To an even more exciting 2015 !

Special Interest Articles

- Upcoming Event
- Partner News
- Job Advertisements

Individual Highlights

- Research News
- Fellows Activity
- Secondments

oPAC went from highlight to highlight in 2014. We have successfully offered several additional workshops and an advanced school on accelerator optimization to our Fellows and the international accelerator community. The feedback on these training events was excellent and we are all delighted about the way the project is accepted within the community. In addition, the hard work of our Fellows has resulted in more and more outputs. For example, several ESRs contributed to the International Beam Instrumentation Conference (IBIC) which was held in Monterey, USA and *you will find overview articles about some of these contributions in this newsletter edition.*

Close collaboration between universities, research centers and leading industry partners is a central element in oPAC's research and training approach. The company CIVIDEC are one of our beneficiaries and host a Fellow who is carrying out R&D into the next generation of diamond-based detectors. CIVIDEC are also a very active member of the network's Steering Committee and have, amongst others, hosted a Topical Workshop on beam diagnostics in Vienna in May 2014. It is with great pleasure and pride that I can announce in this newsletter that CIVIDEC were awarded the first prize in the category "export" of a very prestigious start-up entrepreneur award in Austria. *I wholeheartedly congratulate the CEO, Prof. Erich Griesmayer and his whole team !*

Several oPAC research projects cover the Large Hadron Collider at CERN and possible upgrade scenarios. An even longer-term perspective is taken by the Future Circular Collider (FCC) study. Within an international collaboration the challenges related to a circular accelerator with a circumference of 80-100 km are being investigated. The study's first annual meeting will take place from 23rd - 27th March 2015 in Washington D.C. and cover all aspects of this novel machine. *Registration has just opened and can be completed via the workshop homepage.*

Now that the year is getting closer to the end, it is a good time to draw up plans for 2015 events. Our Computer Aided optimization of Particle Accelerators (CAoPAC) workshop in March, an LA³NET Workshop on Laser-based Beam Diagnostics and the Conference on Laser Applications at Accelerators in Mallorca, Spain will all be excellent opportunities for discussing the state-of-the art and presenting latest research results and *I hope that you will join us.*

Finally, I would like to thank you for your continuing support throughout this year and wish you a wonderful Christmas time and good start into 2015 !

Carsten P. Welsch, Coordinator

Research News from oPAC Fellows

Cryogenic BLMs for the Superconducting Magnets of the LHC

– Marcin Bartosik,

The Beam Loss Monitor (BLM) detectors close to the interaction points of the Large Hadron Collider are currently located outside the cryostat, far from the superconducting coils of the magnets. In addition to their sensitivity to lost beam particles, they also detect particles coming from the experimental collisions, which do not contribute significantly to the heat deposition in the superconducting coils. In the future, with beams of higher energy and brightness resulting in higher luminosity, distinguishing between these interaction products and dangerous quench-provoking beam losses from the primary proton beams will be challenging. The system can be optimised by locating BLMs as close as possible to the superconducting coils, inside the cold mass in a superfluid helium environment, at 1.9 K. The dose then measured by such Cryogenic BLMs would more precisely correspond to the real dose deposited in the coil. The candidates under investigation for such detectors are based on p+ - n - n+ silicon and single crystal Chemical Vapour Deposition (scCVD) diamond, of which several have now been mounted on the outside of cold mass of the superconducting coil in the cryostat of the Large Hadron Collider magnets

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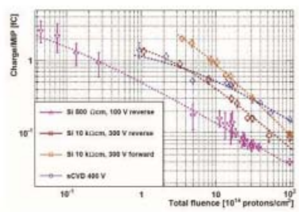
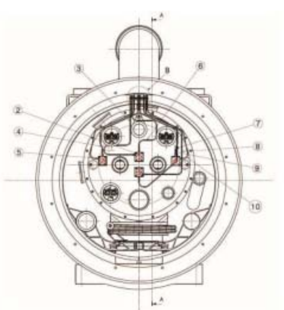


Degradation curves of scCVD diamond detector at 400 V compared with 10 kΩcm silicon detector at 300 V and 500 Ωcm silicon at 100 V reverse as reference curve (courtesy of C. Kurfürst).

