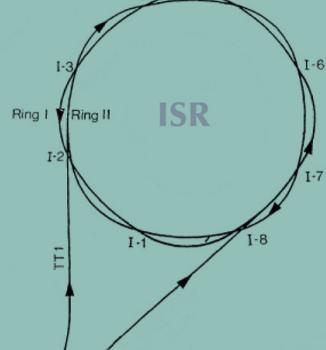


Sketch of the bus.



40th Anniversary of the First Proton-Proton Collisions in the CERN Intersecting Storage Rings (ISR) Colloquium

January 18th, 2011 at 14:30 CERN Council Chamber



Programme

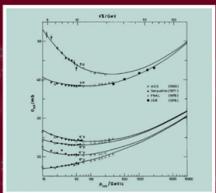
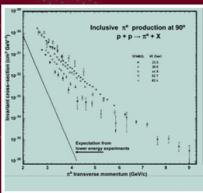
Design and Construction of the ISR, Kurt Hübner

Physics at small angles, Ugo Amaldi (TERA-Novara)

The Impact of the ISR on Accelerator Physics and Technology, Philip J. Bryant

Physics at high transverse momentum, Pierre Darríulat (VATLY-Hanoi)

Concluding remarks, Rolf Heuer



Reflections on the past and future of CERN

What does the history of CERN teach us? How have the ideas which gave

birth to the largest fundamental physics research centre in the world evolved? It is always interesting to stand back and look at the history of one's own organisation in relation to developments in society. On Monday, 13 December, at the University of Geneva's physics faculty, Dominique Pestre will give a lecture and moderate a discussion on these issues.

As director of research at Paris's *Ecole des hautes études en sciences sociales* (EHESS), Dominique Pestre is one of France's principal science historians. With his physics background, he has many publications to his name on the history of physics, the practice of science in the West and on the interactions between science and society in general. He knows CERN very well as he was co-author of *The History of CERN*, a detailed account of the Organization's development from its creation to the 1970s.



Dominique Pestre, Director of Research at Paris's *Ecole des hautes études en sciences sociales* (EHESS).

The well-known science historian, Dominique Pestre, gives his insight into CERN's history and changing trends in the perception of fundamental research.

Why is CERN an interesting subject for a science historian to study?

"CERN is a remarkable success from a scientific and technical but also from an institutional and organizational perspective. The Organization continues to function extremely well in its own particular field of fundamental research. In this respect, it is a fascinating subject for a science historian like me. But CERN is living in a very different climate to the one that made it a success in the 50s and 60s. Next Monday in our discussions we shall be looking back over the changing circumstances in which CERN has evolved."

In what ways has the context in which fundamental physics is conducted changed?

"In the aftermath of the Second World War, an extraordinary aura was conferred on physicists by the development of nuclear weapons. They also had great influence during the subsequent Cold War period. At the time, the prevailing idea in science was reductionism. It was thought that fundamental physics underpinned everything: if you understood the elementary structure of matter, you understood all the higher orders. This view changed in the 1970s, as a result of the thesis propounded by Nobel Prize for Physics Winner, Philip Warren

Anderson, in his article « More is different ». In this article he developed the thesis that specific physics properties emerge at each higher order level. Thus no reduction to the fundamental scale is possible. Ideas on the relationship between fundamental research and applied research have also evolved: We now know that the link is not linear. These changes of perspective are of primordial importance for CERN".

Paradoxically, growing public interest in CERN has been noted over recent years. What do you think the reasons for this are?

"Perhaps there is a renewal of interest in fundamental research that is disconnected from mercantile requirements. Society's increasing preoccupation with materialism has generated a reaction in the form of movements opposed to mercantilism. Physics research at CERN is precisely disinterested in that it has no other goal than itself. It can therefore be seen as a beacon of altruism and transcendence. This is an interesting debate which we can pursue during the discussion."

All the details of the conference are available at:

[http://cdsweb.cern.ch/journal/
CERNBulletin/2010/49/General%20
Information/1311144?ln=en](http://cdsweb.cern.ch/journal/CERNBulletin/2010/49/General%20Information/1311144?ln=en)

Corinne Pralavorio

Muons reveal the interior of volcanoes

With this article, the Bulletin begins a new series providing readers with a look "outside CERN". We will regularly feature scientific activities going on in CERN's Member States.

