

THE FIRST NEUTRON BEAM HITS EAR2

On 25 July 2014, about a year after construction work began, the Experimental Area 2 (EAR2) of CERN's neutron facility n_TOF recorded its first beam. Unique in many aspects, EAR2 will start its rich programme of experimental physics this autumn.



The last part of the EAR2 beamline: the neutrons come from the underground target and reach the top of the beamline, where they hit the samples.

Built about 20 metres above the neutron production target, EAR2 is in fact a bunker connected to the n_TOF underground facilities via a duct 80 cm in diameter, where the beamline is installed. The feet of the bunker support pillars are located on the concrete structure of the n_TOF tunnel and part of the structure lies above the old ISR building. A beam dump located on the roof of the building completes the structure.

Neutrons are used by physicists to study neutron-induced reactions with applications in a number of fields, including nuclear waste transmutation, nuclear technology, nuclear

astrophysics and medical physics. "The research programme that will be carried out at EAR2 is very broad and very important for CERN," confirms Sergio Bertolucci, CERN's Director for Research and Computing. "By combining the existing n_TOF facility and the new EAR2, CERN is now able to provide a unique infrastructure to the neutron physics community, which can be enriched by its contribution."

At EAR2, the neutron-induced reactions will be studied with very high accuracy and in very good experimental conditions thanks to the very high instantaneous neutron

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GETTING TO KNOW INTERNATIONAL GENEVA

Over recent years, CERN has been tightening its links with fellow organisations in Geneva's vibrant international community.

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A word from the DG

GETTING TO KNOW INTERNATIONAL GENEVA

This has brought home to me just how important it is for such a diverse group of international organisations to be located in the same place as CERN. In some cases, the relevance to CERN's missions is clear, and for a few, the links go way back. When the International Telecommunication Union organised the World Summit on the Information Society in 2003, for example, it was natural for CERN to get involved with a side event on the Role of Science in the Information Society. And similarly, it is clear that we have a strong stake in the work of organisations such as the World Intellectual Property Organization, and that our infrastructure makes the partnership with UNOSAT a natural fit. But what of the other international

organisations, around 30 of them, or the 250 NGOs that are based here?

The acting head of the United Nations Office at Geneva, Michael Møller, has launched a campaign to make the role of international Geneva better known, and he's invited CERN to be part of it. With our recent Observer status at the UN, I am delighted to take part, and will be working with Michael to strengthen ties and increase awareness of the great work done by international Geneva. Over the coming months, we'll be looking at ways of increasing awareness within the international organisations of the work done by others, as well as working on the perception of international Geneva more

generally. In the meantime, a good place to start getting closer to international Geneva is Michael Møller's blog at the Huffington Post. Dip in – you might be surprised by what you learn.

Rolf Heuer

(Continued from page 1)

THE FIRST NEUTRON BEAM HITS EAR2

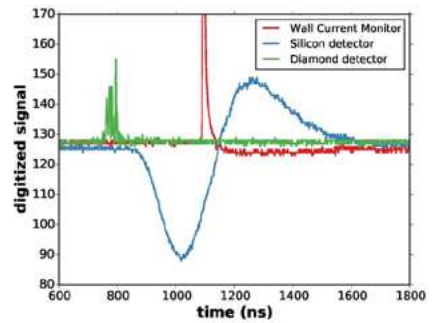
flux provided by the facility. The facility also includes a room, isolated by a concrete wall from the main experimental area, in which scientists will prepare the samples to be measured and where the data acquisition stations are located. "The first experiments will be installed this autumn and our schedule is full until the end of 2015," says Enrico Chiaveri, spokesperson of the n_TOF collaboration.

The reactions that will be studied at EAR2 sometimes require unencapsulated radioactive samples, which is why the whole facility is designed to be in class A, the most stringent standard for radiation protection currently in use. In particular, the dump comprises three different layers: the first one – made of borated polyethylene – to stop thermal neutrons, the second one – made of iron – to stop faster neutrons and the last one – concrete – to make everything radiation-tight. "The beam line of EAR2 is also well shielded and equipped with collimators and a large-aperture magnet for shaping the neutron beam and reducing the background caused by other particles produced in the spallation process," adds Christina Weiss, n_TOF run coordinator and CERN fellow from the Vienna University of Technology.