The cryogenic BLM specifications represents a completely new and demanding set of criteria that has never been investigated in such a form before. The main aim of the cryogenic irradiation test was to investigate the radiation hardness of ionizing radiation detectors in liquid helium at 1.9 K. After careful preparations, the irradiation experiment was performed in the IRRAD facility at CERN. At the end of the cryogenic irradiation a total integrated fluence of $1.22 \cdot 10^{16}$ protons/cm2 was reached, corresponding to an integrated dose of about 3.26 MGy for the silicon and 3.42 MGy for the diamond detectors.



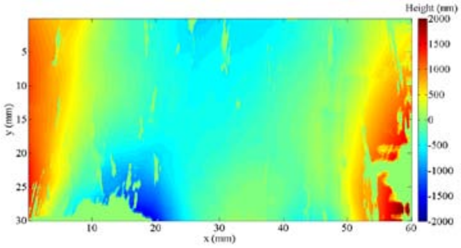
Cross section of an LHC dipole magnet showing the outer cryostat, the inner cold mass housing the superconducting coils and the position of cryogenic radiation detectors on the end of the cold mass.

The silicon has a larger signal than the diamond at the beginning of irradiation, but the situation changes rapidly, see upper figure on the left. The reduction in signal corresponding to 20 years of LHC operation (2 MGy) is of a factor of 52 ± 11 for the silicon device at 300 V and of a factor of 14 ± 3 for the diamond detector at 400 V. As a safety critical system, the long term stability of the BLM detectors is a high priority criterion. It has therefore been decided to install several Cryogenic BLMs on the outside of cold mass of existing LHC magnets. During a Long Shut-down 1 of the LHC four cryogenic radiation detectors were mounted on the outside of the cold mass containing the superconducting coils in the cryostat of two LHC dipole magnets. These four detectors consisted of one 500 µm scCVD diamond detector, see lower figure to the left, item #1, one 100 µm silicon detector, item #2 and two 300 µm silicon detectors (items 3 and 4).

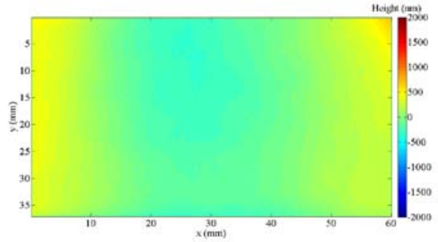
After the interconnection between the two magnets where the detectors were located was closed and the cryostat were under vacuum a Current-Voltage (IV) curve measurement of the detectors was performed. The results show that the leakage current is at a reasonably low level, which should allow the measurement of beam losses with a high signal to noise ratio.
These first cryogenic radiation detectors installed in operational, superconducting LHC magnets will not only allow the behaviour of the detectors to be tested in realistic conditions, but also determine the validity of the integration in a setup at 1.9 K, in a magnetic field and under vacuum. First results with beam are expected in early 2015, when the LHC starts its second operational run.

Beam Size Measurements using Synchrotron Radiation Interferometry at ALBA – Laura Torino

ALBA is a 3 GeV third generation synchrotron light source operative for users since 2012. Due to the small emittance of the machine it is not possible to measure the beam size by using a simple imaging system because of the diffraction limit. Measurements of the beam size are nowadays routinely performed using a x-ray pinhole camera. In order to have a second reliable measurement of this parameter the double slit synchrotron radiation interferometry technique (SR interferometer) has been proposed and is still under development. Preliminary tests were performed at the diagnostic beamline Xanadu using the already existing optical components where the quality was not good enough to provide the best results. For this reason Xanadu had been upgraded changing all the components of the optical path. The components were measured to guarantee the good optical quality. A result for the flatness of the old Xanadu extraction mirror and the one mounted after the upgrade is shown in the figures below. The flatness of the new mirror was measured to be λ/7 while the old mirror has a flatness of λ.

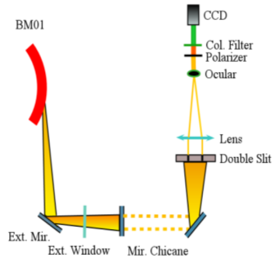


Old Xanadu extraction mirror



New Xanadu extraction mirror

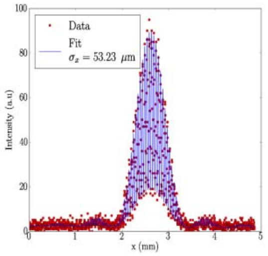
After the beamline upgrade we were able to perform SR interferometry beam size measurements. The scheme of the experimental setup is shown in the figure below.