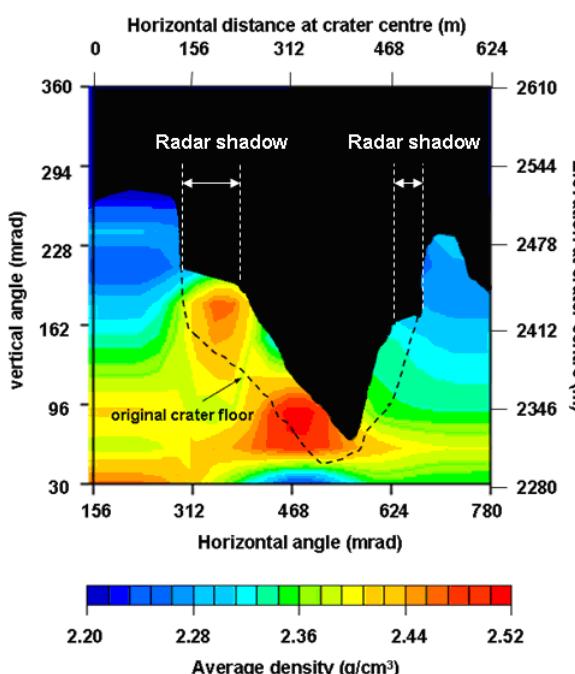
Like X-ray scans of the human body, muon radiography allows researchers to obtain an image of the internal structures of the upper levels of volcanoes. Although such an image cannot help to predict 'when' an eruption might occur, it can, if combined with other observations,

The MU-RAY project has the very challenging aim of providing a "muon X-ray" of the Vesuvius volcano (Italy) using a detector that records the muons hitting it after traversing the rock structures of the volcano. This technique was used for the first time in 1971 by the Nobel Prize-winner Louis Alvarez, who was searching for unknown burial chambers in the Chephren pyramid.

help to foresee 'how' it could develop and serves as a powerful tool for the study of geological structures.



The location of the muon detector on the slopes of the Vesuvius volcano.



Reconstructed average density distribution of the summit of Mt. Asama in Japan. [From H.K.M. Tanaka et al., *Earth and Planetary Science Letters* 263 (2007) 104].



Did you know?

The MU-RAY collaboration involves physicists and volcanologists from the Universities of Florence, Naples, Perugia and Tokyo, as well as from INFN, the Vesuvius Observatory of the INGV, Fermilab and LAL-Orsay. Other volcanoes are being studied with this technique in Japan and in the Lesser Antilles.

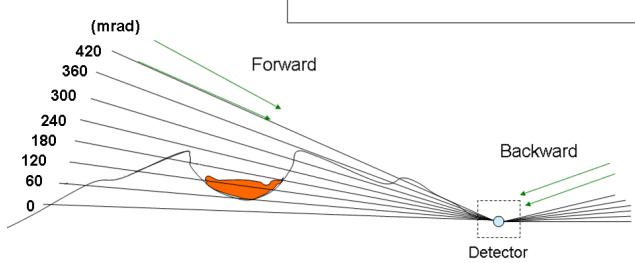
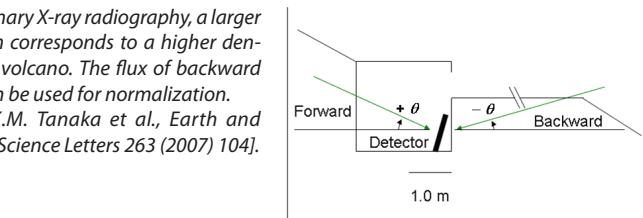
Nuclear Physics (INFN) and the University of Naples Federico II.

From a technical point of view, performing muon tomography of Vesuvius is a great challenge, much beyond what has been done so far. "The morphology of the mountain is complex, partly due to the fact that it has grown in the caldera of a larger volcano, of which what is left is now called Monte Somma," explains Paolo Strolin. Muons have to go through about two kilometres of rock to reach the detector on the opposite side of the volcano, and only muons of very high energy are able to do so. "For a first investigation, we are using the detector already used in Japan, although that volcano was much less thick than Vesuvius", explains Strolin.

The thicker the layer of rock, the larger the detector area must be, otherwise it would take too long to take the data. "We are working on a prototype of a new detector," says Paolo Strolin. "The new system will be modular to globally cover surfaces of the order of tens of square metres. The detectors will have good angular resolution and an improved signal-to-background ratio". The R&D project on the new generation 'muon telescopes' is supported by INFN, the Italian National Institute of Geophysics and Volcanology (INGV), the Italian Government and the University of Naples Federico II.

Francesco Poppi

As for ordinary X-ray radiography, a larger absorption corresponds to a higher density in the volcano. The flux of backward muons can be used for normalization.
[From H.K.M. Tanaka et al., *Earth and Planetary Science Letters* 263 (2007) 104].