On 25 July, the much awaited moment came when the detectors – a combination of silicon sensors, MicroMegs and diamond

detectors – measured the first neutron beam in EAR2. "It was a low-intensity beam," says Frank Günsing, n_TOF physics coordinator and a CERN scientific associate from CEA Saclay, "but it showed that the whole chain – from the spallation target to the experimental hall, including the sweeping magnet and the collimators – is working well and that we are ready to complete and commission this exciting new facility."

Antonella Del Rosso



The first signal recorded by the various detectors at n_TOF's EAR2 on 25 July.

LS1 REPORT: SUMMER COOL DOWN

As the final LS1 activities are carried out in the machine, teams have been cooling down the accelerator sector by sector in preparation for beams.



Liquid nitrogen, arriving at CERN on trucks, is injected into exchangers that pre-cool the helium flow used to cool the magnets.

The third sector of the LHC to be cooled down - sector 1-2 - saw the process begin last week. During the cool-down phase, survey teams are measuring and smoothing (or realigning) the magnets at cold. By the end of August, five sectors of the machine will be in the process of cooling down, with one (sector 6-7) at cold.

The LHC Access Safety System (LASS) is now being commissioned, and will be validated during the DSO tests at the beginning of October. As teams consolidate the modifications made to LASS during the shutdown, many points were closed for testing purposes.

The CSCM (copper stabiliser continuity measurement) tests have been completed in the first sector (6-7) and no defect has been found. These results will be presented to the LHC Machine Committee next week. CSCM tests will start in the second sector in mid-August.

Following many months of effort, the teams are at last making good progress in the Long Straight Section. All beam instrumentation equipment around the warm part of the beam tube were re-installed at the end of last week.

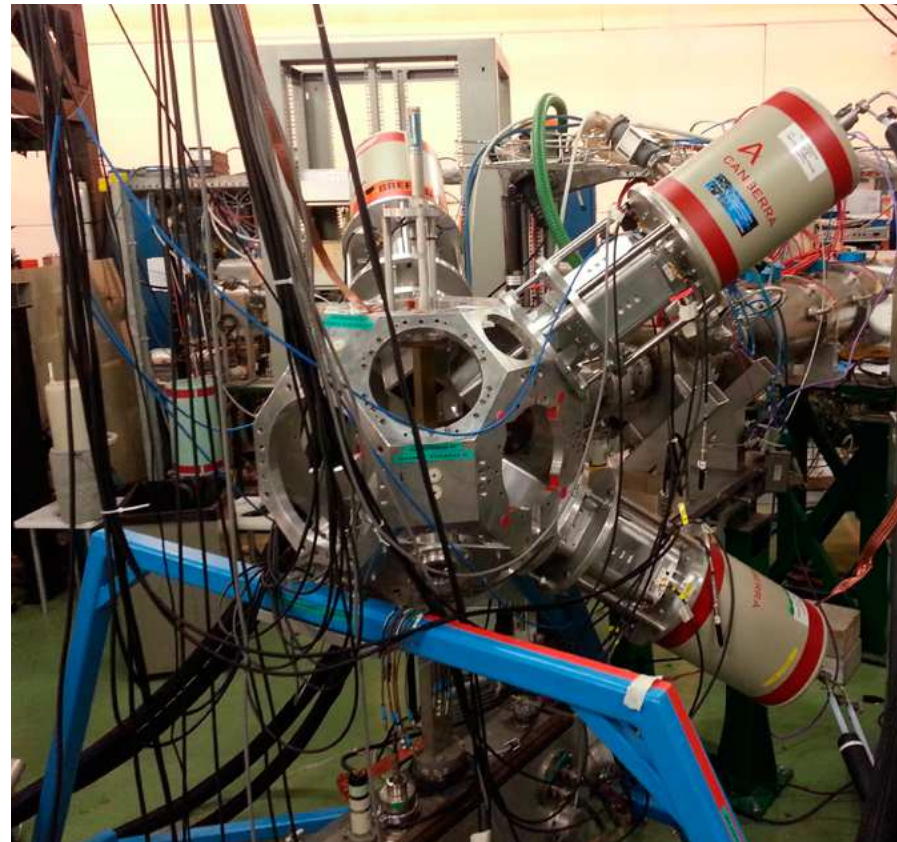
Elsewhere in the machine, teams are celebrating the completion (or near-completion) of work. The last pressure tests were carried out on Thursday, 31 July, and the last short circuit tests will be complete by mid-August.

