WAO 2014

26-31 October 2014 WORKSHOP ON ACCELERATOR OPERATIONS

Mainz, Germany

Abstract Booklet

FAIR GSI HIT Heidelberger Ionenstrahl-Therapiezentrum DESY

Contents

Foreword

Dear colleagues,

the Workshop on Accelerator Operations was founded in 1996 as a platform of communication for operators and operations managers of particle accelerators around the world. Since then the workshop has been held at different laboratories and has developed a rotation scheme between Europe, Asia and the Americas with one workshop every two years. WAO2014, the ninth workshop of this series, will now take place in Mainz, Germany, jointly hosted by GSI/FAIR, HIT and DESY.

WAO2014 provides a unique forum for experts and novices to share their experience and to exchange information and ideas in the field of accelerator operations. The workshop aims to provide an atmosphere that fosters lively discussions about the operation of particle accelerators worldwide, ranging from low energy machines over synchrotron radiation facilities to high energy, high intensity hadron accelerators and colliders. Topics of the workshop include control room design, software tools, safety aspects, operator training and motivation, shiftwork, accelerator maintenance and reliability, user satisfaction and other aspects of operating a big, expensive and in most cases unique system like an accelerator.

Both the International Program Committee and the Local Organizing Committee welcome you to Mainz and we hope that you will have a good time at WAO2014.

Michael Bieler, Chair of the IPC

Petra Schütt, Chair of the LOC

WAO2014 Agenda - Sunday, 26 October 2014

Location: Foyer Ketteler Saal C076
18:30 – 20:15 Registration
20:15 – 22:00 Welcome Reception

WAO2014 Agenda - Monday, 27 October 2014

Monday 08:30 – 10:00
Session: Introduction & How We Do Business, New Labs
Location: Ketteler Saal C076
Chair: Michael Bieler, Jon Bonofiglio

08:30 Opening, Michael Bieler, DESY
08:55 Cyclotron Production of Spect Isotopes, Jozef Orzechowski, TRIUMF
09:15 Operation of the ATLAS Superconducting Accelerator, Matthew Hendricks, ANL
09:35 The Linac Coherent Light Source (LCLS) Free Electron Laser (FEL) Performance Program, with Focus on Reproducibility, William Colocho, SLAC

10:00 – 10:30 Coffee Break

Monday 10:30 – 12:00
Session: New Control Room Technologies
Location: Ketteler Saal C076
Chair: Petra Schütt

10:30 The Fully Digital PSI Accelerator Control Room, Andreas Luedeke, PSI
10:55 New Control System of PLS-II, MunGyung Kim, PAL
11:15 Progress toward a New Control Room for the SLAC Accelerators, Michael Stanek, SLAC
11:35 Operating Experience with the New RHIC Control Room, Peter Ingrassia, BNL

12:00 – 13:30 Lunch Break

Monday 13:30 – 15:00
Session: Happy User's Index - Customer Satisfaction
Location: Ketteler Saal C076
Chair: Rossano Giachino

13:30 A Common Operation Metrics for 3rd Generation Light Sources, Montse Pont, ALBA
13:55 Operation Progress and Upgrade in SSRF, Qinglei Zhang, SINAP
14:15 LHC Machine Availability & Luminosity Production, Georges-Henry Hemelsoet, CERN
14:35 Tailoring the ESS Reliability and Availability Needs to Satisfy the Users, Enric Bargalló, ESS

15:00 – 15:30 Coffee Break

Monday 15:30 – 17:00
Session: Operating a SC Machine
Location: Ketteler Saal C076
Chair: Qing Qin

15:30 Operation of Superconducting Items in BEPCII, Jun Xing, IHEP
16:00 An Overview of Cryogenic Operations at ESS, John Weisend, ESS
16:30 Commissioning and First Years of Operation of the SARAF Phase-I Linac, Leonid Weissmann , Soreq, NRC

18:30 – 19:30 Dinner

20:15 – 22:00 IPC Meeting

WAO2014 Agenda - Tuesday, 28 October 2014

Tuesday 08:30 – 10:00
Session: Software Tools incl. "Remote Operation"
Location: Ketteler Saal C076
Chair: Kazuro Furukawa

08:30 Current Status of Web Application for RIBF Accelerator Operations, Akito Uchiyama, RIKEN
08:55 Model-Driven CEBAF Setup after the 12 GeV Upgrade, Dennis Turner, JLAB
09:15 The Fault Analysis tool for the ISIS Accelerator, Julian Brower, ISIS
09:35 Software Tools for the ATLAS Superconducting Accelerator, Maria Power, ANL

10:00 – 10:30 Coffee Break

Tuesday 10:30 – 12:00
Session: Automation without Losing Skills
Location: Ketteler Saal C076
Chair: Eiichi Takada

10:30 Automation at the CERN Super Proton Synchrotron, James Ridewood, CERN
11:00 The Automation of the Sequencing of Accelerator Cycles and Events at Fermilab, Stanley Johnson, FNAL
11:30 Semi-automatic Beam Adjustment using MIRKO at GSI/FAIR, Stephan Reimann, GSI

12:00 – 13:30 Lunch Break

Tuesday 13:30 – 15:00
Session: Operator Training – Online Lectures
Location: Ketteler Saal C076
Chair: Dan Johnson

13:30 Operations Machine Simulator, Adrian Johnson, DIAMOND
13:55 Operators Training Experience at the ALBA Synchrotron Light Source, Ferran Fernandez, ALBA
14:15 How to find Best Practices for Operator Training, Andreas Luedeke, PSI
14:35 Training the Control Room Accelerator Physicists, Isadoro "Terry" Carlino, JLab

15:00 – 15:30 Coffee Break

Tuesday 15:30 – 17:00
Session: Operator Issues, Motivation, Managing OPs, Open Discussion
Location: Ketteler Saal C076
Chair: Peter Ingrassia

15:30 Operator Roles at the Australian Synchrotron Light Source, Don McGilvery, SLSA
16:00 Maintaining a Viable Operations Group; Motivating and Managing Operators, Peter Ingrassia, BNL
16:30 Open Discussion

18:30 – 19:30 Dinner

20:15 – 22:00 Open Discussion
Location: Gewölbekeller

WAO2014 Agenda - Wednesday, 29 October 2014

Wednesday 08:30 – 10:00
Session: Communications, Log-Books, Managing Tools
Location: Ketteler Saal C076
Chair: Glen Johns

08:30 Data Supply of Accelerator Devices – Handling a Huge Amount of Device Process Data at a Medical Accelerator, Michael Galonska, HIT
08:55 Upgrading Electronic Logbooks to the 21st Century, Gregory Marr, BNL
09:15 The Australian Synchrotron Electronic Log Book, Don McGilvery, SLSA
09:35 Major Event Reports, Chris Wetton, CERN

10:00 – 10:30 Coffee Break

Wednesday 10:30 – 12:00
Session: Communications, Log-Books, Managing Tools
Location: Ketteler Saal C076
Chair: Glen Johns

10:30 Experiences from using a Shift Reporting Tool in Addition to the Electronic Log Book at the Heidelberg Ion Beam Therapy Center, Klaus Höppner, HIT
10:50 2nd Generation Electronic Logbook for Fermilab Accelerator Division Operations Department, Duane Newhart, FNAL
11:10 Intuitive Concepts for HMI in Attentive Environments, Michael Voit, TU Dortmund

12:00 – 13:30 Lunch Break

Wednesday 13:30 – 15:00
Poster Session
Location: St. Lioba C173/174
Chair: Eiichi Takada

15:00 – 15:30 Coffee Break

Wednesday 15:30 – 17:00
Session: Radiation Safety Tasks done by Operators
Location: Ketteler Saal C076
Chair: Michael Bieler

15:30 Operators Perform Routine Radiation Monitoring Tasks at Jefferson Lab, Anna Shabalina, JLAB
15:55 Operator Roles and Responsibilities for Radiation Safety at the Advanced Light Source, Tom Scarvie, LBL
16:15 Lessons Learned from NSLS-II Linac Commissioning, Raymond Fliller, BNL
16:35 Safety in Modern Particle Accelerators: The Role of Control Room Operators, Pierre Ninin, CERN

18:30 – 19:30 Dinner

20:15 – 22:00 Open Discussion
Location: Gewölbekeller

WAO2014 Agenda - Thursday, 30 October 2014

Thursday 08:30 – 10:00
Session: Commissioning & Recommissioning, Checkout Before Beam
Location: Ketteler Saal C076
Chair: Rossano Giachino

08:30 Recommissioning of CPS Complex, Denis Cotte, CERN
08:55 Recommissioning the FNAL Recycler Ring for Proton Operation, Martin Murphy, FNAL
09:15 Commissioning of the 12 GeV CEBAF Accelerator, Brian Freeman, JLab
09:35 "What's Old is New Again": Operations Control of RHIC Start Up, Travis Shrey, BNL