Interferometer setup

Using the interferometer, the degree of spatial coherence of the synchrotron radiation produced by the beam is measured, and from this the beam size is inferred. The visible part of the radiation produced by the electron beam passing through a bending magnet (BM01) is extracted by an in-vacuum mirror located at 8.635 m from the source and at 6 mm from the beam orbit plane. In this way the extraction mirror is not in contact with hard x-rays that may compromise its characteristics. The light is extracted through a window and guided out from the tunnel up to the optical table in the beamline by 6 mirrors. The interferometer system is composed by a double slit aperture that produces the interferogram. The width of the slits is 1 mm and the height is chosen depending on the quantity of light needed. The separation between the two slits is variable from 8 mm to 22 mm. immediately after the double slit an apochromat lens with focal length of 500 mm and flatness λ/10 is located. After the focal point an ocular is introduced to magnify the image. A polarizer and a 540 nm narrow bandpass color filter (width 10 nm) are used to select the σ radiation polarization and energy. Finally the interferogram is captured by a CCD camera and analyzed.

The technique provides good results for the horizontal beam size measurement (~53 µm) but must still be improved for the vertical beam size (~24 µm).

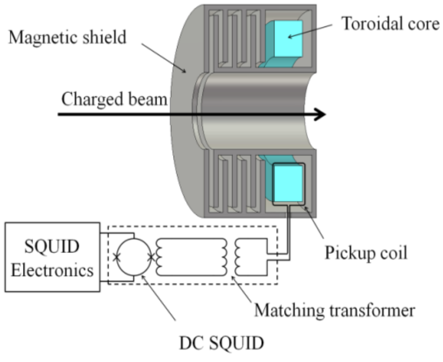


Experimental data (red dots) and fit (blue line)

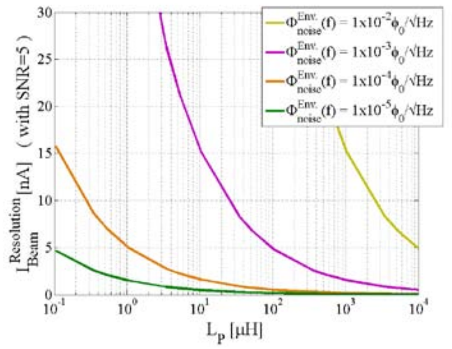
Design of a Cryogenic Current Comparator - Miguel Fernandes

Low-intensity charged particle beams present a considerable challenge for existing beam current diagnostics; this is particularly significant for coasting beams with average current below 1 nA which is the minimum resolution of DC Current Transformers.

The CCC works by coupling the magnetic field induced by the travelling particle beam into a SQUID (Superconducting QUantum Interference Device) device, which is a very sensitive magnetometer, see the figure below.



The current resolution of the monitor will be fundamentally limited by the different noise contributions. These are the intrinsic noise level of the SQUID plus its read-out electronics, the thermal noise of ferromagnetic core that was estimated from the measured complex permeability via the fluctuation-dissipation theorem, and external interferences that can be induced from mechanical vibrations, stray magnetic fields or RF interferences. Using these sources the achievable beam current resolution was estimated as a function of the self-inductance of the pickup core, see figure below.



To increase their dynamic range, the SQUID devices are normally used in the Flux-Lock Loop (FLL) mode configuration. In this mode the stable operation requires the slew-rate of input signal to be limited. Signals during AD injection (instant of highest slew-rate) are several orders of magnitude above the practically achievable maximum limit. The study of how the different system parameters: coupling transfer function, FLL gain and bandwidth, and total system noise influence the slew-rate stability limit was presented. The design of a low-pass filter to ensure proper operation for the AD beam parameters was also presented.

The contribution also covered the design of a new cryostat to house the CCC monitor, which is being developed together with the TE-CRG group at CERN. This included the heat-load budget estimation and the mechanical design analysis, aiming at reducing total heat in-leak and the effect of mechanical vibrations in the monitor. To satisfy the specification for having a stand-alone solution from the cryogenic point-of-view, the cryostat will be connected in a close cycle to a helium re-condensation unit, powered by a pulse-tube cryocooler.