The SPS beam dump replacement - announced in last week's LS1 Report - has been planned for mid-August. Otherwise, work on the machine's hardware testing phase continues as scheduled.

Katarina Anthony

ISOLDE BACK ON TARGET

On Friday 1 August, the ISOLDE installation, supplied by the beams of the PS Booster, restarted its physics programme. After a shutdown of almost a year and a half, there was a real buzz in the air as the first beam of protons hit the target of the first post-LS1 ISOLDE experiment.



The ISOLDE Decay Station (IDS), one of ISOLDE's two new permanent experimental stations.

Many improvements have been made to the ISOLDE installation during LS1. One of the main projects was the installation of new robots for handling the targets (see photo right). "Our targets are bombarded by protons from the PS Booster's beams and become very radioactive," explains Maria Jose Garcia Borge, spokesperson for the ISOLDE collaboration. "They therefore need to be handled carefully, which is where the robots come in. The robots we had until now were already over 20 years old and were starting to suffer from the effects of radiation. So LS1 was a perfect opportunity to replace them with more modern robots with electronic sensor feedback."

On the civil engineering side, three ISOLDE buildings (115, 507 and 601) have been demolished and replaced with a single building, 508, which will house the ISOLDE team. It includes a new control room, a data storage room, three laser laboratories, a biology and materials laboratory, and a room for visitors, from which they can admire the ISOLDE hall in comfort. Another building, 197, has been extended to house the MEDICIS

project, and two other buildings (198 and 199), completed at the end of 2012, are gradually being equipped with new electrical systems as well as the cooling and ventilation systems needed for the future HIE-ISOLDE.

In the ISOLDE hall itself, new permanent experimental stations have also been installed: "One of the permanent stations – called IDS or ISOLDE Decay Station (see photo above) – is dedicated to nuclear spectroscopy," says Maria Jose Garcia Borge. "It will allow us to study beta decay and to measure the lifetime of excited states. The other permanent station – VITO – will be used for combined material measurements and biological analyses."

As for the experiment that started this week, it is picking up where the promising analyses carried out in 2012* left off: "Just before LS1, we carried out a medical physics experiment on terbium, directed by the Institut Laue-Langevin (ILL) and the Paul Scherrer Institute (PSI)," explains Maria Jose Garcia Borge. "It involved in vivo studies of the use of terbium

isotopes for both detecting and treating cancerous tumours. Generally, two different chemical elements are used for diagnosis and therapy. Using isotopes of a single chemical element could be very useful in improving the reliability of the process."

For the remainder of 2014, the ISOLDE programme is already very busy: almost 40 low-energy experiments are already planned between now and December. At the same time, the necessary infrastructure for the HIE-ISOLDE superconducting accelerator will continue to be installed. Its first cryomodule is due to be installed in spring 2015, ready for high-energy physics to begin in the autumn of the same year.

* For more information on the medical physics experiment carried out at ISOLDE in 2012, see the CERN Courier Volume 53.

Anaïs Schaeffer



One of the new target-handling robots installed by ISOLDE during LS1.

THE LIGHT AT THE END OF THE TUNNEL GETS BRIGHTER

With the LHC restart just a few months away, the future of the accelerator is as hot a topic as ever. In June, in the framework of the Medium-Term Plan, the CERN Council endorsed the construction of the LHC's successor, the High-Luminosity LHC (HL-LHC), which is set to take over from 2025 onwards.



Group photo at the HiLumi LHC/LARP Annual Meeting, 2013.

"This marks an important stage in the approval process of the HL-LHC," says project coordinator Lucio Rossi. "It all started back in 2010 when the project was launched. In 2011, we obtained a European Commission grant for the conceptual design study under the Seventh Framework Programme (FP7) and, in 2013, the CERN Council identified the project as a priority at its special session dedicated to the European Strategy for Particle Physics. Finally, the Council this year confirmed the priority status of the HL-LHC project in the CERN scientific and financial programme by approving the Medium-Term Plan for the years 2014 to 2019. In so doing, it also took note of the total cost of the project up to 2025, which was provided for information in the MTP. That's all very positive and enables CERN and its partners to prepare a long-term plan for developing the technologies and implementing the project."