10:00 – 10:30 Coffee Break

Thursday 10:30 – 12:00
Session: Commissioning & Recommissioning, Checkout Before Beam
Location: Ketteler Saal C076
Chair: Rossano Giachino

10:30 Using Checklists as an Operational Tool in Accelerator Operations, Vince Kempson, DIAMOND
10:55 "New and Improved": The JLab (state-of-the-art) HCO System, Kenneth Baggett, JLab
11:15 Preparation Phase of the FAIR Project, Uwe Scheeler, GSI
11:35 Initial Operation Plans for the ESS Linac, Marc Muñoz, ESS

12:00 – 13:30 Lunch Break

Thursday 13:30 – 23:30
Tour to Heidelberg Ion Therapy Center and Banquet

13:30 Bus Trip (01h30')
15:00 HIT Tour (04h00')
19:00 Banquet (03h00')
22:00 Bus Trip (01h30')

WAO2014 Agenda - Friday, 31 October 2014

Friday 08:30 – 10:00
Session: Incidents and Lessons Learned
Location: Ketteler Saal C076
Chair: Michael Stanek

08:30 Dissolved Gas-in-Oil Analysis for Preventative Maintenance of the LANSCE High Voltage Systems, Karen Young, LANL
08:55 Trouble-shooting in Initial Operation of the KOMAC 100-MeV Proton Linac, Dae-Il Kim, KAERI
09:15 Catastrophic Equipment Failure during an Extended Outage, Thomas Spickermann, LANL

10:00 – 10:30 Coffee Break

Friday 10:30 – 12:00
Session: WAO Feedback & Closure (2014), Outlook (2016)
Location: Ketteler Saal C076
Chair: Michael Bieler

10:30 FAIR visit – some general information, David Ondreka, GSI
11:00 Feedback & Closure 2014, Outlook 2016, Michael Bieler, DESY

12:00 – 13:30 Lunch Break

Friday 13:30 – 18:00
Tour to GSI, Darmstadt

List of all the abstracts for the Workshop on Accelerator Operations - WAO2014, October 26 – 31, 2014, Mainz, Germany

Monday Oral Presentations

Session: How we do Business, New Labs

CYCLOTRON PRODUCTION OF SPECT ISOTOPES

Jozef Orzechowski, TRIUMF

Tri University Meson Facility (TRIUMF) is located on the University of British Columbia territory. The NORDION Vancouver Operations (VanOps) facility is located on the TRIUMF site and is focused on the production of medical radioisotopes using cyclotrons. The unique symbiotic relationship between a scientific laboratory and commercial company will be explained. The equipment used for isotope production comprises a CP-42 and two TR-30 cyclotrons in addition to two beam lines (~100 and ~500 MeV) from the TRIUMF 500-MeV cyclotron. The radioisotopes produced at TRIUMF/NORDION VanOps include Ga-67, Sr-82, Pd-103, In-111, I-123, and Tl-201. These are produced as follows. Ga-67 ($t_{1/2}$ 3.26 d) is produced on a TR-30 cyclotron. Sr-82 ($t_{1/2}$ 25.55 d) is produced on an ~100 MeV beamline from the TRIUMF 500-MeV cyclotron. Pd-103 ($t_{1/2}$ 16.99 d) is produced on a TR-30 cyclotron. In-111 ($t_{1/2}$ 2.80 d) is produced on a TR-30 cyclotron. I-123 ($t_{1/2}$ 13.2 h) is produced on CP-42 and TR-30 cyclotrons. Tl-201 ($t_{1/2}$ 3.04 d) is produced on a TR-30 cyclotron.

OPERATION OF THE ATLAS SUPERCONDUCTING ACCELERATOR*†

Matthew R. Hendricks, ANL

ATLAS (the Argonne Tandem Linac Accelerator System) is a super conducting heavy ion accelerator which can accelerate nearly all stable, and some unstable, isotopes between protons and uranium, with a charge to mass range of 1/1 to 1/7. The maximum energy ranges of these accelerated ions are 7-17 MeV per nucleon with intensities ranging from sub-picoampere to microampere currents. Recent additions to the facility include, CARIBU (neutron-rich fission fragments from a one Curie-252 Cf source for charge breeding and acceleration), a 60 MHz CW radio frequency quadruple, as well as energy and intensity upgrade cryostats. On average ATLAS delivers a different ion species and energy each week to one of six target areas. ATLAS currently operates 24 hours a day, 6 days per week, with 7 days per week planned. Topics discussed will be how we handle day to day operation of the facility including start up, troubleshooting problems, maintenance, ion beam tuning methods for intensities below ammeter detectable currents, and diagnostic tools used for unstable beam transport.

* This material is based upon work supported by the U.S. Department of Energy, Office of Science, Office of Nuclear Physics, under contract number DE-AC02-06CH11357

† This research used resources of ANL's ATLAS facility, which is a DOE Office of Science User Facility

THE LINAC COHERENT LIGHT SOURCE (LCLS) FREE ELECTRON LASER (FEL) PERFORMANCE PROGRAM, WITH FOCUS ON REPRODUCIBILITY

William Colocho, SLAC

This talk will describe the current performance improvement program of LCLS. It will describe how machine time is partitioned to accommodate beam time requests from different groups. Machine time is allocated for User delivery, configuration preparation for future users, FEL performance program, preventive maintenance, installation of new instrumentation and control software testing. The talk will present in more detail the FEL performance improvement program and then focus in more detail on reproducibility issues of LCLS FEL at SLAC National Accelerator Laboratory. A significant amount of machine time is spent in configuration preparation; a good fraction of this time could be recovered by achieving a more reproducible X-ray laser system.

Session: New Control Room Technologies

THE FULLY DIGITAL PSI ACCELERATOR CONTROL ROOM

Andreas Luedeke, PSI

The Paul Scherrer Institute operates four independent accelerator facilities from one common control room since 2007. All beam signals are digitized locally at the accelerators, no analogue signal cables are going into the control rooms. All accelerator facilities are operated by one team of operators, everyone being trained on all machines. We'll present the technical and administrative solutions that contributed to the success of our common control room.

NEW CONTROL SYSTEM OF PLS-II

MunGyung Kim, PAL

PLS-II has been upgrade from PLS (Pohang Light Source) from 2011. There are several important changes. At first electron beam energy changed from 2.5 Gev to 3.0 GeV. Operation mode was changed from decay to top-up. RF systems in the storage ring were changed form 5 normal conducting cavities to 3 superconducting cavities. Two times of insertion devices than PLS were installed. These means we need a new control system to control them with more high accuracy and safety. Furthermore we wish operator and user friendly systems, specially using mobile phones. During the last three years we have developed the control systems step by step in these aspects. So this paper introduces a new control system of PLS-II in these aspects.

PROGRESS TOWARD A NEW CONTROL ROOM FOR THE SLAC ACCELERATORS

Michael Stanek, SLAC

We are constructing a new control room at SLAC to unify and improve the operation of the LCLS, SPEAR3, and FACET accelerator facilities, and to provide the space and flexibility needed to support the LCLS-II accelerator when it is ready for commissioning. The existing control rooms for the linac and SPEAR3 have been upgraded in various ways over the last decade, but their basic features have remained unchanged. The new Accelerator Control Room (ACR) in the new Research Support Building (RSB) will be larger and have features better matched to the evolving needs of the accelerators. In this paper, we describe the status of this project and the plans for the months ahead.

OPERATING EXPERIENCE WITH THE NEW RHIC CONTROL ROOM

Peter Ingrassia, BNL

After six years of planning and construction RHIC operation began in the “third generation” control room in January 2012. This presentation will review the goals for the project; the parts of the design that did and did not work; the challenge to obtaining beneficial occupancy; new technologies employed; the modifications that have been made since 2012; and the overall level of customer satisfaction with the result.

Session: Happy User’s Index – Customer Satisfation

A COMMON OPERATION METRICS FOR 3rd GENERATION LIGHT SOURCES

Montse Pont, ALBA

High reliability is a very important goal for third generation light sources. Very often the beam availability and the mean time between beam outages is used as an operation metrics to measure the reliability of the accelerator. A survey at different 3rd generation light sources revealed that the calculation of the beam availability and the mean time between beam outages does vary significantly between facilities. This does prevent a useful comparison of the reliability of these accelerators. The authors propose a specific metrics for the reliability of 3rd generation light sources; a metrics that will allow a detailed and meaningful comparison of these particle accelerators.

OPERATION PROGRESS AND UPGRADE IN SSRF

Qinglei Zhang, SINAP

Shanghai Synchrotron Radiation Facility (SSRF) has been opened to users since May2009, and the performance has been improved continuously to satisfy their needs. Accelerator failure analysis and solution study has been progressing, and the failure rate was reduced significantly. Some experience was summarized and would be helpful for operation in future. Several new beamlines were under commissioning. The new insertion devices had brought some problems in operation, such as injection difficulty and life time decrease, which was unfavorable to users. Much time and effort has been devoted to restore the beam dynamics and synchrotron quality. Close orbit stability was under control with feed forward system, which was also an important aspect for users.

