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Recruitment, research, training – the oPAC project starts its activities

Screening hundreds of applications for the 22 vacant early stage researcher positions within the oPAC project has kept the consortium busy since the start of the project. Following an international advertising campaign, it was great to see such a large number of high quality applications from all parts of the world.

Most positions have now been filled and the majority of fellows has started with their research projects. They will contribute to an international effort to optimize the performance of existing and future particle accelerators through investigations into charged particle beam dynamics, the development of novel beam diagnostics methods, numerical studies and R&D into advanced control systems. You will find background information about several of our fellows in this newsletter edition.

In parallel to cutting edge research across the network **professional training** within oPAC has also started: All fellows were enrolled into internationally renowned **schools** in accelerators physics: Several joined the CERN Accelerator School (CAS) in Granada, Spain and all others currently participate to the Joint Universities Accelerator School (JUAS) in Archamps, France. These several week-long schools will provide them with a solid base for their future research and will also allow them to network with many other researchers who are at a similar career stage.

Next on their agenda will be a week-long **school on complementary skills** which will be held in Liverpool between June 3rd – 7th 2013. The gaining of complementary skills is one of the aims of the European Higher Education Area as it promotes training to ensure that all graduates have the skills necessary to enter the global job market. oPAC will provide both subject-specific and generic training from a variety of academic and industry trainers. This workshop will be the first time all oPAC fellows meet.

Finally, oPAC will also organize a series of **Topical Workshops** that will be open to the wider community. Each workshop will focus on a targeted research area and will bring together leading researchers from academia and industry, as well as early stage researchers. The main aims of these workshops are to review the state of the art, knowledge exchange and discussions about how to best pave the way for future (joint) research projects.

This series will be started by a two day workshop on *Grand Challenges in Accelerator Optimization* which will be held at CERN, Geneva on June 26th and 27th. All fellows will participate to this event; a full program will be published shortly on the oPAC web page – watch this space !



Carsten P. Welsch, Coordinator

Meeting of the oPAC Steering Committee

The second meeting of the Steering Committee took place in Brussels on Monday 10th December 2012. New Adjunct Partners were introduced to the Committee who approved their accession to the Network. Members of the Committee considered the training of Fellows over the next twelve months, setting planning in place for one School and two Topical Workshops. The first oPAC skills school is scheduled for the week commencing 3rd June 2013. It will be organized in Liverpool and will be attended by all Fellows. The week

commencing 24th June 2013 shall see two, one day, introductory events at CERN, which all Fellows will attend: Training by CST on their *Particle Studio* Suite and by Bergoz on Beam Instrumentation. The events will be followed by a 2 day workshop on the *Grand Challenges in Accelerator Optimization*, and meetings of the oPAC Supervisory Board and Steering Committee.

Finally, it was tentatively decided to hold the Network's mid-term review meeting in Barcelona on 14th and 15th October.



First Training for oPAC Fellows: CERN Accelerator School

The CERN Accelerator School (CAS) took place 28th October to 9th November 2012 at the University of Granada, Spain. This school is internationally renowned as providing introductory and intermediate training to accelerator scientists. The two week school included sessions on accelerators and current developments; beam instrumentation; transverse, longitudinal beam and electron beam dynamics. The oPAC Consortium decided to enroll all fellows joining the network in this School in order to provide

them a sound training background as they commence their projects within the network.

Seven newly appointed oPAC fellows took part in this School.



New to the Network

Over the last three months further recruitment has taken place within the project with 15 fellows recruited from the 22 vacancies advertised. Below are the profiles of six new fellows.

Marcin Bartosik grew up in Krakow, Poland and studied at the Jagiellonian University in Krakow from 2005, where he studied general physics for three years. Thereafter, he decided to focus on experimental physics. Since the focal points of his interests were always lasers, engineering and electronics, he decided to undertake a Master's degree, focusing on a research and development of an optoelectronic device for fibre Bragg grating spectroscopy. After obtaining his Master's degree he decided to join an international team developing the first Polish synchrotron light source facility – Solaris. Since then, he has gained unique experience in synchrotron light source construction and design, and developed his knowledge in radiation protection. Contact with the Solaris team of

highly experienced, cutting edge research accelerator scientists and engineers, helped him discover a great interest in accelerator physics and the desire to pursue a PhD in that field. Marcin is enrolled in a PhD program at Marian Smoluchowski Institute of Physics, Jagiellonian University in Krakow, Poland. Marcin joined oPAC as a Marie Curie Fellow in October 2012 and is based at CERN, Switzerland. He is working in the Beam Loss Monitoring group with a focus on the development of a Beam Loss Monitors for use in cryogenic environments foreseen to be used in the upgraded Large Hadron Collider.