The Digital Scientist to be launched in the New Year

● SGTW has been successfully contributing to the international grid community and steadily growing in popularity and appeal, as shown by a readership drawn

from nearly 200 countries that increased by 89% in under two and a half years. Now, the goal is to expand the coverage of the publication to include high-end technologies such as supercomputing, volunteer computing, distributed computing, networks and cloud computing, as well as grid computing. This change in the publication brings with it a new name: The Digital Scientist.

If you've been on a stroll through Restaurant No. 1 or walked through the corridors of Building 600, a colourful poster - with spotlights, a QR code and the words "Coming soon..." - might have caught your attention. This has been brought to you by the team at iSGTW (International Science Grid This Week), the CERN-based grid computing newsletter, and signifies that the publication is being transformed... into The Digital Scientist.

The launch of The Digital Scientist comes along with a "major" redesign and a brand-new website, boasting features carefully chosen to enhance the reader's experience, as part of a complete relaunch in January 2011. The new publication will show how high-end computing resources go beyond the world of physical sciences, encompassing much of modern science, research and the public sphere.

The Digital Scientist will also introduce new interactive features, such as a facility for readers to comment on and rate stories, to share them with social media and other websites, and to take part in polls and surveys. In addition, readers will be able to create or host an existing blog and submit story ideas directly to the editors. The Digital Scientist will also provide the most relevant links to other computing news on the web.

Few, if any, websites provide a single source to learn about all forms of high-end computing. At The Digital Scientist, readers will find a one-stop-shop for all their computing news.

The Digital Scientist Team

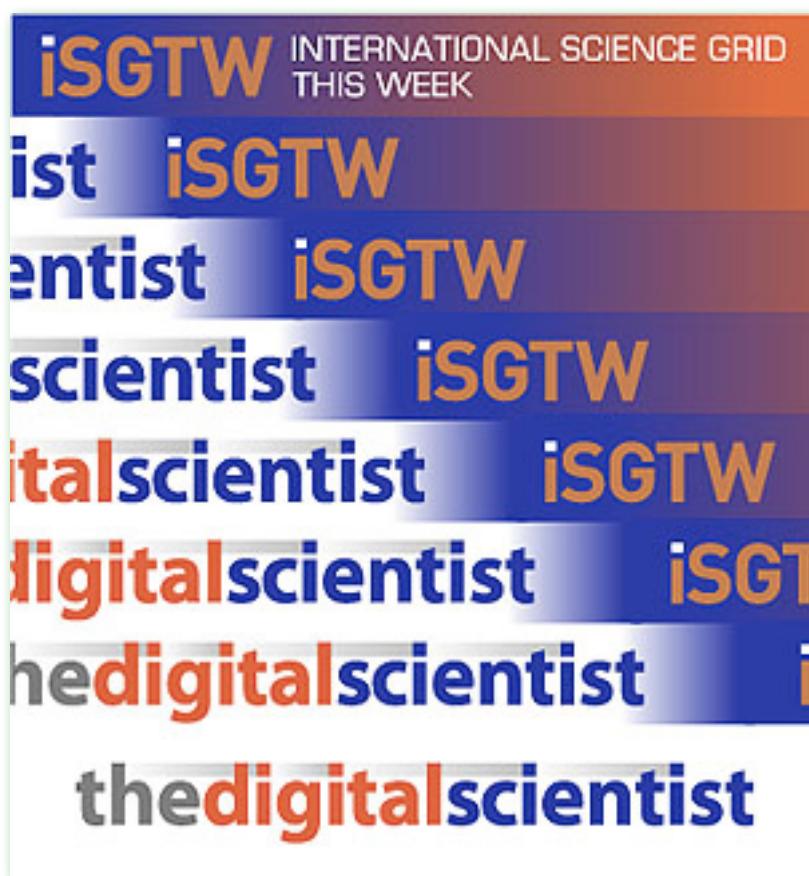


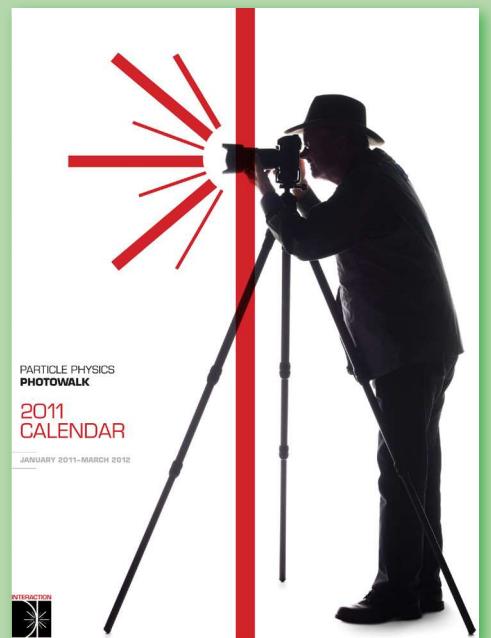
Image courtesy of Andre-Pierre Olivier from e-ScienceTalk.