LHC MACHINE AVAILABILITY & LUMINOSITY PRODUCTION

Georges-Henry Hemelsoet, CERN

The performance of particle colliders is often quantified by the key figures of beam energy, instantaneous luminosity, and importantly integrated luminosity. This talk will describe how we optimize the different parameters to maximize both the instantaneous and integrated luminosity. The beam energy is generally fixed at the beginning of the year. Good machine availability is critical for integrated luminosity production and fault analysis, maintenance, careful planning, injection readiness and turnaround time all contribute to meet the experiments' demands for massive event production. We will describe the specific challenges that Operation has to face in order to maximize the time in physics.

TAILORING THE ESS RELIABILITY AND AVAILABILITY NEEDS TO SATISFY THE USERS

Enric Bargalló, ESS

ESS is a neutron source facility that will serve the scientific community by delivering spallation neutrons to a suite of scientific instruments where scientific users will be able to perform neutron scattering experiments. As a user facility, ESS must tailor its specifications and its future operation to satisfy the needs of the users and their experiments. Reliability and availability are key metrics for achieving the scientific vision of the ESS. To define these metrics, some specifications in terms of possible degraded modes of operation and consequences of the different possible events on the experiments have to be defined. The goal of this contribution is to describe the different kind of experiments expected at ESS and their needs in terms of neutron beam performance: reliability, availability and quality. The implications on the reliability and availability requirements will be described as well as the work being done to analyze and achieve such goals.

Session: Operating a SC Machine

OPERATION OF SUPERCONDUCTING ITEMS IN BEPCII

Jun Xing, IHEP

The Upgrade Project of Beijing Electron Positron Collider, BEPCII, applied superconductivity in the RF cavities and magnets including the final focusing magnets and detector solenoid. A cryogenics system was set up to accommodate these superconducting elements. Also there are control, power supplys and protection parts to running the superconductor RF cavities and magnets. This talk will provide an overview of the operation status and improvements on the superconducting items in these years. The limitations and puzzles are also discussed.

AN OVERVIEW OF CRYOGENIC OPERATIONS AT ESS

John Weisend, ESS

The European Spallation Source (ESS), currently under construction in Lund, Sweden will be a world class center for neutron science. Cryogenics is a key technology for the ESS providing cooling for the superconducting RF cavities in the accelerator, for the 16.5 K hydrogen moderator and supplying liquid helium for the neutron

instruments. This talk will give a brief overview of the ESS cryogenics system, describe planned operating scenarios and staffing. It will also address reliability, turn down capacity and the planned control system.

COMMISSIONING AND FIRST YEARS OF OPERATION OF THE SARAF PHASE-I LINAC

Leonid Weissmann , Soreq, NRC

Phase I of the Soreq Applied Research Accelerator Facility (SARAF) should accelerate 2 mA protons and deuterons CW beams at energies up to 4 and 5 MeV, respectively. These specifications were achieved only partially. Nevertheless the facility is in active use since 2010. The status of the main accelerator components and their major improvements are reported. Operation experience accumulated during the recent years will be summarized. The latter includes acceleration of up to 2 and 1 mA CW protons beam at energies 2 MeV and 3.7 MeV correspondingly and operations of pulsed deuteron beams at energies up to 5.6 MeV. Some experiments with high power beams on specially designed beam dumps and exotic targets, including the liquid lithium jet target, will be briefly presented. The further improvements in operation of the current facility and plans for the future Phase II of the SARAF linac are discussed.

Tuesday Oral Presentations

Session: Software Tools incl. "Remote Operation"

CURRENT STATUS OF WEB APPLICATION FOR RIBF ACCELERATOR OPERATIONS

Akito Uchiyama, RIKEN

To provide the world's most intense radioisotope (RI) beams over the whole range of atomic masses of heavy ions, the RIBF project has been started at RIKEN. The control system of RIKEN RIBF adopted the EPICS (Experimental Physics and Industrial Control System) that used LAN-based protocols and was constructed on its own network. For RIBF control system, Web technology is used for applications of variety purpose, because it has advantages for the following reasons: platform-independence, rapid system development, and ease of system maintenance. Especially JavaScript and HTML provide a simplified, rapid method of creating dynamic Web content, such as AJAX technology. Therefore, we developed AJAX-based Web applications for accelerator operation tools such as electronic log notebook, operational log system, and data archive viewer. On the other hand, we have also designed WebSocket-based operator interface to improve interactive performance on the Web browser. WebSocket is a new protocol provided by the Internet Engineering Task Force (IETF) for Web-based systems. In this workshop we will report the system implementation and the current status for RIBF operation in detail.

MODEL-DRIVEN CEBAF SETUP AFTER THE 12 GeV UPGRADE

Dennis Turner, JLAB

For the 12 GeV upgrade, improvements in agreement between the CEBAF model and machine performance, along with new software tools and processes, were implemented such that new machine configurations can be set from the model with less tune time. Over the course of 12 GeV CEBAF commissioning, these new tools and processes were tested and improved upon. The result was a measurable reduction in necessary time for new machine configurations. This talk will discuss the new tools and processes and compare with those of the 6 GeV CEBAF era.

THE FAULT ANALYSIS TOOL FOR THE ISIS ACCELERATOR

Julian Brower, ISIS

FLD 3 years on. The PC/Wi-Fi based interactive fault analysis tool and technical knowledge base system, for use by ISIS accelerator Operation crew members. By using valuable time efficiently and effectively, FLD aims to decrease the response time to resolve equipment faults. FLD guides the crew through a hierarchical fault flow chart at the point of need, providing all the information to drill down to failure modes. FLD, with over 40 engineering contributors (Equipment Owners) on board, has grown organically to incorporate many ISIS accelerator systems and equipment. Three years on, we can now report our encouraging findings for saving down time. We will show how we overcame challenges and gained the trust and support of our stakeholders.

SOFTWARE TOOLS FOR THE ATLAS SUPERCONDUCTING ACCELERATOR[*†]

Maria Power, ANL

At ATLAS (the Argonne Tandem Linac Accelerator System) several software tools are utilized by the operations group in order to assist in the operation of the accelerator. One such tool is the Operators Notebook, which includes a shift log, experiment up and downtime tracking, and equipment tracking. A second tool, called Paradox, archives the equipment control settings from running experiments and allows them to be optionally scaled and loaded back into the accelerator control system for other experiments. In this paper, I will discuss these and other tools used at the facility to assist in the accelerator operations.

[*]This material is based upon work supported by the U.S. Department of Energy, Office of Science, Office of Nuclear Physics, under contract number DE-AC02-06CH11357

[†]This research used resources of ANL's ATLAS facility, which is a DOE Office of Science User Facility

Session: Automation without Losing Skills

AUTOMATION AT THE CERN SUPER PROTON SYNCHROTRON

James Ridewood, CERN

The CERN Super Proton Synchrotron (SPS) machine has evolved into a truly multi-cycling, multi-client machine which has meant that changes to machine state are significantly more frequent than was once the case. To maintain efficiency, several often-repeated tasks have been automated (access preparations, beamline steering, automated economy settings, software interlock systems). This presentation will explore some of the automation systems used by operations at the SPS complex, and will address some of the advantages and disadvantages that automation brings. Examples of how and where automation is used in the SPS will be demonstrated along with some potential future improvements and other areas where automation could be of benefit. The relationship between operations personnel and their machine will be examined and how increased use of automation may affect this relationship.

THE AUTOMATION OF THE SEQUENCING OF ACCELERATOR CYCLES AND EVENTS AT FERMILAB

Stanley Johnson, FNAL

The accelerator complex at Fermilab has evolved over the years to include many different accelerators, beam lines, and modes of running. The various modes of running or accelerator cycles need to controlled and sequenced for safe and efficient operation of the accelerator complex. This control is provided by a device called the “Timeline Generator”. This talk will look at the past, present, and future of this device. In particular, this talk will look at how setting up this device has become more automated during the evolution of both the software and hardware components. The talk will also include a discussion of how the automation affects operators and knowledge of the system.

SEMI-AUTOMATIC BEAM ADJUSTMENT USING MIRKO AT GSI/FAIR

Stephan Reimann, GSI

At all accelerator facilities many tasks are going the path of increasing automation. At GSI the interactive ion optics application MIRKO is used to adjust optical settings and semi automatically adjust the beam position within transport lines. This talk will present the use cases for operators and the problems with interpreting their results. In this context it will be shown, that this kind of automation leads in fact to a gain in efficiency but also holds some pitfalls, which are important to avoid. On one hand there is the simplification, on the other hand still the need remains to understand the underlying technical and scientific concepts.