Network News

EU Project Administration Training Day

The oPAC EU Project T.E.A.M. organized a full day training event on European-funded project administration for institutions from across Europe on 5th December 2014 at the University of Liverpool.

The oPAC project management activities had been recognized as European 'success story' by the European Commission as part of the mid-term review meeting and had been showcased via various events. This meant the time was ripe to share best practice with partner organisations and interested external representatives from other disciplines and institutes. The topics of training covered project audits from an auditor's perspective, project management and reporting from FP7 to Horizon 2020, experiences gained throughout FP7 and communication of best practice in ITN coordination.

It is expected that bringing administration representatives together in this way will provide an excellent basis for future initiatives. oPAC Coordinator Professor Carsten P. Welsch declared the event a great success saying, 'The delegates clearly engaged with the speakers and the discussions were highly productive. The next step is to build on this to create a sustainable network of administrators as a forum for optimising processes in the same way that scientific communities function.'

oPAC Project T.E.A.M. members Dr. Rob Ashworth and Ms. Samina Faisal also both made presentations at the event.

Upcoming oPAC Event

CAoPAC Workshop at GSI

A Workshop on Computer Aided Optimization of Particle Accelerators (CAoPAC) Workshop will be held on 11th-13th March 2015 at GSI in Darmstadt, Germany. This international workshop is dedicated to providing an overview of the computer resources commonly used in the particle accelerators infrastructures. The use and development of computational tools have become a crucial point to commission, operate and optimize the different aspects involved in these kinds of facilities.

The workshop will be composed of five sessions covering various aspects of accelerator design, operation, and optimization:

- beam dynamics simulations,
- controls systems,
- design and optimization of accelerator components,
- particle physics simulations, and
- generation and propagation of radiation.

The event will also feature a poster session in which all participants will be invited to present and discuss their work.

The first session starts off the workshop with an introduction to some of the computational tools used for beam dynamics simulations. The session begins with an overview discussing the strengths and capabilities of some of the more commonly used optics software, and then goes into greater detail about tools used for more complex problems involving multi-particle collective effects.

The control system is designed to convey all monitor, control, model-based, and computed data from all accelerator, facility, experimental, safety and operations subsystems to accomplish supervisory control, automation, and operational analysis. During the second session, the main challenge in control system and data analysis will be faced. During normal operation of an accelerator a number of primary particles is lost from the driven beam and interacts with the environment. As most of the processes connected to the beam losses are too complex to formulate analytically, Monte-Carlo approach is used. The third session covers optimization and the fourth session will present the tools which can be used to determinate the secondary particles produced by the beam and how they can be used to optimize beam diagnostics.

The last session concerns the development and the application of tools to simulate the several kinds of radiation produced or induced by the beam and how they may be exploited in the accelerator physics. The section will be focused on the importance of tools such as SRW or WAVE to generate the synchrotron radiation produced by the beam passing through bending and/or insertion devices, or tools like Zemax and XOP to simulate and later construct transport lines for beam diagnostics.

The oPAC Fellows took the lead in the organization of this event and all are very pleased to be able to bring together an exciting panel of speakers who are leading experts in a wide range of topics related to computational accelerator physics.

Further details and registration information can be found at the workshop home page: https://indico.cern.ch/event/333414/)

Fellows Activity

oPAC Fellows Laura Torino and Michele Carla attended the Italian Physical Society 100th Annual National Congress

oPAC Fellows Laura Torino and Michele Carla were invited to attended the Italian Physical Society (SIF) 100th Annual National Congress as speakers. The event which took place in Pisa from 22nd-26th September 2014 gathers approximately 600 Italian physicists. The Congress is composed of Plenary Sessions and 8 Parallel Sessions.

Both presented talks about their work on Wednesday 24th September during the Accelerator Physics session, Laura's focussing on 'Transverse Beam Size Measurements at ALBA Synchrotron Light Source' whilst the title of Michele's talk was 'Lattices for 3rd Generation Synchrotron Light Sources'.