New calendar features winning photos from Photowalk 2010

The winning photos from Photowalk 2010 will feature in a 2011/2012 calendar, which will be on sale in the Reception from 15 December. You can already download it free of charge at:

<http://www.interactions.org/cms/?pid=1030288>

Katarina Anthony



The zebras come to CERN

Popular Franco-Swiss host Jean-Marc Richard brought Les Zèbres to the Laboratory with a live broadcast. The idea was to let the children themselves host the broadcast. Accompanied by their physics teachers, pupils from junior secondary schools in Golette, Colombières and Drize were given the opportunity to

From 23 to 26 November CERN played host to an unusual group of visitors, who arrived in a red-and-white striped camper. On the tenth anniversary of "Les Zèbres", a children's broadcast on Swiss radio, the show's makers invited 8th and 9th grade pupils from Swiss schools to conduct a live broadcast from CERN.

spend half a day at CERN. Each day, one class came to find out about a particular aspect of the Laboratory and then conduct

a live broadcast with Jean-Marc Richard from 12:10 to 12:30. The young people, aged 13 to 15, had a chance to explore the Universe of Particles exhibition, visit CERN's Control Centre, get involved in demonstrations at the cryogenics laboratory and visit the ATLAS visitors' centre.

A "zebra forum" was set up for young listeners to share their views about the place of science in society and its usefulness. You can visit the forum at:

<http://www.leszebres.ciao.ch/?all=1&id=14012>

To listen to the broadcasts, go to:

<http://www.rsr.ch/#/la-1ere/programmes/les-zebres/?date=23-11-2010>

Laëtitia Pedroso

FORUM // CIAO - Les Zèbres

un forum de l'émission Les Zèbres (RSR - la 1ère en collaboration avec CIA) > mode d'emploi

5 - cire le 23.11.2010 à 21:29:13

je ne sais pas si j'ai rêvé mais vous avez dit ke le cern avait capturé la semaine dernière de l'anti matière c'est géant bravo vive les sciences

6 - denis le 23.11.2010 à 21:31:19

la vie fait partie de la sciences et la sciences fait partie de la vie mais quand on fait des recherches sur la naissance de la planète on se confronte à dieu et c'est trop on s'en fout de savoir d'où on vient je veux savoir ou je vais et avec ces accccccccellierateurs on va dans le mur

7 - frere le 23.11.2010 à 21:31:49

tout ce qui est nul à l'école

8 - cerise le 23.11.2010 à 21:32:38

kan on aura répondu à la question d'où venons nous on aura plus d'autres questions

Pour toi, qu'est-ce qui fait partie de la science ? Pourquoi ?
Penses-tu qu'il faut investir plus ou moins d'argent dans la recherche scientifique ?
23.11.2010
Les enfants ont des droits, mais ont-ils également des devoirs ?
Lesquels ? 16.11.2010
Que penses-tu des aventuriers ?
Et toi quelle aventure aurais-tu envie de faire ? 9.11.2010
Qu'est-ce que veut dire pour toi la

Les Zèbres

Ilu-ve à 1zh1o

CIAO RSR.ch 1ère

bleu-vert communication & le petit ridois

Terminé

Caption

New arrivals

On Thursday 9 December 2010, at the second part of the Induction Programme, members of the CERN Management welcomed recently-recruited staff members and fellows (photographed

here with Jean-Marc Saint-Viteux, Deputy Head of HR Department, and Vincent Vuillemin, CERN Ombuds).

HR Department



Official news

2011 MARS – REFRESHER PRESENTATION

GENERAL PRINCIPLES OF THE MERIT, APPRAISAL AND RECOGNITION SCHEME

Staff members are invited to attend one of the following three information sessions that will outline the general principles of the 2011 annual Merit, Appraisal and Recognition Scheme (MARS).