Session: Operator Training – Online Lectures

OPERATIONS MACHINE SIMULATOR

Adrian Johnson, DIAMOND

The ever increasing emphasis on machine reliability and minimising number of trips and downtime means that existing Operators are actually operating the machine less and less frequently, and new Operators have very little hands on machine time for learning. To provide a tool which can be used by Operators for training and practice we have started development of a machine operations simulator. The simulator is based around a single EPICs soft IOC with python ‘process’ scripts simulating the behaviour of machine sub systems and python GUI scripts for control and parameter read back. The simulator is modular in construction so that more sub systems and more complexity and realism can be added piece by piece.

OPERATORS TRAINING EXPERIENCE AT THE ALBA SYNCHROTRON LIGHT SOURCE

Ferran Fernandez, ALBA

Since the ALBA synchrotron light source started operation with users on May 2012, up to five new operators have joined ALBA and have been trained. A program has been established to train the new operators from

scratch in about six to nine months. The training is divided in five steps. First, there is a set of lectures about the ALBA accelerators and its sub-systems, which include assignments marked by the different lecturers. Second, there is a set of lectures and hands-on training on the operational procedures, which cover everything from normal operation to troubleshooting and common repairs. In the third step the trainees discuss different failure scenarios proposing how the failure should be solved. The 4th step is dedicated to radiation safety including an official course required by the Spanish radiation regulatory agent. And finally, the trainees go into the control room to accumulate hours of hands-on training. The experience with this training program will be discussed.

HOW TO FIND BEST PRACTICES FOR OPERATOR TRAINING

Andreas Luedeke, PSI

At all accelerator facilities operators needs training. But how is this training organised? How much effort is necessary until an operator can safely operate the machine? Are there best-practices that could be applied to the training of operators for a variety of different facilities? We did a survey of 17 different accelerator facilities to find answers to these questions. This contribution will evaluate the results of the survey and present some ideas on how we could collaborate for the benefit of our operator training.

TRAINING THE CONTROL ROOM ACCELERATOR PHYSICISTS

Isadoro "Terry" Carlino, JLab

Re-training control room staff after a major accelerator upgrade is already a considerable challenge, but add in required training for Accelerator Physicists, a limited training development budget, and no training-tracking mechanism, and the task becomes even more daunting. Using "Just-in-Time" training provided by System Experts and existing on-line training, two different training paths were created: one for Accelerator Operators and another for Accelerator Physicists. Content was developed and stored on an independent server, while tracking of course completion was done using the already-established Jefferson Laboratory Training Department database.

Session: Operator Issues, Motivation, Managing OPs

OPERATOR ROLES AT THE AUSTRALIAN SYNCHROTRON LIGHT SOURCE

Don McGilvery, SLSA

The Australian Synchrotron schedules over 5000 hours of user beam each year as well as 2000 hours of machine development and physics. This requires 24/7 Operator support. Since transitioning to Top Up operation and the installation of a UPS for the storage ring, the Control Room functions have become much less demanding. How to keep the Operators Motivated? Using a combination of creative shift rostering, their involvement in projects matched to their skills and interests and by extensive training to provide "Expert Out of Hours Support" to Beamline Users, are we providing a challenging but satisfying work environment for our Operators?

MAINTAINING A VIABLE OPERATIONS GROUP; MOTIVATING AND MANAGING OPERATORS

Peter Ingrassia, BNL

Retaining operators has always been a challenge for operations managers. One might say the challenge tends to increase with time given, for example, changing budgets, a new mission, an increase in complexity of operation, or added responsibilities for the group. Reducing the challenge is not entirely deterministic – some luck is involved. Each operations manager has strong opinions regarding methods used to meet the challenge. This presentation will summarize some of the lessons learned while attempting to manage the challenges during more than two decades at the AGS-RHIC complex with the hope that it will spark an open discussion by the workshop attendees and encourage them to share their positive and negative experiences.

Wednesday Oral Presentations

Session: Communications, Log-Books, Managing Tools

DATA SUPPLY OF ACCELERATOR DEVICES – HANDLING A HUGE AMOUNT OF DEVICE PROCESS DATA AT A MEDICAL ACCELERATOR

Michael Galonska, HIT

The Heidelberg Ion Therapy Facility (HIT) is the first dedicated proton and carbon cancer therapy facility in Europe. It uses full 3D intensity controlled raster scanning dose delivering method of pencil beams provided by a linac-synchrotron-system to four high energy beam lines including a 360° rotating heavy ion gantry. Each beam line combination, i.e. a combination of the three ion source branches and treatment rooms is represented as a *virtual accelerator* (VAcc) within the control system. For each VAcc and for each ion kind (C, p, O, He) the device settings for all energy steps (255), beam sizes (4), intensities (10), and gantry angles (36) -making up for more than 100,000 possible settings- have to be provided by the control system. This contribution outlines some issues of the data supply and data handling of this huge amount of device input and process data at HIT from an operator's point of view. That is the operator's database interfaces and tools which display the device settings and in particular its change history, and the backup and restore functions of device settings according to the strong quality needs of medical treatment.

UPGRADING ELECTRONIC LOGBOOKS TO THE 21st CENTURY

Gregory Marr, BNL

The Collider-Accelerator Complex at Brookhaven National Laboratory converted from paper to electronic logbook records in 2001. Since then our "elog" system had only 2 revisions, without much more than cosmetic changes for the end user. This past year the Operations group collaborated with our Controls division for a major update to our elog system, addressing many of the deficiencies found in our old elog package. Creating and introducing a new interface has not been without difficulty. Our goals, progress and challenges will be presented here.

THE AUSTRALIAN SYNCHROTRON ELECTRONIC LOG BOOK

Don McGilvery, SLSA

Since commissioning, the Australian Synchrotron has kept all operational logs in electronic form. Due to many shortcomings of other Log books the Operators have developed a comprehensive Web based log book in house. The eLog has standard features of formatted text and graphics, cut and paste capability, embedded objects such as video, hot links and annotations. Regular entries such as shift summaries, beam dumps and operational dropouts are auto-filled into standard templates. Facility statistics on uptime, faults, MTBF, MTB and others are auto generated and available on line. Over time its use has extended to all beamlines, engineering, technical and safety groups. Having a single searchable repository of information for systems across the facility has enabled the Operators to provide invaluable after hours support for beamlines and support systems. Having detailed logs and statistics from day one has proven invaluable for tracking machine performance and directing budget expenditure to drive facilty improvements.

MAJOR EVENT REPORTS

Chris Wetton, CERN

In the event of an incident, or Major Event, it is important that all relevant information be recorded so that measures can be taken to reduce or prevent further incidents. At CERN, the responsible for creating these reports are the TI operators, who record the events directly related to the incident before a validation by the CERN hierarchy. The original tool that we had as part of our logbook was complicated to use and resulted in a lot of wasted time and frustration on the part of the TI operators. With the move to a new version of the logbook, we simplified the data entry process and, with a slight modification to the approval process, we allowed the other concerned groups to add more details to these reports. This presentation will show some of the modifications that were made to the reporting procedure and how we resolved some of the problems that we had, resulting in a much more efficient report with greater control over the confidentiality of restricted

information. Whilst a great improvement over the old tool there are still some issues that we want to improve upon on, and new features that we will add in a newer version of the tool to be implemented with an updated logbook.

EXPERIENCES FROM USING A SHIFT REPORTING TOOL IN ADDITION TO THE ELECTRONIC LOG BOOK AT THE HEIDELBERG ION BEAM THERAPY CENTER

Klaus Höppner, HIT

The HIT (Heidelberg Ion Beam Therapy) center is the first dedicated European accelerator facility for cancer therapy using both carbon ions and protons, located at the university hospital in Heidelberg. It provides three fully functional treatment rooms, two with fixed beam exit and a rotatable Gantry. In early 2014, we introduced a web based shift reporting tool for accelerator operations. Its aim is both to support accelerator operations by documenting error messages of devices, read automatically from the control system's Oracle database and enriched by the operator's comments, as to document changes to device settings and configurations that require additional checks and verifications that are part of the quality assurance guidelines of a medical accelerator. The tool is based on the Python based CherryPy web framework, using SQLAlchemy for object relational mapping and jQuery to provide a desktop like look and feel. It is also integrated with the well established Wordpress based electronic log book used at HIT. We will present the software architecture of the shift reporting tool and report on the experiences and lessons learnt after about half a year of operation.

2nd GENERATION ELECTRONIC LOGBOOK FOR FERMILAB ACCELERATOR DIVISION OPERATIONS DEPARTMENT

Duane Newhart, FNAL

The Operations Department converted from a paper logbook to an electronic logbook on March 10th, 1998. 15 years 3 months and 12 days later we launched our 2nd Generation of electronic logbook. What prompted the change after so many years? This presentation will cover the purpose for the change; the production and development of the 2nd generation electronic log. Provide an overview of the performance of the 2nd generation elog to date, in addition to a wish list for the future.