Emilia Cruz Alaniz was born in Guadalajara, México in July 1985. She eventually moved out to live in Mexico City to pursue her professional goals of studying Physics in the Science Faculty at the Universidad Nacional Autónoma de México (UNAM).

As an undergraduate in Physics, she participated in an exchange program and studied one semester in the University of California Berkeley. She also started to work with the experimental nuclear and high-energy physics group in the Instituto de Física at UNAM and was involved in the CREAM project (Cosmic Ray Energetics and Mass). As part of this project Emilia spent a summer in the LPSC in Grenoble, France. Her work in this project consisted in analysing the resolution of one of the detectors called the Cherenkov Camera. Emilia obtained her Bachelor's degree in August of 2009.

Emilia continued studying for a Master's in Physical Science with specialization in High Energy Physics. This time she worked in the ALICE experiment at the LHC. As part of this project she made two different stays at the CERN laboratory, the first one in 2010 and the second one in 2011 to work on the development of her thesis. She worked on this project analysing the resonances phi and rho by its decays in kaons and pions respectively in proton-proton collisions at 7 TeV. She obtained her Master's degree in January of 2012.

Currently Emilia is a Marie Curie Fellow within the oPAC project and enrolled as a PhD student within the University of Liverpool. Her research will focus on the development of designs for possible LHC upgrade options.



Pavel Kavrigin received his MSc. degree at the Saint Petersburg State University of Russia (SPbSU) in 2011. His graduate research at the Department of Computational Physics was related to numerical simulations in particle and nuclear physics with applications in hadron therapy. The title of his Master's thesis was 'Simulation of processes of interaction of charged particles with matter in hadrontherapy tasks'. Part of the research was also dedicated to the study of Cerenkov and Askaryan effects via simulation of charge distribution in liquid and gas media. Another important aspect of the research was high performance computing – parallel algorithms and distributed environments. The results of this work were presented in several publications and conference talks. Pavel also participated in SPRINT Lab (SPbSU-Intel) and conducted a series of lectures on high



performance computing solutions of Intel Corporation.

He is now employed as an early stage researcher at CIVIDEC Instrumentation GmbH (Vienna, Austria) within oPAC.

The topic of his research is 'Development of a versatile beam loss monitor'. This topic covers theory of interaction of particles with matter and related simulations, principles of particle detecting technologies, data processing, design and construction of the detector as well as beam tests and experimental investigation of its performance. This research will be the main focus of his PhD thesis at Vienna University of Technology.



Konstantin Kruchinin was born in Aleksandrovsk-Sakhalinsky, Russia in June 1988. After finishing school he entered Tomsk Polytechnic University (TPU) where he was conferred a Master's degree in February 2011. In 2011 he was also appointed as a part-time engineer in the Applied Physics Department. In the summer of 2009 Konstantin undertook an internship at the Joint Institute for Nuclear Research in Dubna, Russia where he participated in an ALICE experiment (CERN, Switzerland). His activity was devoted to the analysis the detector effects by extracting information about gluon structure functions from the data obtained by the modelling of the processes of heavy quarkoniums (s.a. J/ψ) production in proton-proton collisions at the LHC with the centre of mass energy of 14 TeV. Konstantin has developed an algorithm for calculating amendments for the data analysis using the software packages of the ALICE experiment.



Following this Konstantin became interested in diffraction radiation and its possible applications for beam diagnostics in modern accelerators. He developed and analysed the model for generation of diffraction radiation by a charged particle moving near a rectangular screen with finite sizes and finite permittivity. The result of this research was represented in his Master's thesis.

Konstantin is now a Marie Curie Fellow supported by the oPAC project and enrolled as a PhD student at Royal Holloway, University of London. His research will focus on the development of advanced diagnostic techniques based on a laser wire for future H- accelerators to be used for fundamental and applied research.



Sehar Naveed was born on June 27, 1985, in Depalpur, a small town in Pakistan. She graduated from Islamia University Bahawalpur (IUB), Pakistan and earned a Silver Medal in Mathematics. While completing her degree, Sehar had been appointed as the interim Laboratory Assistant at IUB where certain laboratory sessions of C++ were monitored and demonstrated by her. Perceiving her craving for standardized higher education, a Professor from IUB advised her to pursue study in England.