- Monday 10 January at 16:00-17:00
BE Auditorium Prévessin (864-1-D-02)
– French
- Tuesday 11 January at 15:00-16:00
– Council Chamber (503-1-001) – English
- Thursday 13 January at 15:00-16:00 – Kjell Johnsen Auditorium (30-7-018)
– French

General information on the MARS exercise may also be found on the Human Resources website:

<https://hr-eguide.web.cern.ch/hr-eguide/mars/mars.asp>

*Human Resources Department
Tel. 70674 / 72728*

END-OF-YEAR CLOSURE 2010/2011

As announced in Weekly Bulletin No. 2-3/2010, the Laboratory will be closed from Wednesday 22 December 2010 to Tuesday 4 January 2011 inclusive.

This period consists of:

- 4 days' official holiday, i.e. 24, 25 and 31 December 2010 and 1st January 2011;

- 6 days' special paid leave in accordance with Article R II 4.38 of the Staff Regulations, i.e. 22, 27, 28, 29 December 2010, and 3, 4 January 2011;
- 2 days, 23 and 30 December 2010 to compensate for 25 December 2010 and 1st January 2011 (Article R II 4.39 of the Staff Regulations);
- 2 Sundays, i.e. 26 December 2010 and 2 January 2011.

The first working day in the New Year will be Wednesday 5 January 2011.

Further information is available from Department Secretariats, specifically concerning the conditions applicable to members of the personnel who are required to work during this period.

*HR Department
Tel. 73903*



Take note

CONFERENCE FOR CERN PENSIONERS

Wednesday, 19 January 2011,
2.30 to 4.30 p.m.

Council Chamber,
Main Building 503-1-001

RESEARCH PROJECT

"Optimum brain ageing"

- **"Intelligence and longevity"**
Dr François HERRMANN,
University Hospitals of Geneva (HUG)
- **First results of the questionnaire:
Promotion of Optimum Brain Ageing**
Dr François HERRMANN,
University Hospitals of Geneva (HUG)
- Discussion with the participants.

In French

Admission free

GS Department

CERN SHOP
Christmas sale*

Building 33

Looking for Christmas present ideas ?
CERN card holders will have a special reduction
of 10% on all CERN shop articles

from Monday 13 to Saturday 18 December 10
From 08:15 to 17:45 | On Saturday, 09:00 to 17:15

Electronics Pool acces by car

THE CERN ELECTRONICS POOL MOVES TO BUILDING 13

After 32 years in Building 4 R-050, the CERN Electronics Pool will re-open in Building 13 R009 on

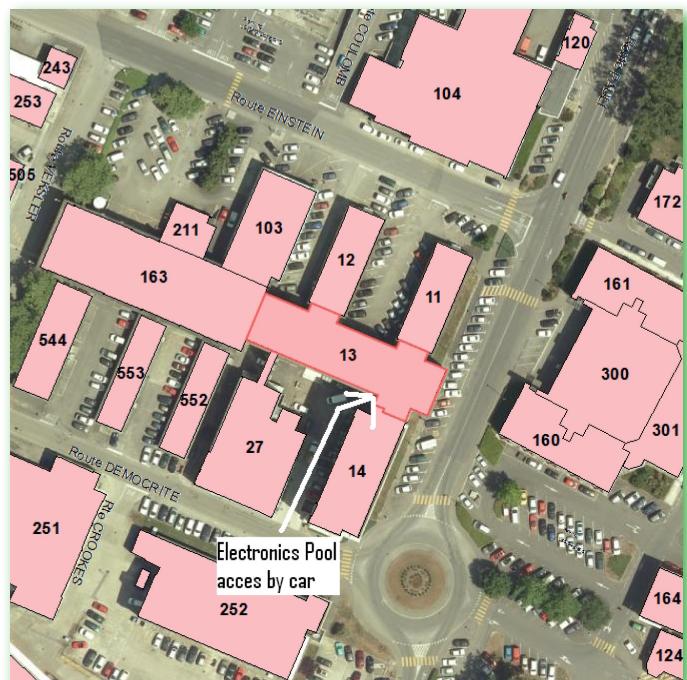
Monday 13 December at 10:00.

As of his date, you will be able to come and choose the instruments you want: oscilloscopes and other measurement instruments, low and high voltage power supplies, modular instrumentation, etc.

Please do not hesitate to consult the catalogue and give us any input you may have.

The CERN Electronics Pool operates on a self-service basis (with a CERN budget code) and is available for any help you may need.

PH Department





Take note

INFORMATION FROM THE CENTRAL STORES

All items sold in the CERN shop (Bldg. 33) are now available in the central stores (Bldg. 73) and can be purchased on-line via EDH "Material Request" or at the "Emergency Desk" of the stores on the ground floor of Bldg. 73.