INTUITIVE CONCEPTS FOR HUMAN-MACHINE-INTERACTION (HMI) IN ATTENTIVE ENVIRONMENTS

Michael Voit, TU Dortmund

Intuitive human-machine interaction requires the computer to recognize the context and intention of the respective user. In everyday face-to-face encounters, humans rely heavily on visual information, in order to grasp as much context information regarding their surrounding and dialog partner. With recent advances in computer vision, this perceptual capability can be implemented technically, and the deduced situation awareness can be beneficially used for innovative and intuitive user interfaces.
This presentation gives an overview of the advances at Fraunhofer IOSB for enhanced user interfaces with vision-based perceptual components. The advances are emphasized by recent project use cases, in which prevailing interfaces were upgraded to perceptual interaction modalities for user-friendly and intuitive input solutions.

Session: Radiation Safety Tasks done by Operators

OPERATORS PERFORM ROUTINE RADIATION MONITORING TASKS AT JEFFERSON LAB

Anna Shabalina, JLAB

Jefferson Lab does not have a 24/7 on-site radiation control group presence, so accelerator operators are trained to perform some routine radiation safety duties. All operators are required to complete Assigned Radiation Monitor (ARM) training, which includes five days of in-class training, a practical exam, and a written exam, all administered by the Radiation Control Department. After completing the training, operators can perform tasks such as radiation surveys, filling out and filing survey maps, providing escorted access to radiologically controlled areas, monitoring and troubleshooting area radiation monitors, conducting beam enclosure pre-release surveys of tools and materials, and performing weekly source checks of the survey

equipment. This paper details the motivation for this program, the required training, lessons learned, types of tasks performed by operations staff, and types of tasks operations staff are not allowed to perform.

OPERATOR ROLES AND RESPONSIBILITIES FOR RADIATION SAFETY AT THE ADVANCED LIGHT SOURCE

Tom Scarvie, LBL

At the Advanced Light Source, Operators play a fundamental role in accelerator radiation safety. Accelerator Operators are directly responsible for ensuring that radiation levels in the accelerator complex and on the experimental floor are kept As Low as Reasonably Achievable (ALARA). Floor Operators are responsible for controlling all work involving beamline shielding and ensuring that all beamline work is carried out safely and within our regulatory and procedural framework. This presentation will include an overview of radiation---related Operator duties, a discussion of the tools they use to carry them out, and examples of past radiation incidents and the roles Operators played in them. The beamline shielding control methods in use at the ALS will also be presented, and some of the challenges involved in safely controlling the work of a diverse set of beamline personnel will be highlighted.

LESSONS LEARNED FROM NSLS-II LINAC COMMISSIONING

Raymond Fliller, BNL

The NSLS-II linac was commissioned in the spring of 2013. During the final stages of commissioning, a weakness in the existing shielding was discovered which allowed unwanted radiation in the NSLS-II booster tunnel, which could have resulted in unexpected exposure. A subsequent investigation of the incident revealed a number of areas in our conduct of operations which required improvement. In this paper we briefly discuss the event, the lessons learned, and our response to it. These lessons have application to facilities within the Dept. of Energy complex and facilities worldwide.

SAFETY IN MODERN PARTICLE ACCELERATORS: THE ROLE OF CONTROL ROOM OPERATORS

Pierre Ninin, CERN

The safety of personnel in charge of the maintenance of last particle accelerator generations relies on the treatment of huge amount of information and operational conditions intended to avoid the accidental exposition of humans to radiations or other dangers. The latest risk assessment for CERN site highlights an increasing of risks for personnel deriving particularly from co-activities carried by different teams of technicians inside the classified areas. Personnel safety is then granted via two complementary means: an automatic Personnel Protection System (PPS) and the human supervision of control room operators. From one hand, the PPS is in charge of automatically performing a predefined set of Safety Instrumented Functions preventing the presence of personnel inside areas where a potential dangerous event may occur. From the other hand control room operators are responsible for coordinating the various activities for avoiding operational dangerous modes for the personnel. In this context, one fundamental question needs to be answered: what is the optimum balance between PPS automated tasks and the ones carried out by operators? This paper analyses the return of experience gained on this subject after several years of operation of LHC PPS and during the refurbishing of the PS Accelerators Complex PPS.

Wednesday Poster Presentations

RELIABILITY MONITORING FOR CUSTOMER SATISFACTION

Inokuchi Hiromi, NIRS

We believe that most important factor for customer satisfaction is to supply stabilized beam without trouble. In other words, the role of operation and maintenance for accelerator is to minimize the occurrence of trouble during operation and the downtime for recovery. To achieve the goal, NIRS, National Institute of Radiological Sciences, in Japan has just started to monitor the performance of accelerator with parameter of Availability, Failure Rate and Human Error as a User's happy index. All troubles that occurred in a month are listed with cause of trouble, defective part and downtime to calculate above parameters. Those parameters are graphed to monitor the trend. Also, defective parts are categorized and graphed for more breakdown information. Human errors are classified to three stages, Level 0 for low risk and Level 2 for highest risk. The quality review meeting is held every month. If a parameter of trend shows low quality, cause would be investigated and corrective action would be discussed in the meeting. We had experienced the number of 82 near-miss(level 0) errors in the last fiscal year, and about 50% of errors were caused by the fact that persons having within one year experience lack some prerequisite knowledge. As a result of this analysis, we have reviewed and improved the training program for new face, also modified the classroom training to be performed by two instructors this year. While one instructor is lecturing, the other instructor is taking care of the person who has a poor understanding of the lecture at the same time. Therefore, we expect positive effect s from this improvement in this year.

KEEPING SHIFT OPERATORS UP TO DATE

Adrian Johnson, DIAMOND

The Operator shift patterns at Diamond include whole weeks of normal 9 to 5 'off shift' days, which provides holiday and emergency cover. To provide the 'off shift' operators with relevant, timely and concise information we have developed a number of tools. These range from web based tools for viewing information on smart phones to large displays in the control room. Operator experience has shown that keeping up to date via these tools makes for shorter easier handover sessions and less chance of important information being missed or lost.

SOFTWARE INTERLOCK SYSTEM

Louis Pereira, CERN

The Software Interlock System (SIS) was introduced to protect the SPS (Super Proton Synchrotron) complex, mainly for some areas of the SPS ring and extractions areas in 2005. SIS protects the machine through surveillance and by analysing the state of various key devices and dumping or inhibiting (timing system) the beam if a potentially dangerous situation occurs. Being a part of the machine protection, and reach the final operational state targeting LHC (Large Hadron Collider) in 2007. The system, which was designed with the use of modern, state-of-the-art technologies, proved to be highly successful and very reliable from the very beginning of its existence.

OPERATOR DEVELOPED CONTROL & ANALYSIS TOOLS

V. J. Winter, DIAMOND

As operational conditions of a particle accelerator evolve, the tools used to control it need to be developed and adapted. Technical groups provide detailed access and control of system parameters that may not be optimised for ease of use, clarity and fit for purpose for when dealing with 24/7 operation or repetitive tasks. Operators have developed tools for simultaneous control of multiple insertion devices & beamline front ends, which both bring together existing parameters from different machine areas and add control scripts in python. Additional tools focus on analysis such as comparing back-up parameters with the current machine settings or extracting machine protection interlock data from a data archive in a human readable format. By being produced by the operators for the operators they have the benefit of developing operational group knowledge of systems as well as being relatively easily and quickly developed if business needs demand.

OPERATION OF SCANNING IRRADIATION SYSTEM AT NIRS-HIMAC
Yuji Tachikawa, NIRS

Three-dimensional scanning irradiation system has been utilized for treatment since 2011 at Heavy Ion Medical Accelerator in Chiba (HIMAC), in the National Institute of Radiological Sciences (NIRS). The scanning irradiation requires strict checking for beam position, size, range, and spill shape, because any changes in these characteristics of beam will cause a significant impact on the irradiation dose. Therefore, the operators perform the regular quality assurance (QA) checks for the therapeutic beam, daily, monthly, and half-yearly.
Daily QA : In short limited time before treatment session, we check the reproducibility of the beam.
Monthly QA : We check the characterization of beam as a reference for Daily QA once a month, in detail.
Half-yearly QA : After the scheduled half-yearly shut down of HIMAC, we check condition of the scanning system in detail.
Additionally, we newly measure the characterization of beam as a reference for Daily QA and Monthly QA and re-tune the current of magnets from the measured results. In this presentation, we report regular QA as an operation of scanning irradiation system as NIRS-HIMAC. Improvement in Daily QA activity and relevant progress will be discussed.

4 YEARS OF OPERATION WITH THE C70 ARRONAX
Freddy Poirier, Arronax

The Cyclone C70 of Arronax is a multi-particles cyclotron based in Nantes, France. Arronax has been running a regular program for radioisotopes production based on protons at the intensity of the order of 100 µA simultaneously in two beamlines and at the same time has ensured a wide variety of beams with various characteristics and particles for an extended R & D program for experimental users. The poster presents the facility, the machine and operations that are performed at Arronax as well as the difficulties with the runs and solutions that have been applied.