In December 2011, Sehar completed her Master's degree in mathematics and computational sciences at the University of Manchester, UK. She wrote her dissertation underlying the field of computational fluid dynamics' with the title of 'The Onset of Convection in the Aqueous Humor of Human Eye'. The project was completed by carrying out an intensive research by modelling the human eye as a 3 dimensional spherical shell and the onset of convection, under the influence of an externally applied central

force field, was inspected through numerical simulations.

After graduation Sehar returned to Pakistan and worked as a lecturer in Mathematics at the Government Degree College for Women, Depalpur. Previously, she had worked as a Science Teacher for Higher Secondary Classes at OPF Public School Depalpur during 2009/2010. She also supervised the Examination Committee there, and was selected as the 'Most Favourite Teacher' by students voting.

Sehar is a Marie Curie Fellow within the oPAC project and is enrolled as a PhD student at the University of Liverpool. Her research will focus on the development of simulation suite based on the Multilevel Fast Multipole Method. Her research interests include Numerical Optimization, Computational Finite Element Method and Computational Electromagnetism.



Laura Torino was born in Naples (Italy) in August 1988. She moved with her family to Sarzana, in the north of Italy.

In 2007 she started to study physics at the University of Pisa as an undergraduate. In the summer of 2010 Laura was a Visiting Scholar at the University of Mississippi in Oxford (MS) for two months. During that period she joined the LIGO collaboration (Laser Interferometer Gravitational wave Observatory) working on the characterization of auxiliary instrumental and environmental channels used in the latest LIGO science run.

In January 2011 Laura obtained the Bachelor's degree defending a thesis about the measurement of the anomalous magnetic moment of the muon. Since that date she is studying for a Master in Physics of Fundamental Interaction.

In the summer of the 2011 Laura was a summer student at DESY, location Zeuthen,

and she worked with the PITZ group (Photon Injector Test facility at Zeuthen). During a two month period she worked on the images processing of raw experimental data in order to measure the size and emittance of PITZ electron beam.

Laura is now preparing her Master's thesis concerning the measurement of the longitudinal filling pattern of the ALBA storage ring using Electro-Optical devices.

Laura is a Marie Curie Fellow within the oPAC project and she is attending a Master's in Generation and Application of Synchrotron Radiation within the Autonomus University of Barcelona (UAB). Her research is focused on the ALBA beam profile diagnostic.



Alessandra Valloni was born in Teramo, Italy, in September 1982. She moved to Rome to pursue her professional goals by studying Electronic Engineering at Sapienza, University of Rome and joined the INFN National Laboratory of Frascati, Rome, as a postgraduate student in 2009. During this time she worked on her Master's degree thesis on ultrafast time resolved electron diffraction with pulsed electron beams for atomic and molecular imaging.

In the following years, while she was pursuing her Research Doctorate degree in applied electromagnetism, she worked on the design and experimental characterization of a novel accelerating structure in the class of photo injectors. She is enrolled in a PhD program at Sapienza in the Department of Fundamental and Applied Science for Engineering and will receive her PhD in Electromagnetism in November 2012.

Alessandra took part for two years in a collaborative study with the Particle Beam Physics Laboratory (PBPL) at University of California, Los Angeles (UCLA), under the supervision of the director, Dr. James Rosenzweig. While at UCLA, she expanded her research to include the field of extremely compact optical accelerators. Her expertise

mainly focuses on analysis of problems involving bunching as well as simultaneous focusing and acceleration of charged particles in slab dielectric laser-powered systems based on biperiodic photonic bandgap structures. At UCLA she also participated in the Galaxy (Gigavolt-per-meter Acceleration and X-ray free source Integrated experiment) project and she was also involved in the installation and initial experimental setup for Dielectric Wakefield Acceleration at FACET facility, SLAC, for testing of hollow dielectric fibres and slab dielectric structures as sources of Wakefield acceleration and THz Cherenkov Radiation Generation.

Alessandra is now a Marie Curie Fellow within the oPAC project. Her research focuses on the development of a recirculating energy recovery linac for the LHeC project. She already enjoys experiencing the atmosphere of frontier research at the LHC, it offers the unique opportunity to learn and work on a plethora of technical and theoretical problems for dedicated researchers.