These items can be found in the CERN catalogue under the "SCEM" codes beginning with 92.

*Department of
General Infrastructure Services (GS)
GS-SEM Group*

CAR STICKERS FOR 2011

The 2011 car stickers are now available.

- Holders of blue car stickers will receive their 2011 car stickers by internal mail as of 15 December.
- Holders of red car stickers are kindly requested to come to the Registration Service (Building 55, 1st floor) to renew their 2011 stickers. This service is open from Monday to Friday from 7.30 am to 5.30 pm non-stop. Documents for the vehicles concerned must be presented.

*Reception and Access Control Service –
GS/ISG/SIS
General Infrastructure Services Department*



Technical training

TECHNICAL TRAINING: AXEL-2011 - INTRODUCTION TO PARTICLE ACCELERATORS

CERN Technical Training 2011: Learning for the LHC!

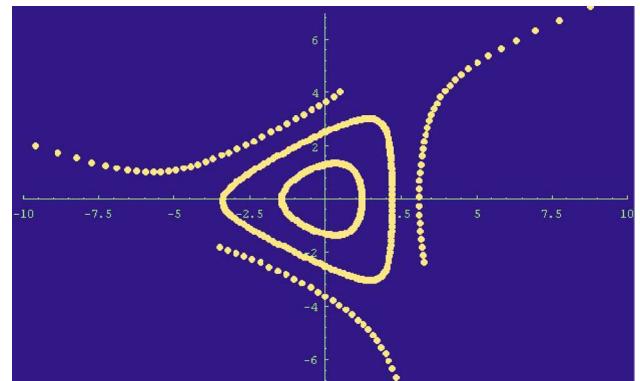
AXEL-2011 is a course series on particle accelerators, given at CERN within the framework of the 2011 Technical Training Program. As part of the BE Department's Operation Group Shutdown Lecture series, the general accelerator physics module has been organized since 2003 as a joint venture between the BE Department and Technical Training, and is open to a wider CERN community.

The **AXEL-2011** course series is designed for technicians who are operating an accelerator, or whose work is closely linked to accelerators, but it is also open to technicians, engineers, and physicists interested in this field. The course does not require any prior knowledge of accelerators. However, some basic knowledge of trigonometry, matrices and differential equations, and some basic knowledge of magnetism would be an advantage.

The series will be composed of 10 one-hour courses (Monday 10.01.2011

- Fri 14.01.2011, from 09:00 to 10:30 and from 14:00 to 15:30 except for Wednesday 12.01.2011: from 14:00 to 15:30 and from 16:00 to 17:30), and given in English with questions and answers also possible in French. The lecturer is Rende Steerenberg, engineer and section leader in the BE-Operation Group. The program will cover: Basic Mathematics; Transverse Optics; Lattice calculations; Resonances; Longitudinal Motion; Leptons; Transfer Lines, Injection and Ejection; Longitudinal and Transverse Beam Instabilities.

This course series is free of charge, but registration is required: participation in all lectures is encouraged, to allow people to gain maximum benefit from the course; registered participants will be invited, and attendance will be recorded in the personal training records. If you are interested in AXEL-2011, please talk to your supervisor and/or your Departmental Training Officer. On-line registration is possible via the training catalogue and the detailed program is available on the AXEL-2011 web page, accessible from <http://www.cern.ch/TechnicalTraining/>



*Organizers: Michael BENEDIKT / BE-OP/73380, Marie-Laure LECOQ/HR-DI/74924
ENSEIGNEMENT TECHNIQUE
TECHNICAL TRAINING
technical.training@cern.ch*



ACCU MEETING

**DRAFT Agenda
for the meeting to be held
on Wednesday 8 December 2010
at 9:15 a.m. in room 60-6-002**

- | | |
|--|---|
| 1. Chairperson's remarks | 8. The new account management system |
| 2. Adoption of the agenda | 9. Crèche progress + Restaurants |
| 3. Minutes of the previous meeting | 10. Reports from ACCU representatives on other committees |
| 4. Matters arising | 11. Users' Office news |
| 5. News from the CERN Management | 12. Any Other Business |
| 6. Report on services from GS department | 13. Agenda for the next meeting |
| 7. The CERN Ombuds | |

Anyone wishing to raise any points under item 12 is invited to send them to the Chairperson in writing or by e-mail to

Michael.Hauschild@cern.ch

Michael Hauschild (Secretary)