ARDUINO, OPEN SOURCE PLATFORM USED FOR ENVIRONMENT DATA ACQUISITIONS AT ELETTRA
Andrea Vescovo, ELETTRA

Ambient variables like temperature, humidity, air pressure, vacuum chamber's vibration play an important role about the quality and beam stability. Using the open source platform Arduino is possible to have an inexpensive and easy to use single board for all these measurements and to have all the data integrated in the control system.

EleFan SYSTEM AT ELETTRA
Enzo Benfatto, ELETTRA

Automatized remote control system for air cooling prototype of BPM and UDL.

COOLING WATER MANAGEMENT: DISSOLVED OXYGEN AND CLOGGING CORPUSCLE
Hiroki Arai, AEC

HIMAC (The Heavy Ion Medical Accelerator in Chiba) has been supplying medical treatment beam, and research experiment beam favorably. There are, however, instances of beam stop, once a while. Diminished flow rate is one of the most frequent cause of beam stop. For example we use eighty five of Quadrupole Magnets at HEBT(High Energy Beam Transport) line, and mean value of decreasing amount per week is about 0.3~0.5ℓ/min, or near 10%, when we adjust the cooling water flow during scheduled maintenance time (bi- or tri-weekly). It is assumed that the cause of diminishing flow rate is a clogged copper oxide. Cooling water flow increases by removing copper oxide, however we need to prevent the generating of a copper oxide in order to solve the problem from its root cause. We have been measuring the amount of dissolved oxygen since March 2014. We found that it is fluctuating from 200 to 1000 ppb. In this presentation, we report our experience on the correlation between diminishing flow rate and amount of dissolved oxygen of low conductivity water in magnet-cooling system. In addition, we introduce other measures in order to prevent diminishing flow rate.

AUTOMATIC EMITTANCE MEASUREMENT IN THE CERN 1.4 GeV BOOSTER

Jean-Francois Comblin, CERN

To deliver high brightness beams to the LHC, the injectors are running at their stability limit and have to be constantly tuned to avoid beam degradation. A quality monitoring has been put in place and requires repeated measurements of intensity, transverse and longitudinal emittances. For the Booster, which has 4 rings, this represents a supplementary work load of 1 hour every shift. To minimize the impact for the other facilities and users, an application has been developed to ease this task: the measurements are done automatically, while the operator keeps the responsibility of logging the final quality results.

THE RECONSTRUCTION OF THE FERMILAB ACCELERATOR MAIN CONTROL ROOM

Stanley Johnson, FNAL

The Fermilab Accelerator Main Control Room has existed in the same location and mostly the same configuration since the beginning of the laboratory. During a recent long accelerator shutdown, the room was mostly gutted and rebuilt. This poster will present a brief history of the control room, and look at the planning that went into rebuilding the room. The final section will look at the new control room and present some lessons learned from the experience.

REMOTE OPERATION AT SNS: TOOLS FOR THE MODERN INTERCONNECTED WORLD

Geoffrey Milanovich, ORNL

The days of being forced to sit in a control room to monitor accelerators are over. There are several tools in use at SNS that provide remote monitoring of systems. We will demonstrate webpage-based displays, remote EPICS access, and CSS's WebOPI and EDM2BOY, which makes possible remote operation of an entire accelerator from a cell phone.

CUSTOMER SATISFACTION IN RI PRODUCTION -PRESENT AND FUTURE-

Satoru Hojo, NIRS

A NIRS-930 cyclotron has been used for the various purposes since the first beam in 1973. Among others, Radio Isotope (RI) production has been one of the most important purposes at the NIRS-930. It is necessary to fulfill the demands from the users of a higher intensity beam such as protons and helium with various energies for RI production. In order to respond to such demands from users, a future conceptual upgrading plan oriented for higher intensity beams and stable operation is now under development based on our operation experiences and hopefully also on the ones at other world front-running facilities.

OPERATION OF NIRS CYCLOTRONS

Yuichi Takahashi, AEC

The cyclotron facility at National Institute of Radiological Science (NIRS) consists of a NIRS-930 cyclotron (Thomson-CSF AVF-930, Kb=110 MeV and Kf=90 MeV) and a small cyclotron HM-18 (Sumitomo- Heavy-Industry HM-18). The HM-18 has been used for production of short-lived radio-pharmaceuticals for PET. The NIRS-930 has been used for various purposes spreading over from basic sciences to such applications as RI production and beam irradiation. The control system of axial injection beam line was updated to the system using PLC. The beam monitors such as higher intensity viewer and phase probe were installed for operation. The operational status of the cyclotron facility is to be presented.

COMMISSIONING THE NSLS-II WITH CS-STUDIO

Tasha Summers, BNL

The NSLS-II restarted commissioning in November 2013. By July 2014 the initial goal of storing 50 mA in the storage ring had been achieved. The primary tool at NSLS-II for interacting with the EPICS control system is Control System Studio (or CS-Studio). CS-Studio is an integrated set of tools which combines operator interfaces (runtime and development), data trending and archive viewing, alarm handling and logbook services. The operations experience using CS- Studio during commissioning will be presented.

OPERATORS INVOLVED IN MAINTENANCE WORK ON THE ACCELERATORS

Gilles Garnodon, ESRF

Experienced accelerator Operators have a global working knowledge of the machines. During shutdown periods, Operators are encouraged to utilise and share this knowledge by assisting in maintenance activities relating to their experience and interests. In this way, they integrate and create links with other groups. This valorises Operator skills and provides variation in their role. We present a poster of ESRF Operators participating in maintenance tasks around the machine.

THE IMPORTANCE OF COMMUNICATION ABOUT THE ACCELERATORS BY THE OPERATION GROUP

Philippe Roussely, ESRF

Activities and developments on the accelerators are often carried out by small, highly specialised groups. One of the principal roles of the ESRF Operation Group is to communicate these activities to the other groups in the Accelerator and Source Division, both to promote the high-quality work carried out by each group and to create a global, cohesive view of the progress of the ASD. This is often done by means of a poster and we present an example of a typical Run poster, describing the main events, machine parameters and activities carried out during six weeks of operation.

NEW PARTICLE ACCELERATOR RELIABILITY WEBSITE

Philippe Roussely, ESRF

Following a request from the Accelerator Reliability Workshop in Vancouver in January 2009 for a collaborative website to enable information exchange and failure trouble-shooting within the accelerator community, the Particle Accelerator Reliability website has been created! We present a poster outlining the main features and the information available on this site and encourage colleagues to utilise it.

RADIOACTIVE MATERIAL LEAK AT THE HADRON EXPERIMENTAL FACILITY OF J-PARC

Kazuro Furukawa, KEK

In J-PARC, a radioactive material leak accident occurred at the Hadron Experimental Facility (HD facility) on May 23, 2013. The accident was triggered by a malfunction of the slow extraction system of the Main Ring synchrotron (MR). A beam of $2x10^{13}$ protons was extracted within a very short time of 5 ms and delivered to the gold target in the HD facility, whereas normally a total of $3x10^{13}$ protons were extracted for 2 s. The gold target was instantaneously heated up to an extraordinarily high temperature due to the short-pulse beam and partially damaged. As a result, the radioactive material dispersed from the gold target and leaked into the primary beamline room, because the target container was not hermetically sealed. Since airtightness of the primary beamline room was not sufficient, the radioactive material leaked into the hadron experimental hall (HD hall) and workers were exposed to radiation. Additionally, due to operation of ventilation fans in the HD hall, the radioactive material was released into the environment outside of the radiation controlled area of the HD facility. In this paper, the causes and preventive measures of the accident are presented.

Thursday Oral Presentations

Session: Commissioning & Recommissioning, Checkout before Beam

RECOMMISSIONING OF CPS COMPLEX

Denis Cotte, CERN

The CERN PS Complex just came out of a long shut down period that started in March 2013 and ended June 2014. During this long shut down the entire accelerator control system was renovated and upgraded. As consequence the user interfaces were updated and controls tools have been reconfigured. All the machine hardware was re-commissioned at the end of the shutdown period, after which many dry runs were performed to test and validate the individual systems. Prior to the re-commissioning of the accelerators the new and state-of the-art PS Complex access control and safety system was commissioned and validated. After a cold checkout period during which the machines are made fully operational without beam, the beam commissioning period took place to setup and provide beams to the different physics facilities by July 10th. This presentation provides an overview of the major changes together with the way to make the machines operational again.