Miguel Fernandes @ BI-Day 2014

The BI-Group at CERN organised on the 16th of October a one day event – BI-Day 2014 – with the aim of providing a platform for technical staff, students and Fellows to present their projects to a wider audience. It included talks on the work performed during LS1 as well as the development of instrumentation for ISOLDE, AD and CTF3/CLIC and diagnostics linked to improving the operation and understanding of the LHC and its injector chain.

Miguel Fernandes presented an update on his Cryogenic Current Comparator project that is being currently developed for the Antiproton Decelerator in collaboration with GSI, University of Jena and Helmholtz Institute of Jena.

The agenda of the BI-Day 2014, as well as the different presentations can be found here: indico.cern.ch/event/336612

Miguel Fernandes visits schools in Lisbon

oPAC Fellow Miguel Fernandes who is based at CERN visited the primary and secondary schools that he himself had attended in the town of Queluz, in the vicinities of Lisbon, on the 14th of November. He started by talking to the students about the world that exists at the microscopic scales and how can these be peered by scientists with the help of particle accelerators. Then he showed the students a few basic experiments demonstrating for example electromagnetic effects, which where kindly borrowed from the "Circo da Física", a student's club from the physics department of the Universidade Técnica de Lisboa.

Miguel enjoyed being with a group of very interested students that showed a genuine and vibrant curiosity for physical sciences as well as for his own work place, CERN.

Taking Outreach Videos to new Heights

Scientific outreach is a core element of oPAC activities. All project partner have actively engaged with the general public via various open days, lab visits, internships that were offered to summer students, but also contributions to major scientific outreach events such as the ESOF earlier this year or next year's Outreach Symposium which will be held in the Liverpool Convention Centre on 26th June 2015.

In addition, all oPAC Fellows were asked to produce a short video about their research activities. Many have already completed their video and the remaining ones shall be finalized early next year. **Two particularly nice ones are now accessible via the oPAC home page and youtube.**

Enjoy !

Pavel Maslov – Device Control Database Tool

Manuel Cargnelutti – Common HW and SW Platforms for Particle Accelerators

Pavel Maslov participated to the PCaPAC 2014

oPAC Fellow Pavel Maslov from COSYLAB participated to the PCaPAC 2014 conference which was held at KIT, Germany and presented a talk about "TestBed - Automated Hardware-in-the-Loop Test Framework" and a poster about the Device Control Database Tool (DCDB).

Secondments

Within the frame of their 3-year research projects, the oPAC Fellows have many opportunities to build international links. This includes contributions to international conferences, participation to topical workshop and schools as opportunities to start discussions, establish new contacts and present the results from their own research.

In this context a special opportunity are scientific secondments where Fellows can spend some time working at a different institute, thus gaining additional insights that fall outside of their core R&D activities and help broadening their experiences and skills.

Daria Astapovych undertook a secondment at Computer Simulation Technology AG in Darmstadt, Germany at the beginning of October 2014.
CST is a software company with headquarters in Darmstadt. It develops and markets high performance software for the simulation of electromagnetic fields in all frequency bands. The main working branches are in industries as diverse as Telecommunications, Automotive, Electronics, and Medical Equipment.

CST STUDIO SUITE is one of the company's products and extensively used across the particle accelerator community. It comprises various modules dedicated to specific application areas.

During her secondment, Daria worked predominantly with the CST PARTICLE STUDIO package, allowing the simulation of the motion of charged particles in electromagnetic fields, and MICROWAVE STUDIO which targets microwave RF applications. Below, one of the results from the work done during her stay is shown.
Experts from CST helped Daria to master and learn the most important and interesting features of the code quickly. Daria found that the change in activity during her secondment helped her not only to learn something new, but also greatly assisted her in her own project, allowed for personal growth and the establishment of new professional connections.

Thermo Fisher SCIENTIFIC
The world leader in serving science

Blaine Lomberg, oPAC Fellow at the Cockcroft Institute and the University of Liverpool, spent two weeks at an R&D Company called Thermo Fisher Scientific in New York, USA. Thermo Fisher is one of two major brands within the company and is a world leader in serving science. It provides customers with a diverse range of high-end analytical instruments, technologies and solutions within all areas of science.

The Thermo CIDTEC division is a direct partner within the oPAC consortium and offers a unique set of cameras and imagers. In particular their **C**harge **I**njection **D**evice (CID) cameras are a very interesting piece of technology when used as a beam diagnostic instrument in particle accelerators. They can be used to monitor radiation or to measure the profile of the light generated by charged particle beams, with an exceptionally high dynamic range.