ACCU is the forum for discussion between the CERN Management and the representatives of CERN Users to review the practical means taken by CERN for the work of Users of the Laboratory. The User Representatives to ACCU are (CERN internal telephone numbers in brackets):

Austria	G. Walzel (76592)	Norway	J. Nystrand (73601)
Belgium	C. Vander Velde (Chairperson) (71539)	Poland	M. Witek (78967)
Bulgaria		Portugal	P. Bordalo (74704)
Czech Republic	S. Nemecek (71144)	Slovak Republic	A. Dubnickova (71127)
Denmark	J.B. Hansen (75941)	Spain	I. Riu (76063)
Finland	K. Lassila-Perini (79354)	Sweden	K. Jon-And (71126)
France	N. Besson (75650)	Switzerland	M. Weber (71271)
	A. Rozanov (71145)	United Kingdom	M. Campanelli (72340)
Germany	H. Lacker (78736)	Non-Member States	S. McMahon (77598)
	O. Biebel (72974)		D. Acosta (71566)
Greece	G. Tsipolitis (71162)		E. Etzion (71153)
Hungary	F. Siklér (76544)		C. Jiang (71972)
Italy	G. Passaleva (75864)		N. Zimine (75830)
	N. Pastrone (78729)	CERN	E. Auffray (75844)
Netherlands	G. Bobbink (71157)		F. Teubert (73040)

CERN Management is represented by S. Bertolucci (Director for Research and Computing), S. Lettow (Director for Administration and General Infrastructure) and J. Salicio Diez/PH with M. Hauschild/PH as Secretary. Human Resources Department is represented by J. Purvis, the General Infrastructure Services Department by M. Tiirakari, the Occupational Health Safety and Environmental protection Unit by E. Cennini, and the CERN Staff Association by M. Goossens. Other members of the CERN Staff attend as necessary for specific agenda items. Anyone interested in further information about ACCU is welcome to contact the appropriate representative, or the Chairperson or Secretary (73564 or Michael.Hauschild@cern.ch).

<http://cern.ch/ph-dep-ACCU/>



Take note



PUBLICATION OF THE BULLETIN IN 2011

The table below lists the 2011 publication dates for the paper version of the Bulletin and the corresponding deadlines for the submission of announcements. Please note that all announcements must be submitted by 12.00 midday on Tuesdays at the latest.

Bulletin No. Week number	Submission of announce- ments (before 12.00 midday)	Bulletin Web version	Bulletin Printed version
3-4	Tuesday 11 January	Fridays 14 and 21 January	Wednesday 19 January
5-6	Tuesday 25 January	Fridays 28 January and 4 February	Wednesday 2 February
7-8	Tuesday 8 February	Fridays 11 and 18 February	Wednesday 16 February
9-10	Tuesday 22 February	Fridays 25 February and 4 March	Wednesday 2 March
11-12	Tuesday 8 March	Fridays 11 and 18 March	Wednesday 16 March
13-14	Tuesday 22 March	Fridays 25 March and 1 April	Wednesday 30 March
15-16	Tuesday 5 April	Fridays 8 and 15 April	Wednesday 13 April
17-18	Tuesday 19 April	Fridays 21 and 29 April	Wednesday 27 April
19-20	Tuesday 3 May	Fridays 6 and 13 May	Wednesday 11 May
21-22-23 (Ascension)	Tuesday 17 May	Fridays 20 and 27 May	Wednesday 25 May
24-25	Tuesday 7 June	Fridays 10 and 17 June	Wednesday 15 June
26-27	Tuesday 21 June	Fridays 24 June and 1 July	Wednesday 29 June
28-29	Tuesday 5 July	Fridays 8 and 15 July	Wednesday 13 July
30-31	Tuesday 19 July	Fridays 22 and 29 July	Wednesday 27 July
32-33-34	Tuesday 2 August	Friday 5 August	Wednesday 3 August
35-36	Tuesday 23 August	Fridays 26 and 2 September	Wednesday 31 August
37-38	Tuesday 6 September	Wednesday 7 and Friday 16 September	Wednesday 14 September
39-40	Tuesday 20 September	Fridays 23 and 30 September	Wednesday 28 September
41-42	Tuesday 4 October	Fridays 7 and 14 October	Wednesday 12 October
43-44	Tuesday 18 October	Fridays 21 and 28 October	Wednesday 26 October
45-46	Tuesday 1 November	Fridays 4 and 11 November	Wednesday 9 November
47-48	Tuesday 15 November	Fridays 18 and 25 November	Wednesday 23 November
49-50	Tuesday 29 November	Fridays 2 and 9 December	Wednesday 7 December
51-52/1-2	Tuesday 13 December	Friday 16 December	Wednesday 20 December

If you wish to publish a news article or an item in the General Information or Official News sections, please contact

Bulletin-Editors@cern.ch

If you wish to publish an announcement in the Staff Association section, please contact

Staff.Bulletin@cern.ch

Publications Section, DG-CO group





INDUSTRIAL EXHIBITION "11TH GERMANY AT CERN"

Administration Building
(Bldg. 60/61)

Tuesday 25 January: 11a.m. - 5.30 p.m.