The Network is Growing

New adjunct partners joining oPAC in the last months have swelled the consortium to 31 partners. oPAC welcomes eight new adjunct partners to the network:

Ciemat, Spain

A Public Research Agency attached to the Spanish Ministry of Economy and Competitiveness, CIEMAT is mainly focused in the fields of energy, environment and technology related with them. It is aiming at linking the basic research with the industrial applications, as a bridge between the R&D and the social goals. With a human team of

around 1400 people, CIEMAT is diversified technologically and geographically. The main site is in Madrid, where most of the personnel is based. In addition CIEMAT is managing other centres like the Almeria Solar Platform (PSA), an outstanding solar technology facility.



CIEMAT activities are framed in the national and international scope. The centre is participating in UE programmes and cooperating with other agencies and research institutes from all over the world, especially in Europe and South America.

In the field of accelerators, CIEMAT has contributed extensively supplying accelerator instruments for big facilities like CERN, XFEL, IFMIF or other smaller facilities like the Microtron Project in Barcelona. CIEMAT significantly contributes in the field of beam diagnostics, beam dynamics and control

systems for high current linear and compact hadron accelerators. The group is currently strongly active in the following fields related to the OPAC network: Beam diagnostics: non-interceptive transverse profilers, pickups and electronics for low beta RF accelerators, mean energy measurements; Beam dynamics: cyclotron of space-charge dominated beams, emittance measurements; Control systems: control of precise motion systems, and integration in EPICS and PLC control systems.

Institutul National pentru Fizica si Inginerie Nucleara Horia Hulubei, Romania (IFIN-HH)

IFIN-HH is the central institute for nuclear and atomic physics in Romania. Its more than 400 scientists are collaborating with numerous institutes (e.g.: IUCN, CERN, IAEA, GSI...) and projects (PHARE, FAIR, IN2P3, SPIRAL2...) in almost all fields of fundamental and applied nuclear physics.

IFIN-HH has a very strong record as a national training centre and lengthy experience in hosting Diploma and PhD students. The Department of Nuclear Physics IFIN-HH is a multidisciplinary research unit in the field of nuclear and atomic physics. The department's mission lies in the areas of basic and applied research, particularly in the fields which are relevant for sustainable development and the national endeavour for integration in the European Union.

The department fosters a Centre of Excellence (IDRANAP), two Euratom projects and more than 15 bilateral collaborations with centres from Europe, the USA, Japan and Russia. In addition, it has recently been decided that Romania will be the third pillar in ELI project which is supposed to become the most powerful, Exawatt-class laser in the world.

At ELI it will be possible to address laser-matter interaction in the ultra-relativistic regime, with power densities greater than 10^{22} W/cm², where electrons and ions in the laser field exhibit a relativistic character.



INFN - Laboratori Nazionali del Sud (LNS), Italy

Laboratori Nazionali del Sud (LNS) is one of the four national laboratories of INFN. Founded in 1976, it currently employs about 150 people (researchers, technicians, PhD and Diploma students), and represents an advanced development centre for technology

and instrumentation. Research activity is mainly devoted to the study of structure and properties of atomic nuclei, in collaboration with researchers coming from several countries.



At LNS two particle accelerators are available: a 15 MV Tandem Van de Graaf that started to be used for the first experiments in the early '80s, and a K800 Superconducting Cyclotron in full operation since 1996. The EXCYT facility for the production of exotic beams, based on the coupled operation of the two mentioned accelerators, is already running. Research and development of new apparatuses and technologies are typically applied to different fields like biophysics, photonics, plasma science, radwaste monitoring. The CATANA centre for the proton therapy of the eye-melanoma and a

laboratory for the analysis of historical and archaeological heritage by means of non-destructive techniques are in operation at LNS.

It is also worth mentioning a submarine laboratory installed at 2000m depth offshore from Catania, to be used for R&D related to the Neutrino Mediterranean Observatory project. At the moment LNS is also involved in research and development of particle accelerators and beam diagnostics, as well as of new acceleration techniques using high power lasers.

Uppsala University, Sweden

Uppsala University are engaged in beam instrumentation activities related to the CLIC Test-Facility CTF3 at CERN, where they have contributed a monitor to measure the beam frequency spectrum at each step of the bunch train combination process in the CTF3 Preliminary Phase which was complemented

later with a study of a novel so-called confocal resonator monitor. Furthermore, the two-beam test stand at CTF3 with all integrated diagnostics to monitor the two-beam acceleration process were designed and constructed by Uppsala University.

University of Dundee, UK

The University of Dundee is one of the UK's leading universities, internationally recognized for its expertise across a range of disciplines including science, medicine, engineering and art. Dundee was Scottish University of the Year 2004/2005, and is recognized for its exceptional teaching quality.