In collaboration with Thermo Fisher Scientific the CID technology was tested in the area of beam instrumentation, especially to further evaluate the limitations in which the device can measure halo particles in a beam. This is in direct relation to Blaine's main research project topic which involves studying the composition of particles within the tail and halo region of a particle beam.

During the visit, the performance of a brand-new version of Thermo CID821 camera was critically evaluated. This camera is intended for measuring signals with an extremely high dynamic range, i.e. to observe light emission signals in the very low intensity regime, while simultaneously observing signals in the very high intensity regime. Observing the very dim regions of the beam is particularly difficult to measure with conventional detectors and cameras however, the CID camera makes this possible. This possibility is due to its unique pixel design, in which excess charges can be injected into the silicon substrate without saturating any pixels, while performing a signal readout.

During his secondment Blaine characterized the camera with standard detector tests for determining its readable noise and linearity with respect to measuring the amount of light in correlation to charge obtained. In addition, various measurement algorithms were used to determine the limits and capabilities of the camera and to ultimately optimize the device. Several evaluations were made and discussed with experts from Thermo Fisher, indicating ways how the device performance might be further improved in the future.

Blaine felt working within an R&D company as opposed to the academic sector was a new and enlightening career experience. He commented that: "The knowledge gained from working first hand within industry is vital for any prospective scientist to flourish". He has gained insight into how a Company operates as well as learnt how to test the boundaries and limitations with technology in respect to imaging devices and how to improve them with respect to software and electronics.

Manuel Cargnelutti was in Lund, working at the European Spallation Source for his first secondment for six weeks, between April and May 2014.

At ESS many studies and early developments are going on to develop the future machine beam diagnostics. In particular, the Beam Position Monitor system will include in total more than 140 BPM detectors of different sizes and types. The electronics attached to each detector will be required to provide position and phase measurement with state-of-the-art accuracy and resolution.

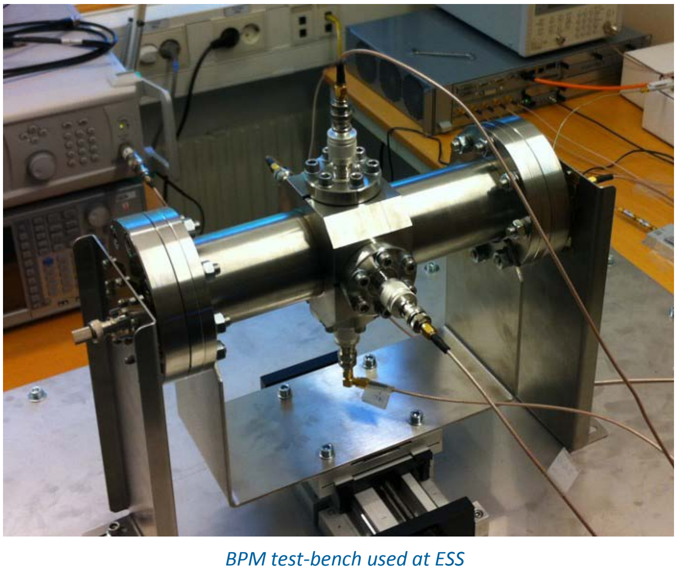
Libera Single Pass H is an instrument intended for phase, position and charge monitoring in hadron and heavy ion LINACs, therefore a potential off the shelf solution. The instrument was tested at the ESS laboratory, to prove the feasibility of operation with ESS beam conditions. To give a realistic picture of the device performance, different testing setups were evaluated, including all the signal and environment conditions foreseen for the final ESS LINAC operation.

To evaluate the performance of the instrument, several test-setups and a BPM test-bench were used. The latter is a section of the beam pipe with a BPM in the middle of it. Inside of the pipe, the beam is simulated with current impulses which pass through a wire, exciting electromagnetic signals which are captured by the BPM pickups. Mechanical slides can be used to control the wire position, offering the possibility to calibrate the instruments and perform the position measurements. Figure 1 shows the BPM test-bench designed and assembled at ESS.