The HL-LHC project is being conducted by an international collaboration comprising CERN and many European, American and Japanese laboratories. Its aim is to increase the LHC's nominal luminosity – in other words, its ability to produce useful collisions – by a factor of 5 to 10 (peak luminosity by 5 and integrated luminosity by 10). This would allow an increase in the statistics produced for the Higgs boson* and other new particles, which would facilitate their analysis. Of course, the LHC accelerator chain will have to be upgraded (LIU project) in parallel as well as the detectors of the ATLAS, CMS, ALICE and

LHCb experiments, on the same time scale as the accelerator's upgrade.

Only 1.2 km of the existing accelerator will need to be replaced (mainly at Points 1 and 5) in order to turn the LHC into the HL-LHC. The new hardware (see box), which is based on innovative technologies that are mostly still under development, will be installed in the tunnel during the third long shutdown (LS3), starting in 2022. Thus rejuvenated, the LHC will have seen its useful lifetime extended by another ten years or so, until around 2035.

* More information on the research prospects of the ATLAS and CMS experiments at the HL-LHC is available in the proceedings of the 37th International Conference on High-Energy Physics (ICHEP).

Anaïs Schaeffer

State-of-the-art technology

Four components that are crucial to the future HL-LHC are currently being developed by CERN and its partners:

- new niobium-tin (Nb_3Sn) superconducting magnets: these quadrupoles (inner triplets), developed by a collaboration comprising CERN and US-LARP (US LHC Accelerator Research Program), will be able to reach more than 12 tesla (compared with 8 tesla for today's LHC). The collaboration is also developing 11-tesla dipoles (the LHC magnets are limited to 8.3) to house the LHC's new arc collimation system;
- new radiofrequency cavities: "crab cavities", based on a technology never used before in a proton accelerator, are currently under development at CERN, in partnership with US-LARP and a UK collaboration comprising the University of Lancaster, the Science & Technology Facilities Council (STFC) and the Cockcroft Institute;
- a new generation of collimators developed by CERN together with numerous European partners including the University of Manchester, London's Royal Holloway University, the University of Huddersfield (UK) and the Spanish National Research Council (CSIC) in Valencia;
- new magnesium-diboride-based (MgB_2) superconducting cables capable of transporting electrical currents of 20 to 150 kA. These cables will make it possible to move the power converters currently located in the LHC tunnel to the surface, thereby greatly facilitating technical operations. They are being developed by CERN, the University of Southampton, INFN and a Genoa-based company, Columbus.

All these components, based on new superconducting technologies, will play a decisive role in the future of experimental particle physics as they will also be used in accelerators beyond the HL-LHC.



Short magnets of the new Inner Triplet Quadrupole (SQXF) made with advanced superconductor Nb_3Sn . These magnets are currently under construction at CERN by the TE-MS group.

YOUR IPHONE AS A KEY-LOGGER

In the past, we have repeatedly elaborated on the computer security risk of using smartphones. Today, something new for the paranoid: did you know your smart phone can be used to spy on your PC's keyboard?!

In fact, the tiny accelerometer, gyroscope and orientation sensors that your smartphone uses to determine its tilt and movements can also determine the letters you type on your computer. Thus, it acts as a hardware "key-logger"! It only requires your smartphone to be put close to your computer keyboard and to run a corresponding, malicious app. The rest is done by the highly precise sensors which can record keyboard vibrations and subsequently the letters you type. In a dedicated study, students of the Georgia Tech College of Computing were able to decipher complete sentences with up to 80 percent accuracy using an iPhone*. In a nice twist, the same feature can also be used to "infer the occurrence of

tap events on the touchscreen as well as the tapped positions on the touchscreen".

But don't worry yet! So far these highly targeted attacks have never been used against CERN. However, this does not mean that your iPhone (or your Android phone) is an innocent little gadget. On the contrary: It is a full-blown pocket PC which needs to be taken care of properly. Update it regularly and be careful when installing additional apps, as some malicious apps are known to infect smart phones (see our articles "iPhones, Androids, and history repeating" and "Is your Android running a temperature?"). Other apps are quite greedy and forward much too much

of your personal information stored on your phone - for example, your location, address book and local data - to their data centre for further aggregation, analysis and, presumably, future marketing.

** Alternatively, wireless keyboards emit sufficient information to reconstruct your key strokes...*

Check out our website for further information, answers to your questions and help, or e-mail Computer.Security@cern.ch.

If you want to learn more about computer security incidents and issues at CERN, just follow our **Monthly Report**.