The University has recently completed a £200 million redevelopment program for the city centre campus. The Carnegie Laboratory of Physics is part of the School of Engineering, Physics and Mathematics. It has a history of world leading research into photonics, materials, biophysics and communications. Many advances and world firsts have been achieved including thin film electronics and flat panel displays. It now focuses strongly on

biophysics, optoelectronics and photonics, sustainable energy, nano-materials and imaging.

Its laboratories are equipped with state-of-the-art facilities for miniature laser development, bio-photonics, biomedical physics and optical manipulation, materials deposition and laser processing, nano-scale materials research, and organic materials. In optoelectronics and photonics the university is leading the world in quantum dot and other miniature laser devices with the aim of developing new tools and therapies in biomedicine. It also leads a major European FP7 consortium (Fast-DOT) to exploit this work. Moreover, it is involved in a number of international projects utilizing its expertise in photonics.



University of Manchester, UK

The University of Manchester is one of the largest in the UK. It has an exceptional record of generating and sharing new ideas and innovations and is applying its expertise and knowledge to solving some of the major social, economic and environmental problems confronting mankind around the globe. Manchester has the largest student community in the UK, with more than 28000 undergraduates and 11000 postgraduates, the University's four faculties include twenty academic schools and hundreds of specialist research groups undertaking pioneering multi-disciplinary teaching and research of

worldwide significance in Engineering and Physical Sciences, Medical and Human Sciences, Life Sciences and Humanities.

In the physics of particle accelerators, the University has international expertise in the dynamics of charged particles, RF accelerating structures and novel machines. It plays a key role in the luminosity upgrade of the Large Hadron Collider and central roles in future collider projects such as the LHeC. Moreover, it is involved in a number of international projects utilising its expertise in beam dynamics.



SLAC National Accelerator Laboratory, US

Home to the world's longest particle accelerator and top-notch research facilities, SLAC National Accelerator Laboratory attracts thousands of users, visiting scientists and students from all over the world each year.

The same 2-mile-long linear accelerator that has enabled Nobel prize-winning discoveries in particle physics now powers a revolutionary X-ray free-electron laser, the Linac Coherent Light Source (LCLS). Launched in 2009, the LCLS pushes photon science to new frontiers with ultrabright, ultrashort X-ray pulses that allow atomic-scale snapshots of material dynamics in the femtosecond regime. Building on its success, an expansion project, LCLS-II, is scheduled to open to users by 2019. Over the past decade SLAC has built

up extensive laser capabilities, with in-house expertise to support LCLS and other research across the lab.

SLAC's other premier user facilities include the Stanford Synchrotron Radiation Lightsource, which provides bright, broad-spectrum X-rays for research ranging from nanotechnology to human health, and the Facility for Advanced Accelerator Experimental Tests (FACET), a test bed for next-generation particle accelerators. SLAC is a U.S. Department of Energy national laboratory managed by Stanford University; other major research areas with close coupling to Stanford include basic photon science, particle physics, astrophysics and cosmology.



ViALUX GmbH, Germany

ViALUX GmbH was founded in 2000 and is a privately held company with a worldwide network of representatives. It is a highly innovative company with a continuing focus on latest technology developments. ViALUX engineers work on sustained product

development in line with customer needs. Combining advanced opto-electronics with outstanding metrology software forms the core competence and is the key of success.



News from Partners

Bergoz Instrumentation – Frank Stulle

A CRADA agreement has been signed by Jefferson Laboratory and Bergoz Instrumentation to foster development of the Goubau line for bench testing of beam instrumentation. The idea is to use an electromagnetic (EM) wave instead of a current as a particle beam replacement. This EM wave travels along a dielectric coated wire that acts as a waveguide. For several years, Jefferson Laboratory have successfully performed BPM qualification on a Goubau line. At Bergoz Instrumentation a first

Goubau line was set up early in 2012. It helped in understanding the subject and has already revealed some new insight into the high frequency behaviour of beam instrumentation devices. A new setup based on newly developed wave launchers will be assembled soon. Due to the enhanced properties of the generated EM wave it will allow improved knowledge of beam instrumentation devices at frequencies way above 1GHz.



Bergoz New Products and Advances

Bergoz Instrumentation are pleased to announce that a few femtoseconds 5pC single bunch charge non-interceptive measurement with 1% resolution is a new reality for XFEL and LP accelerators and has been successfully tested at the SwissFEL injector test facility.