RECOMMISSIONING THE FNAL RECYCLER RING FOR PROTON OPERATION

Martin Murphy, FNAL

In 2012 the FNAL Main Injector & Recycler Ring were turned off for a 15 month long period of upgrades and repurposing. The end goal of the project is to increase the beam power delivered to the Neutrino program from 300 KW to 750 KW. We are now over one year removed from the end of that shutdown and the Recycler commissioning is an ongoing process. The talk will outline what has been accomplished thus far and what obstacles remain. The primary talking points will be the motivation for the upgrades, an overview of the changes to the machine, the current status of the recommissioning process, the integration of operators into the process, and how operators are being trained to run the “new” machine.

COMMISSIONING OF THE 12 GeV CEBAF ACCELERATOR

Brian Freeman, JLAB

The 12 GeV Continuous Electron Beam Facility (CEBAF) was commissioned in two stages. Each stage included extensive component replacement, rework, and reassembly, followed by a period of commissioning with beam. An inefficient system checkout process used during the first commissioning stage contributed directly to a serious magnet fire. As a result, during the second stage of commissioning, new software tools and processes were put in place to handle system checks in a more streamlined, comprehensive manner. System owners used a web-based tool to check off components as they were readied for beam, and progress toward completion was tracked in the daily planning meeting, raising awareness of the requirement for rigorous checkout. Operators and Crew Chiefs used this same tool to verify the readiness of each machine component before powering-on or operating any device. Commissioning was successful, and all performance goals were met, without further incident.

“WHAT’S OLD IS NEW AGAIN”: OPERATIONS CONTROL OF RHIC START UP

Travis Shrey, BNL

The RHIC accelerator complex is in a constant state of evolution from run to run. While individual systems may be modified or added and need to be commissioned, the process of getting the machines ready for Physics production remains very much the same. The last two runs have seen management of the Start Up period move from control by an accelerator physicist (Run Coordinator) to the Operations group. By reducing the load of scheduling and decision making from a single person (with usually very limited Operations experience) to a group of people the setup period has become shorter even as the complexity of the machine has increased. This talk will discuss the mechanisms and communications used by Operations during the start-up period.

USING CHECKLISTS AS AN OPERATIONAL TOOL IN ACCELERATOR OPERATIONS

Vince Kempson, DIAMOND

Having presented general benefits of checklists at ARW Melbourne - now, a year onwards, it's time to show checklists in actual use for important functional steps in accelerator operation: 'Start-up of multiple accelerators , 'shut downs' each of which we do 5 times a year, machine days (28-30 times a year) and some specific short checklists for reinstatement of beam if it lost are all important areas using dedicated checklists. Development of the checklists and consolidation of them in a common database structure increases the flexibility available and the ease of creating new ones or variants of existing ones. The database has permitted more flexible tools to be used with the checklists to allow work to take place outside the control room avoiding handwritten sheets and tedious manual transfer back into the diamond elog system.

"NEW AND IMPROVED": THE JLab (STATE-OF-THE-ART) HCO SYSTEM

Kenneth Baggett, JLab

Determining machine readiness is crucial to ensure safe accelerator operations at machine start-up. Based on lessons learned at JLab (and other accelerators) a new process and software tool has been developed to allow operations to better understand system readiness with respect to accelerator components, checkout requirements and work interactions. The strength of the new system is its ability to clearly identify the state of all accelerator components while providing accountability of process. This is accomplished by improving communication between operations, technicians, system owners, and group leaders, requiring group leader and technician signoff of HCO elements, and supporting coordination by defining prerequisite tasks. A web based interface provides real-time work completion status, by group, on accelerator components. Details of how the process was developed, including group feedback integration, and how it was accepted and utilized during the JLab 12GeV re-commissioning effort and facilitate the peer-review Accelerator Readiness Review process will be presented.

PREPARATION PHASE OF THE FAIR PROJECT

Uwe Scheeler, GSI

FAIR will be an unique international accelerator facility for research with heavy ions and antiprotons, hosted by GSI. The new facility will provide higher energies and higher intensities compared to the present GSI accelerators. The Commissioning will start in 2017 and operation of the first module is foreseen in 2019. This talk describes the changes in GSI operation regime and the involved operation group during the project.
Main topics are:

- Establishing long shutdowns for upgrade and maintenance programs of the present GSI accelerators
- Redirection of the operators to new working tasks
- extensive accelerator development program in 2014
- Coordination of the construction of the new Main Control Room
- Training of personnel for the operation of the new machines

INITIAL OPERATION PLANS FOR THE ESS LINAC

Marc Muñoz, ESS

The European Spallation Source (ESS) is planned to be the world-leading source of slow neutrons for neutron scattering experiments. The facility will aim at a two orders of magnitude performance improvement compared to present facilities in Europe and consists of a 5 MW, 2 GeV proton Linac for long (ms) pulses, a Target for neutron production and 22 Instruments for experiments. ESS will be built in the period 2014-2019, with commissioning of the Linac during 2019, the first neutrons at the end of that year, and expecting to provide 1 MW of power for neutron production at the end of 2021, with only a part of the superconducting Linac installed. After installation of the remaining part of the Linac, the power would ramp up during the initial operation, reaching 5 MW by 2025. Steady-state operation of ESS will start in 2026, with routine operations and commissioning of initial suite of 7 instruments, to reach the baseline suite of 22 neutron instruments in 2028. This paper presents the plans being developed at ESS for Linac beam commissioning in order to provide a successful transition from construction to steady state operations, including details on availability and reliability.

Friday Oral Presentations

Session: Incidents and Lessons Learned

DISSOLVED GAS-IN-OIL ANALYSIS FOR PREVENTATIVE MAINTENANCE OF THE LANSCE HIGH VOLTAGE SYSTEMS

Karen Young, LANL

The LANSCE linac RF system consists of four 201.25 MHz RF stations that supply RF power to the drift tube linac (DTL), and forty-four 805 MHz RF stations, that supply RF power to the coupled-cavity linac(CCL). There are four large high voltage power supplies for the DTL RF systems and seven high voltage power supplies provide the power for the 805 MHz stations. All power supplies consist of a transformer/rectifier, Inductrol Voltage Regulator (IVR) and a capacitor bank with crowbar protection. After 44 years of operation, some components are approaching the end of life. An analysis of the oil in the high voltage power supply units was done to assess their health and to determine if units require maintenance or repair. Since 1998, the oil in each unit has been sampled and tested annually, and reprocessed when required. Gas-in-oil data for these units from 1998 to present was analyzed. The levels of each gas component, trends in the data and the significance of the each dissolved gas are discussed. Several units have been re-built. Case studies are presented that correlate the dissolved gas analysis with the failures found.

TROUBLE-SHOOTING IN INITIAL OPERATION OF THE KOMAC 100-MeV PROTON LINAC

Dae-Il Kim, KAERI

The 100-MeV proton linac of the Korea Multi-purpose Accelerator Complex (KOMAC) started to provide a proton beam to users on July 2013. The KOMAC facility has a 100-MeV proton linac, five beam lines for 20-MeV beam utilization, and another five beam lines for 100-MeV beam utilization. During the linac operation, the downtime occurred by some troubles related with utilities providing cooling water and electricity, high voltage modulators for klystrons, and Interlock systems of the MPS (Machine Protection System) and PPS (Personal Protection System). In 2013 operation, the availability was 82% and the downtime was 94.7 hours. This paper summarizes troubles in initial operation of the KOMAC facility and presents a preparation to reduce the downtime.

CATASTROPHIC EQUIPMENT FAILURE DURING AN EXTENDED OUTAGE

Thomas Spickermann, LANL

During the most recent extended maintenance outage of the LANSCE accelerator complex at Los Alamos National Laboratory, a 30-degree bending magnet used to send 800 MeV protons to the WNR facility failed catastrophically. During shutdown for the maintenance period the magnet was de-energized and the cooling water system for this magnet turned off. A short circuit in the 24 volt DC magnet control power supply caused failures in several control circuits for the magnet, including the module that controlled the magnet power supply. Contacts for magnet interlocks were bypassed by the control circuit failure and the magnet power supply automatically ramped up to the operational setpoint of about 1800 amps. As a result, the magnet coils overheated and were damaged beyond repair. A sprinkler right above the magnet was set off and caused a flood that spread soot from melting plastic over a large area. I will present the course of events as established by two investigation teams, as well as Lessons Learned regarding shutdown procedures, incident response during outages when the control room is not staffed, beam tunnel access by incident responders and tracking of legacy inventory.