Computer Security Team

Training

MANAGEMENT AND COMMUNICATION COURSES – PLACES AVAILABLE

Please note that there are some places available on the following management and communication courses starting in September or October.

For more information on the course, visit the Training Catalogue site. You can then sign up online.

Course	Next session	Duration	Language	Availability
Managing Time	15 September 9 October 7 November	20 hours	English	2
Managing Stress	6 October 7 October	16 hours	English	5

NEW PROCEDURE FOR DECLARING CHANGES IN FAMILY AND PERSONAL SITUATION

On taking up their appointment, Members of the Personnel (employed and associated) are required to provide official documents as evidence of their family situation. Any subsequent change in their personal situation, or that of their family members, must be declared in writing to the Organization within 30 calendar days.

As part of their efforts to simplify procedures, the Administrative Processes Section (DG-RPC-PA) and the HR and GS Departments have produced a new EDH form entitled "Change of family and personal situation", which must be used to declare the following changes:

- birth or adoption of a child;
- marriage;
- divorce;
- entry into a civil partnership officially registered in a Member State;
- dissolution of such a partnership;
- change of name;
- change of nationality or new nationality.

Members of the Personnel must create the form themselves and provide the information required for the type of declaration concerned, indicating, if applicable, any

benefit from an external source that they or their family members are entitled to claim that is of the same nature as a benefit provided for in the Organization's Staff Regulations. They must also attach a scan of the original certificate corresponding to their declaration.

The form is sent automatically to the relevant Departmental Secretariat, or to the Users Office in the case of Users, Cooperation Associates and Scientific Associates, and is then handled by the services within the HR Department. The Member of the Personnel receives an EDH notification when the change in personal status has been recorded.

The information recorded remains confidential and can be accessed only by the authorised administrative services.

N.B.: If allowances and indemnities paid regularly are affected, the next payslip constitutes a contract amendment. In

accordance with Article R II 1.15 of the Staff Regulations, Members of the Personnel are deemed to have accepted a contract amendment if they have not informed the Organization to the contrary within 60 calendar days of receiving it.

Further information can be found on the 'Change of family situation' page of the Admin e-guide: https://admin-eguide.web.cern.ch/admin-eguide/famille/proc_change_famille_en.asp

Any questions about the procedure should be addressed to your Departmental Secretariat or the Users Office.

If you encounter technical difficulties with this new EDH document, please e-mail service-desk@cern.ch, explaining the problem.

The Administrative Processes Section (DG-RPC-PA).

Seminars

WEDNESDAY AUGUST 06, 2014

- 09:15 Summer Student Lecture Programme Course Introduction to Cosmology (2/3) Main Auditorium
- 10:15 Summer Student Lecture Programme Course Astroparticle Physics (2/3) Main Auditorium
- 11:15 Summer Student Lecture Programme Course Antimatter in the Lab (2/3) Main Auditorium
- 12:00 Summer Student Lecture Programme Course Discussion Session Main Auditorium

THURSDAY AUGUST 07, 2014

- 09:15 Summer Student Lecture Programme Course Introduction to Cosmology (3/3) Main Auditorium
- 10:15 Summer Student Lecture Programme Course Astroparticle Physics (3/3) Main Auditorium
- 11:00 Collider Cross Talk Higgs Mass

Measurements with gg from ATLAS and CMS TH Conference Room

- 11:15 Summer Student Lecture Programme Course Antimatter in the Lab (3/3) Main Auditorium
- 12:00 Summer Student Lecture Programme Course Discussion Session Main Auditorium

FRIDAY AUGUST 08, 2014

- 10:15 Summer Student Lecture Programme Introduction Closing Lecture Main Auditorium

SUNDAY AUGUST 10, 2014

- 09:00 Scottish Universities SUSSP70: International Neutrino Summer School 2014 (INSS 2014)

MONDAY AUGUST 11, 2014

- 08:00 TH institutes Exact Results in SUSY Gauge Theories in Various Dimensions TH Conference Room

TUESDAY AUGUST 12, 2014

- 11:00 LHC Seminar Gamma measurements in Bs->DsK and other tree-level decays Council Chamber

CINEGLOBE FILM FESTIVAL PRESENTS PARTICLE FEVER IN CELEBRATION OF CERN'S 60TH ANNIVERSARY | 20 SEPTEMBER

The film *Particle Fever* follows six brilliant scientists during the launch of the Large Hadron Collider, which marked the start-up of the biggest and most expensive experiment in the history of the planet, pushing the boundaries of human innovation.