Turbo-ICT & BCM-RF data sheet and PSI paper at www.bergoz.com/



Turbo - ICT

New Product launched at IBIC

Instrumentation Technologies launched a new member of the next generation electron beam position processors in October 2012 at the International Beam Instrumentation Conference. The new product is called Libera Single Pass E and it enables high accuracy in bunch position measurements in a single pass. Via the implemented fast communication protocols, it represents a reliable and deterministic building block for fast-feedback building as well as for fast-forward loops, and thus enables attainment of high beam stability. Libera Single Pass E will be a step further from the successful

Libera Brilliance Single Pass BPM instrument, which seems to be the preferred choice of numerous laboratories for their measurements of the beam position in transfer lines, injectors and LINACs.

Read more: www.i-tech.si/accelerators-instrumentation/single-pass-e/benefits_13



Stockholm University News: A bright new future at GSI for CRYRING – Anders Kallberg

CRYRING is a storage ring for atomic and molecular ions that ran in Stockholm for about 20 years. One of its more prominent features was its versatility. In the course of its lifetime almost 200 different ions were stored – singularly charged atomic and molecular ions, highly charged ions and also negatively charged ions, both atomic and molecular. The electron cooler, which with its expanded electron beam had the lowest transverse temperature in the world, was an important resource which also served as an electron target and the majority of the experiments studied electron recombination. In particular an extensive experimental program related to molecular formation in interstellar space developed. There were also extensive experimental programs measuring half-lives of atomic metastable states as well as studies of atom-ion collisions in a gas-jet target.



Lorries arriving

Despite its success cuts in funding led to a closure of CRYRING in April 2010. The last experiment, the successful tests of slow extraction, pointed towards a new future for CRYRING. The ring, its ion source, beam line and power supplies have been dismantled and transported to GSI in Darmstadt. Here CRYRING will be re-commissioned as a low energy storage ring, bridging the energy gap between the ESR and the HITRAP. It will receive highly charged ions from ESR, store them and decelerate them to a desired energy for a wealth of proposed experiments in atomic, nuclear and astrophysics. Leading

atomic physicists, Thomas Stöhlker and Reinhold Schuch, proposed to couple CRYRING to the existing ESR ring, a project that could start immediately and, furthermore, would make CRYRING most useful as a test bench for many of the new systems that are being developed for FAIR.

On the 19th November, the first lorry, fully loaded with parts was loaded at the Manne Siegbahn laboratory at Stockholm University and left for Darmstadt. During an intense week, a total of five lorries took much of the ring and parts of the injection line to GSI.

There is considerably more to dismount and send to GSI, such as power supplies, switchgear, two large transformers, the ion source, remains of the beam line, as well as many smaller parts - lorries will roll until the beginning of 2013. In the second half of 2013, the ring will be reconstructed at GSI and its first use is planned for 2014. Once the first phase of FAIR has been built there are possibilities also to build a beam line to transport antiprotons to ESR and from there inject them at 30 MeV into CRYRING, where they could be decelerated to 300 keV and used for low energy experiments in the ring or extracted and even further decelerated within the planned FLAIR facility, thus making the original plans for FLAIR a reality.

Further information about FAIR:

<http://www.fair-center.de>



Dipole magnet coming up



Optics measurements at the CERN PS-Booster – Meghan McAteer



The goal of the project work on the PS Booster synchrotron at CERN is to measure and compensate for linear and nonlinear resonances in the machine. Pushing the boundaries of intensity and luminosity in the LHC will require increasing the intensity in the PSB without increasing emittance, and to achieve this we will need to correct linear and nonlinear resonances that could otherwise be detrimental to beam quality. Characterization of the optics has now begun using two methods: measurement of the orbit response to dipole perturbations, and turn-by-turn measurement of coherent betatron oscillations.

Linear optics can be determined from the response of the closed orbit to a kick from a dipole corrector magnet. The PS Booster is comprised of four independent rings which accelerate beam simultaneously, each ring has 26 dipole magnets and 32 beam position monitors that can be used for orbit response measurements. So far a full set of orbit response measurements have been completed on three of the four rings. The remaining measurements will be completed by end of February 2013, and the analysis of the data to determine linear optics imperfections is underway.