Session: WAO Feedback & Closure (2014), Outlook (2016)

FAIR VISIT – SOME GENERAL INFORMATION

David Ondreka, GSI

FEEDBACK & CLOSURE 2014, OUTLOOK 2016

Michael Bieler, DESY

List of Participants

First Name	Family Name	Institute	Email address
Hiroki	**Arai**	AEC	aechebt@nirs.go.jp
Kenneth	**Baggett**	JLab	baggett@jlab.org
Enric	**Bargallo**	ESS	enric.bargallo@esss.se
Winfried	**Barth**	GSI	w.barth@gsi.de
Enzo	**Benfatto**	ELETTRA	enzo.benfatto@elettra.eu
Michael	**Bieler**	DESY	michael.bieler@desy.de
Achim	**Bloch-Späth**	GSI	a.bloch-spaeth@gsi.de
Jon	**Bonofiglio**	NSCL/MSU	bonofigl@nscl.msu.edu
Julian	**Brower**	ISIS	julian.brower@stfc.ac.uk
Terry	**Carlino**	JLab	carlino@jlab.org
Davide	**Carlucci**	INFN	carlucci@lnl.infn.it
Rainer	**Cee**	HIT	rainer.cee@med.uni-heidelberg.de
William	**Colocho**	SLAC	colocho@slac.stanford.edu
Jean-Francois	**Comblin**	CERN	jean-francois.comblin@cern.ch
Denis	**Cotte**	CERN	denis.cotte@cern.ch
Xavier	**Deletoille**	Synchrotron Soleil	deletoille@synchrotron-soleil.fr
Michael	**Edling**	Helmholtz-Zentrum Berlin	michael.edling@helmholtz-berlin.de
Roger	**Erickson**	SLAC	roger@slac.stanford.edu
Ferran	**Fernandez**	CELLS-ALBA	banque@cells.es
Raymond	**Fliller**	BNL	rfliller@bnl.gov
Silvio	**Foiera**	PSI	silvio.foiera@psi.ch
Peter	**Forck**	GSI	p.forck@gsi.de
Brian	**Freeman**	JLAB	bfreeman@jlab.org
Kazuro	**Furukawa**	KEK	kazuro.furukawa@kek.jp
Michael	**Galonska**	HIT	michael.galonska@med.uni-heidelberg.de
Gilles	**Garnodon**	ESRF	garnodon@esrf.fr
Peter	**Gerhard**	GSI	p.gerhard@gsi.de
Isaac	**Gertz**	NRC Soreq	gertz@soreq.gov.il
Rossano	**Giachino**	CERN	rossano.giachino@cern.ch
Sébastien	**Girault**	Arronax	girault@arronax-nantes.fr
Corey	**Gray**	LIGO (Caltech)	gray_c@ligo-wa.caltech.edu
Kevin	**Hall**	AWE	kevin.hall@awe.co.uk
Dennis	**Haupt**	DESY	dennis.haupt@desy.de
Manuel	**Heilmann**	GSI	m.heilmann@gsi.de
Georges-Henry	**Hemelsoet**	CERN	georges-henry.hemelsoet@cern.ch
Matthew	**Hendricks**	ANL	hendricks@anl.gov
Sigrid	**Heymell**	GSI	S.Heymell@gsi.de
Klaus	**Hoeppner**	HIT	klaus.hoeppner@med.uni-heidelberg.de
Tobias	**Hoffmann**	GSI	t.hoffmann@gsi.de
Satoru	**Hojo**	NIRS	s_hojo@nirs.go.jp
Peter	**Hottinger**	PSI	pet.hottinger@psi.ch
Jason	**Hughes**	AWE	jason.hughes@awe.co.uk
Peter	**Ingrassia**	BNL	ingrassia@bnl.gov
Hiromi	**Inokuchi**	NIRS	inokuchi@nirs.go.jp
Glen	**Johns**	SNS / ORNL	johnsgd@ornl.gov
Adrian	**Johnson**	Diamond Light Source	adrian.johnson@diamond.ac.uk
Daniel	**Johnson**	Fermilab	D_Johnson@fnal.gov
Stanley	**Johnson**	Fermilab	SRJ@fnal.gov
Vince	**Kempson**	Diamond Light Source	vince.kempson@diamond.ac.uk
Dae-Il	**Kim**	KAERI	dikim@kaeri.re.kr
Mungyung	**Kim**	PAL	mungyung@postech.ac.kr
Stefano	**Krecic**	ELETTRA	stefano.krecic@elettra.eu
Andreas	**Lüdeke**	PSI	andreas.luedeke@psi.ch
Joseph	**Luner**	NRC Soreq	josephl@soreq.gov.il
Bob	**Mannix**	STFC	bob.mannix@stfc.ac.uk

Gregory	***Marr***	*BNL*	*gmarr@bnl.gov*
Michaela	***Marx***	*DESY*	*michaela.marx@desy.de*
Don	***McGilvery***	*SLSA*	*don.mcgilvery@synchrotron.org.au*
Patrick	***Meijers***	*ASML*	*patrick.meijers-pmem@asml.com*
Geoffrey	***Milanovich***	*ORNL*	*milanovichgw@ornl.gov*
Ingo	***Müller***	*Helmholtz-Zentrum Berlin*	*ingo.mueller@helmholtz-berlin.de*
Marc	***Muñoz***	*ESS*	*marc.munoz@esss.se*
Martin	***Murphy***	*Fermilab*	*mmurphy@fnal.gov*
Duane	***Newhart***	*Fermilab*	*newhart@fnal.gov*
Pierre	***Ninin***	*CERN*	*Pierre.Ninin@cern.ch*
Jozef	***Orzechowski***	*TRIUMF*	*joski@triumf.ca*
Fadmar	***Osmic***	*EBG MedAustrom GmbH*	*fadmar.osmic@medaustron.at*
Hongjib	***Park***	*PAL*	*phj@postech.ac.kr*
Liviu	***Penescu***	*EBG MedAustrom GmbH*	*Liviu.Penescu@medaustron.at*
Damien	***Pereira***	*Synchrotron Soleil*	*damien.pereira@synchrotron-soleil.fr*
Louis	***Pereira***	*CERN*	*louis.pereira@cern.ch*
Filip	***Persson***	*MAX IV Laboratory*	*filip.persson@maxlab.lu.se*
Mikael	***Pettersson***	*TSL - The Svedberg Laboratory*	*mikael.pettersson@tsl.uu.se*
Freddy	***Poirier***	*Arronax*	*poirier@arronax-nantes.fr*
Montse	***Pont***	*CELLS-ALBA*	*pont@cells.es*
Maria	***Power***	*ANL*	*mpower@anl.gov*
Qing	***Qin***	*IHEP*	*qinq@ihep.ac.cn*
Stephan	***Reimann***	*GSI*	*s.reimann@gsi.de*
James	***Ridewood***	*CERN*	*james.ridewood@cern.ch*
Philippe	***Roussely***	*ESRF*	*roussely@esrf.fr*
Tom	***Scarvie***	*LBL*	*tom_scarvie@lbl.gov*
Uwe	***Scheeler***	*GSI*	*u.scheeler@gsi.de*
Petra	***Schütt***	*GSI*	*p.schuett@gsi.de*
Anna	***Shabalina***	*JLAB*	*shabalin@jlab.org*
Travis	***Shrey***	*BNL*	*shrey@bnl.gov*
Thomas	***Sieber***	*GSI*	*t.sieber@gsi.de*
Johan	***Sjögren***	*MAX IV Laboratory*	*johan.sjogren@maxlab.lu.se*
Reid	***Smith***	*BNL*	*smithr@bnl.gov*
Thomas	***Spickermann***	*LANL*	*spickermann@lanl.gov*
Michael	***Stanek***	*SLAC*	*stanek@slac.stanford.edu*
Martin	***Stein***	*GSI*	*m.stein@gsi.de*
Andreas	***Stolz***	*NSCL/MSU*	*stolz@nscl.msu.edu*
Tasha	***Summers***	*BNL*	*tsummers@bnl.gov*
Yuji	***Tachikawa***	*AEC*	*aecmed@nirs.go.jp*
Eiichi	***Takada***	*NIRS*	*takada@nirs.go.jp*
Yuichi	***Takahashi***	*AEC*	*aec_cyc@fml.nirs.go.jp*
Dennis	***Turner***	*JLab*	*dturner@jlab.org*
Akito	***Uchiyama***	*RIKEN*	*a-uchi@riken.jp*
Francesco	***Valentini***	*CERN*	*Francesco.Valentini@cern.ch*
Bruno	***Vedder***	*ESRF*	*vedder@esrf.fr*
Andrea	***Vescovo***	*ELETTRA*	*andrea.vescovo@elettra.eu*
John	***Weisend II***	*ESS*	*john.weisend@esss.se*
Leonid	***Weissmann***	*NRC Soreq*	*weissman@soreq.gov.il*
Christopher	***Wetton***	*CERN*	*cwetton@cern.ch*
Vincent	***Winter***	*Diamond Light Source*	*vincent.winter@diamond.ac.uk*
Lea	***Wunderlich***	*GSI*	*l.wunderlich@gsi.de*
Jun	***Xing***	*IHEP*	*xingj@ihep.ac.cn*
Karen	***Young***	*LANL*	*kareny@lanl.gov*
Qinglei	***Zhang***	*SINAP*	*zhangqinglei@sinap.ac.cn*
Holly	***Zhen***	*ISI STFC*	*holly.zhen@stfc.ac.uk*
Thorsten	***Ziglasch***	*GSI*	*t.ziglasch@gsi.de*