The evaluation covered position and phase measurements, where resolution, precision and accuracy were evaluated separately. Long-term stability was evaluated too, performing periodic measurements over a 24 hour period, controlling the environment temperature conditions. Finally, also the interlock signal response time was measured. An extensive report on the measurements can be found at the link:

www.i-tech.si/file/download/355_d510aadf9bf0

The achieved results show that Libera SPH meets the ESS requirements in almost all the conditions, providing accurate results with good temperature stability.



BPM test-bench used at ESS

Partner News

News from Bergoz: Current Transformer Calibration Method based on Individual Element Calibration

To perform calibration of a measurement system, transfer functions of each element of the measurement chain are individually measured. The transfer function of the full chain is obtained by mathematically combining these. Using such a method allows to replace single elements without re-measuring the full chain; to reestablish calibration only the proper transfer functions need to be combined.

This method was established to calibrate separately the elements of the Turbo-ICT/BCM-RF fast bunch charge measurement system. The Turbo-ICT/BCM-RF working principle is based on the excitation of a resonance at a frequency of typically 180 MHz. For bunches a lot shorter than the resonance wavelength the apex of this resonance is only proportional to the bunch charge. The BCM-RF measures this apex on a logarithmic scale to extent dynamic range. Its output is a DC voltage logarithmically proportional to the input charge. Due to this working principle the Turbo-ICT/BCM-RF is less sensitive to dark current and other background signals.

The first calibration step is to measure the 3-port S-parameters of the Turbo-ICT using a vector network analyzer. The response must be corrected for reflections, which occur only in the laboratory but not in the accelerator. After applying corrections the frequency-domain response is inverse Fourier-transformed to obtain the time-domain response of the Turbo-ICT to a Dirac pulse of normalized charge.

In a second step the Turbo-ICT is excited by a fast pulser and its output resonance is sent into the BCM-RF. The signal of the fast pulser is changed by a programmable step attenuator to scan the dynamic range of the BCM-RF. In this step only a relative dependence of output voltage on input signal is established. Input signal amplitude remains unknown.

Third, the scan is repeated but this time the BCM-RF is replaced, e.g., by an oscilloscope to measure peak-to-peak voltages of the Turbo-ICT resonance. Together with step 2 this allows to relate BCM-RF output voltages to input resonance peak-to-peak voltages, i.e. the BCM-RF transfer function is determined.
Fourth, losses in the cable connecting Turbo-ICT and BCM-RF or oscilloscope, respectively, are measured with a network analyzer at the Turbo-ICT resonance frequency. These losses are deduced from the measured peak-to-peak voltages to obtain peak-to-peak voltages at the Turbo-ICT output.

Finally, relating the previously obtained time-domain Turbo-ICT response and the determined peak-to-peak voltages at the Turbo-ICT output allows to find the input charges corresponding to the measured BCM-RF output voltages.

Consequently, the full system has been calibrated by measuring its elements individually. Turbo-ICT, cable or BCM-RF can be replaced. Only the new element has to be characterized. Calibration of the new system is just mathematics.

Accuracy of such a calibration is limited by the reconstruction of the Turbo-ICT time-domain response and the measurement of the resonance peak-to-peak voltages. Taking into account accuracy of laboratory equipment, an accuracy of the Turbo-ICT/BCM-RF charge measurement of a few percent seems achievable.

FREIA at Uppsala University

At our recently erected Facility for REsearch In Accelerator Physics (FREIA) in Uppsala one of the first projects is developing the radio-frequency generation and distribution system and testing of superconducting spoke accelerating cavities for the European Spallation Source. In March the Helium liquefier passed its acceptance test and delivers over 140 litre liquid Helium per hour at 4 K. Recently the horizontal cryostat HNOSS)see picture) was delivered and is connected to the Helium liquefier and tested down to 4 K. The cryostat is equipped with a further cooling stage to produce 2 K Helium in a Joule-Thomson valve. The sub-atmospheric pumps needed to produce the flow to the valve are installed and are presently connected to the Helium recovery system. Testing at 2 K with a dummy cavity is foreseen before Christmas, around which time we expect delivery of the first spoke cavity such that proper testing can commence early next year. Other ongoing projects concern the development of efficient solid-state power amplifier modules and a non-resonant power combiner. A further thread is an initial investigation into the feasibility of a combined THz free-electron laser with a Compton source for FREIA.