Turn-by-turn measurement of coherent betatron oscillations requires a new data acquisition system for the PSB's beam position monitors (BPM), which is currently being commissioned. Previously each BPM was capable only of recording the average beam position over about a millisecond,

during which time the beam makes many hundreds of revolutions, so oscillations on the timescale of a few turns were not visible. Initial tests of the turn-by-turn acquisition system using three monitors in each transverse plane have been successful, and various methods are being explored for providing a transverse kick to give a sufficiently large coherent beam oscillation. A complete and thorough trial of this measurement and analysis process using the three available BPMs before the start of the long shutdown is planned, and during the shutdown the commissioning of the data acquisition system will be completed and the measurement and analysis process will be refined so that thorough measurements of the PSB's resonances can be made.

This project is proving to be an exciting opportunity for oPAC Fellow Meghan McAteer to work closely with, and learn from, people with a wide variety of expertise and skills. This experience has included working with machine operators in the CERN Control Centre, and with instrumentation specialists. Meghan has been able to apply her previous experience conducting optics measurements and corrections at Fermilab, and benefitted from the extensive knowledge of physicists who have worked on similar problems in other machines at CERN.

2nd joint High Luminosity Large Hadron Collider (HL-LHC) – US LHC: Accelerator Research Programme (LARP) Meeting

The 2nd general HL-LHC meeting took place from 14th to 16th November at the INFN laboratory in Frascati. The meeting was jointly organized with the USLARP collaboration and attracted ca. 130 participants from across the world. The meeting featured two plenary sessions, one

at the beginning of the workshop and a summary session on the last day together with joint parallel sessions for the six core work packages of the European funded HiLumi design study and the US LARP collaborators.



In addition to the topical sessions, the HL-LHC general meeting featured an outreach sessions for young scientists with three presentations from recently appointed US LARP Toohig (two presentations) and oPAC (one presentation) Fellows. Highlights from the meeting are the reports on the first project milestones and deliverables that included the decision on a triplet inner coil aperture of 150mm, the publication of the associated insertion lattice and optics files

and first baseline beam parameters for the 25 ns and 50 ns bunch spacing scenarios for the HL-LHC exploitation that have been agreed between the HL-LHC and the LIU projects at CERN.

More details about the workshop can be found under the workshop website: espace.cern.ch/HiLumi/2012/SitePages/Home.aspx

oPAC Future Events

Accelerator Training for New Fellows

As part of the initial training six recently appointed oPAC fellows will attend the **Joint Universities Accelerator School (JUAS)** in Archamps, France 7th January – 7th February 2013. This school is seen by the consortium to provide a sound training basis as the Fellows take on their projects with the Network.



Topical Workshop Series

CERN will host two, one-day, introductory training events for Fellows and an international Workshop during the week commencing 24th June 2013.

The week will start with hands-on training in 'Particle Studio' provided by Computer Simulation Technology (CST) and 'Beam Instrumentation' by Bergoz Instrumentation on Monday 24th and Tuesday 25th June. This will be followed on Wednesday 26th and Thursday 27th June by an international Workshop entitled 'Grand Challenges in Accelerator Optimization', which will join research leaders with early stage researchers. Plenary talks will be mixed with discussion

and poster sessions and provide an ideal base for knowledge exchange. And a discussion of current research, challenges and future development.

Finally, meetings of the oPAC Steering Committee and the network's Supervisory Board will take place at the end of the week.

All oPAC Fellows shall attend this week which will provide them with a very broad training and an excellent opportunity to network with their other fellows and senior scientists.



Further upcoming Events

Topical Workshop on Non-invasive Profile Measurements

This workshop will be held at CERN in Geneva, Switzerland from 15th to 18th April 2013. Non-invasive measurements are becoming increasingly important for accelerators, yet there is still a long way to go until the beam properties can be determined online and in a ‚parasitic‘ way.

The main aim of this workshop is to prepare non-invasive transverse beam size monitors in the LHC and its injector chain to fulfil the future emittance measurement requirements for LHC beams.

Discussions will be focussed on improvements to existing systems for implementation during the long shutdown in 2013-2014 and on concepts that could be foreseen for installation during the second long shutdown in 2018.

A workshop web site will be setup shortly.

Further information:
www.liv.ac.uk/ditanet

ICFA Mini-Workshop on Beam-Beam Effects in Hadron Colliders (BB2013)

An ICFA mini-workshop on "Beam-Beam Effects in Hadron Colliders" will be held at CERN, Switzerland from March 18th to 22nd, 2013. This workshop is motivated by the successful start of the LHC and the emergence of a vast amount of beam-beam observations in the LHC as well as from the Tevatron and RHIC.