Seeking to unravel the mysteries of the universe, 10,000 scientists from over 100 countries joined forces in pursuit of a single goal: to recreate the conditions that existed just moments after the Big Bang and find the Higgs boson, potentially explaining the origin of all matter. But our heroes face an even bigger challenge: have we reached the limit of our capacity to understand why we exist?

Directed by Mark Levinson, a physicist turned filmmaker, and masterfully edited by Walter Murch (*Apocalypse Now*, *The English Patient*), *Particle Fever* is a celebration of discovery, revealing the very human stories behind this epic machine.

The film will be followed by a panel discussion with director Mark Levinson, Academy Award-winning editor Walter Murch and some of the physicists featured in the film. The audience will have the chance to put their questions to the panel.

After the panel discussion, join us for a drink and the opportunity to watch some CERN scientists become amateur comedians for one night only! From the quirks of quarks to cultural conundrums, you'll hear all about the lighter side of life in cutting-edge science.

Doors open at 6 p.m.

Film (in English with French subtitles) and panel: 7 - 9.30 p.m.

Comedy (in English): 10 - 11 p.m.

The event will be held in a marquee behind the Globe of Science and Innovation, CERN

CONCERT | UNITED NATIONS ORCHESTRA AT CERN | 19 SEPTEMBER

The United Nations Orchestra will give a concert on the occasion of CERN's 60th anniversary.

Under the baton of conductor and artistic director Antoine Marguier, the Orchestra will have the pleasure to accompany the soloist Maestro Matteo Fedeli, who, under the patronage of the Permanent Mission of Italy to the United Nations, will perform on a Stradivarius violin. The programme for the concert comprises:

- Jacques Offenbach, *Orpheus in the Underworld Overture*
- Franz von Suppé, *Poet and Peasant Overture*
- Camille Saint-Saëns, *Introduction & Rondo Capriccioso* for solo violin and orchestra
- Georges Bizet, *Carmen Suite No. 1*
- Franz Lehár, *Gold and Silver Waltz*
- Gioachino Rossini, *William Tell Overture*

Doors open at 6 p.m.

The concert will take place in a marquee behind the Globe of Science and Innovation, CERN

THE PORT: HACKATHON AT CERN | APPLY NOW!

Are you innovative and do you like to share your ideas with other enthusiasts? Would you like to apply your knowledge and skills to humanitarian problems? Are you motivated to work on issues beneficial to society?

Apply for our problem-solving workshop - also known as a hackathon / makeathon - taking place at CERN from 31 October to 2 November. You will work in interdisciplinary teams on topics inspired by other NGOs such as the ICRC, UN Development Programme, UNOSAT and UNITAR.

Example topics are:

- Virtual tower camera for air fields
- The conflict zone humanitarian demarcation certificate
- The \$10 inflatable fridge for field operations
- Wearable sign language interpreter
- Can mobile communication data reveal election fraud?
- Tracking and demarcation system for dogs in rescue and de-mining operations

The four teams of seven hand-picked innovators will be assembled six weeks ahead of the event to give time for preparation as some hardware might be needed. In this time they can contact 'experts-on-call' from different fields of

expertise for support.

The application period just started and is open until 11 August - find out more on our website: www.theport.ch and get ready to change the world. If you want to sign up as an 'expert-on-call' and support the teams with your expertise, please sign up here.

This is your chance to have an impact on our future!



2014 CERN ACCELERATOR SCHOOLS: BEAM LOSS AND ACCELERATOR PROTECTION

The US-CERN-JAPAN-RUSSIA Joint International Accelerator School is organising a course on Beam Loss and Accelerator Protection to be held in Newport Beach, California, USA from 5-14 November, 2014.

This school is intended for physicists and engineers who are or may be engaged in the design, construction, and/or operation of accelerators with high power photon or particle beams and/or accelerator sub-systems with large stored energy. Application deadlines are 15 August and 4 September.

Further information on this Joint School can be found at:

- <http://cas.web.cern.ch/cas/JAS/Newport%20Beach%202014/NPBadvert.html>
- <http://indico.cern.ch/event/287647/>
- <http://uspas.fnal.gov/programs/JAS/JAS14.shtml>