Job Advertisements

PhD Vacancies in the QUASAR Group

There are currently several openings for PhD positions for start on 1.10.2015 (or sooner): This includes R&D into the *characterization of the longitudinal and transverse energy distribution of electrons emitted from photocathodes* in close collaboration with colleagues from ASTeC, as well as studies into *advanced optical diagnostics for accelerators and light sources* where new ways to measure beam emittance and longitudinal beam profile shall be developed.
Finally, there is an opportunity for work on *laser-electron beam Interaction in synchrotron light sources*. The latter is a joint PhD project with oPAC partner SOLEIL. You would carry out most of your first year of studies in the UK, join the team at SOLEIL for year 2 and 3, and finally complete all data analysis and write your thesis in the UK during the final year.

For further information about either of the three projects or to apply, please send an email to Prof. Carsten P. Welsch.

Physicist at the MIT

Since 2009 the unique accelerator facility for high-precision tumour therapy with ion beams is operated at the University Hospital Heidelberg (HIT) in Germany. In Marburg a second accelerator facility of this type will now be put into operation, the “Marburger Ionenstrahl-Therapiezentrum (MIT)”. There are several position vacancies within the accelerator group

Physicists (male/female)

for the following tasks:

- Commissioning and retuning of Linac, Synchrotron and transfer lines
- Organization of the accelerator operation and maintenance periods
- Optimization of the accelerator equipment and settings
- Radiation safety tasks (training will be offered)
- Participation in the rotating shift operation (7/24) of the accelerator facility
- Involvement in the on-call duty for technical systems or radiation safety

You will need to have a qualified university degree and excellent knowledge and experience in:

- Accelerator physics, e.g. application of beam optics codes like MAD-X
- Up-to-date soft- and hardware skills with respect to accelerator control systems
- Usage of modern measurement techniques and data analysis tools
- Project management and documentation
- Good knowledge of German.

After an induction period at HIT in Heidelberg your place of work would be the ion beam therapy facility in Marburg. A regular exchange of operation experiences between both facilities HIT and MIT will be organized and part of your work.
If you have a problem-solving work attitude and used to work within a team, please contact the head of HIT accelerator operation Andreas Peters.

oPAC Project Manager

The oPAC network is currently recruiting a new Project Manager and we invite applications for this important role. Within the project you would be responsible for the co-ordination and management of the project in close collaboration with the network coordinator, Prof. Carsten P. Welsch. This will include building strong links with EU project partners and dissemination of all project outcomes.
You will have a degree (or equivalent qualification) or relevant professional experience and experience with management of FP7 projects, Marie Curie projects and national and international funding bodies. A good command of English, experience working in international contexts and a PhD in Physics, Engineering or a related area is desirable. The post is available until 31 January 2016.

Apply now !

oPAC Events

March 11th - 13th 2015	CAoPAC : Computer Aided Optimization of Particle Accelerators, GSI, Darmstadt, Germany
June 22nd – 23rd 2015	4th oPAC Topical Workshop Technology Transfer, Liverpool, UK
June 24th – 25th 2015	Advanced Researcher Skills School, Liverpool, UK
June 26th 2015	Symposium on Accelerators for Science and Society, Liverpool, UK

Events

March 23rd - 27th 2015	First Annual Meeting of the FCC study, Washington D.C., USA
March 23rd – 24th 2015	LA³NET Topical Workshop on Beam Diagnostics, Palmanova, Mallorca, Spain
March 25th – 27th 2015	Laser Applications at Accelerators Conference 2015, Palmanova, Mallorca, Spain
May 3rd – 8th 2015	IPAC15, Richmond, Virginia, USA
Aug 23rd–28th 2015	FEL 2015, Daejeon, South Korea

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NOTICE BOARD

DEADLINE FOR CONTRIBUTIONS TO THE NEXT NEWSLETTER 15th March 2015.

MERRY CHRISTMAS AND A HAPPY NEW YEAR!

About oPAC

The optimization of the performance of any Particle ACcelerator (oPAC) is the goal of this new network within the FP7 Marie Curie Initial Training Network (ITN) scheme. oPAC aims at developing long term collaboration and links between the involved teams across sectors and disciplinary boundaries and to thus help defining improved research and training standards.

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 289485.