CERN plan to review experience from lepton colliders, such as the use of crab cavities and crabbed waist collision schemes. One of the sessions will be dedicated to discuss the progress and the understanding of the various beam-beam compensation schemes.

Workshop Website: You can find more details and the registration procedure as well as the abstract submission here:
indico.cern.ch/event/beam-beam-2013

Registration: The registration to participate in this workshop can be made through the above website until 31st January 2013.

Abstract submission: The website is open for the submission of abstracts until 31st January 2013.

ICFA Mini-Workshop on Space Charge (SPACE CHARGE 2013)

This workshop will be held at CERN in Geneva, Switzerland from 15th to 19th April 2013. High intensity beams have always caught the attention of the accelerator community. The present development of the field is being pushed by projects and major upgrade programs to existing facilities. We refer for example to the FAIR project at GSI, and the LIU upgrade at CERN. The need for advanced understanding of space charge

dominated machines and the maintenance shut-down of both CERN and GSI accelerators as of early 2013, sets a convenient time window (April 2013) to organize a meeting of reviewing the state of the art in our field.

The workshop web site is:
indico.cern.ch/conferenceDisplay.py?confId=221441

DITANET



Vacancies

Vacancies within the Network

Three posts remain open in oPAC hosted by ALBA in Spain, ESS in Sweden and the University of Seville/CNA in Spain. For further information visit our website:

www.opac-project.eu

If you are able to publicise these vacancies at your organisation to generate the non-Spanish or non-Swedish candidates required by the Marie-Curie rules then please get in touch for more details.

Business Manager at Bergoz Instrumentation

Bergoz Instrumentation is recruiting a Business Manager in charge of Sales to mature markets and market development in CIS and India. This new position has an excellent growth potential. Mature markets are Europe, U.S.A.-Canada, Japan, China, Korea and Taiwan. Our distributors -- GMW for North America and Repic K.K. for Japan are competent and reliable. All other countries are served directly from our main office in France (3 km from Geneva Switzerland and CERN). Our Business Manager will be chosen on the basis of personality, languages, international culture and knowledge of accelerators. This position

will require: lots of travelling, long hours of work and a relentless willingness to learn and progress. Our company will deploy all efforts for the success of its new Business Manager. S/he can rely on six top professionals in accelerator physics and instrumentation, trade and finance for assistance. Our highly qualified manufacturing staff assures highest quality standards. Open to all nationalities. Send your application with relevant documentation to Julien Bergoz, Espace Allondon Ouest, 01630 Saint Genis Pouilly, France.

Cockcroft Institute PhD Positions

The Cockcroft Institute, UK are offering PhD positions to suitable candidates. Please see the following link for further information.

www.cockcroft.ac.uk/.../education/informationPhd.htm

Vacancy within the ASTeC-AP group – Cockcroft Institute, UK

A vacancy has arisen for a Staff Accelerator Physicist based in the Cockcroft Institute. The successful candidate will be employed as a Physics BSc/MPhys at STFC band C, or an Accelerator Physics PhD at STFC band D. AP graduate recruits without a PhD will be

encouraged to study part-time for their doctorate. The contract will be permanent. Closing date is 24th January. Further information can be found at: www.jobs.ac.uk/job/AFR193/accelerator-physicist/



oPAC Events

June 3 rd – 7 th	oPAC Complementary Skills School, Liverpool, UK
June 24 th – 25 th	CERN, Switzerland: Training courses "Particle Studio" (CST) and "Beam Instrumentation" (Bergoz)
June 26 th – 27 th	oPAC Topical Workshop "Grand Challenges in Accelerator Optimization"
June 27 th	Meeting of the oPAC Steering Committee, CERN, Switzerland
June 28 th	Meeting of the oPAC Supervisory Board, CERN, Switzerland

Other Events

January 28 th – Feb 1 st	CLIC Workshop 2013, CERN, Switzerland
February 20 th – 22 nd	1 st LA ³ NET Topical Workshop on Laser Based Particle Sources, CERN, Switzerland
March 18 th – 22 nd	ICFA Mini Workshop on Beam-Beam Effects in Hadron Colliders
April 15 th – 18 th -19 th	DITANET Workshop on non-invasive profile measurements ICFA Mini Workshop on Space Charge
May 13 th – 17 th	International Particle Accelerator Conference, Shanghai, China
June 2 nd – 8 th	European Advanced Accelerator Concepts Workshop Elba, Italy

NOTICE BOARD

DEADLINE FOR CONTRIBUTIONS TO THE NEXT NEWSLETTER: 15th March 2013

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.

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