Wednesday 26 January: 9 a.m. - 5 p.m.

The Federal Ministry of Education and Research (BMBF), together with CERN, will hold the Industrial Exhibition "11th Germany at CERN". Some 30 German companies will present their latest products/technologies related to the field of particle physics and their services to the scientists and buyers of CERN, establish contacts and find out about future purchasing opportunities.

On 25 January, Dr. B. Vierkorn-Rudolph of the Federal Ministry of Education and Research and CERN Director-General, Prof. R. D. Heuer, will open the exhibition, followed by a tour of the stands.

The main subjects are: electrical engineering, electronics, informatics, mechanical engineering, vacuum & low temperature technologies, instrumentation and safety.

CERN staff wishing to obtain information concerning the programme, the exhibitors and their profiles or to get in contact with exhibitors are requested to contact their department secretariat or use the link:

http://gs-dep.web.cern.ch/gs-dep/groups/sem/ls/Industrial_Exhibition.htm

During the evening reception at the "Globe of Innovation", exhibitors and invited CERN employees will have the opportunity to celebrate the event.

The catalogue of exhibitors and their profile will be available prior to the beginning of the event.

List of exhibitors

1. Astro- und Feinwerktechnik Adlershof GmbH, www.astrofein.com – fine mechanics
2. Babcock Noell GmbH, www.babcock-noell.de – SC magnets, wide range products
3. BOA Balg- und Kompensatoren-Technologie GmbH, www.boa-bkt.com - compensators
4. Bruker ASC GmbH, www.bruker-est.com – SC magnets, cavities, etc.
5. CST AG, Darmstadt, www.cst.com – simulation technology
6. Dräger Safety Schweiz AG, www.draeger.com – safety equipment
7. Eckelmann AG, www.eckelmann.de – machine automation
8. ELMA Trenew Electronic GmbH, www.elma.de – electronics
9. Forschungszentrum Dresden-Rossendorf e.V., www.fzd.de – safety research
10. GE Intelligent Platforms GmbH & Co.KG, www.ge-ip.com – electronics
11. HAMEG Instruments GmbH, www.hameg.de –electronics, power supplies
12. Horst GmbH, www.horst.de – special heating systems
13. LT Ultra Precision Technology GmbH, www.lt-ultra.com –ultra fine mechanics
14. MENNEKES Elektrotechnik GmbH & Co.KG, www.mennekes.de – electro-technics
15. MIKROMAT Werkzeugmaschinen GmbH & Co.KG, www.mikromat-wzm.de –tooling machines
16. NTG - Neue Technologien GmbH & Co.KG, www.ntg.de –nano-technics, special machines
17. powerbridge Computer Vertriebs GmbH, www.powerbridge.de, computer, informatics
18. pro-beam AG & Co.KgaA, www.probeam.com –welding, drilling, coating
19. Radio Frequency Systems (RFS), www.rfworld.com –RF systems
20. RITTER Starkstromtechnik GmbH & Co. KG, www.ritter-starkstromtechnikde – electrical power supplies
21. Röhr & Stolberg GmbH, www.roehr-stolberg.de – engineering, radiation protection
22. Schwanner GmbH, www.schwanner.com –piping, vacuum and low temperature technique
23. Schott Glas, www.schott.com/advanced_optics - special glass and ceramics
24. SIEMENS SUISSE SA, www.siemens.com – broad range of products
25. SIS Struck Innovative Systeme GmbH, www.struck.de. –electronics
26. Teletronik Rossendorf GmbH, www.tz-rotech.de –electronics
27. Thermo Fisher Scientific Messtechnik GmbH, www.thermo.com – scientific instruments
28. transtec Computer AG, www.transtec.de –transport control-technics
29. WAGO Contact SA, www.wago.ch –electro & contact-technics

EXHIBITION ORGANIZER

Federal Ministry of Education and Research, Germany
Heinemannstrasse 2, D - 53175 Bonn

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