

Diagnostics Experts of European Light Sources 2022



Report of Contributions

Contribution ID: 8

Type: **not specified**

Tour of BESSY II

Tuesday 7 June 2022 15:30 (1 hour)

Session Classification: Tuesday afternoon

Contribution ID: 9

Type: **not specified**

Welcome

Tuesday 7 June 2022 09:15 (15 minutes)

Session Classification: Tuesday morning

Contribution ID: 11

Type: **not specified**

X-BPM development at the ESRF, and its indispensable use for verifying the genuine stability of our source

Tuesday 7 June 2022 11:00 (30 minutes)

Very beneficial use is now being made of available vacuum chambers in the Front-Ends of our bending magnet beamlines by installing & operating a newly developed X-BPM that measures (only) the vertical X-ray position at 23m from their source-point.

These simple and low-cost X-BPMs convert through a scintillator screen the hard-rays into visible light, that is being captured and imaged by a compact lens & camera system. In 2 units of a first prototype version (installed Oct. 2021) the device is not compatible with the BM-users taking their beam which is of course a major limitation.

However, over a few long periods when the X-BPM could be left inserted it has generated very interesting information and insight on local positional variations, mainly on slow time-scales of hours & days.

A 2nd version is now designed to measure continuously these variations. It will only use these X-rays just beside those used by the beamlines. The ESRF serves a total of 17 such BM beamlines and potentially all can be equipped with such X-BPM, and its output is foreseen for serving a control loop to gain significantly in stability.

Results of the first 2 units will be presented, and this in close correlation with some deficiencies of some of our electron BPMs.

Primary author: Mr SCHEIDT, Kees (ESRF - European Synchrotron Radiation Facility)

Presenter: Mr SCHEIDT, Kees (ESRF - European Synchrotron Radiation Facility)

Session Classification: Tuesday morning

Contribution ID: 13

Type: **not specified**

The SINGLE-electron experiment in the ESRF Storage Ring and future developments to improve bunch pollution measurements

Tuesday 7 June 2022 12:00 (30 minutes)

The control and measurement of a Single-electron have been achieved at the ESRF with the combined use of a low-cost photon detector and the extracted visible-light from bending magnet beam-port. We present both the details of the very particular control of our injector allowing this injection of individual electrons, and the set-up and technique of irrefutably measuring these levels of 1-2-3-4-etc. electrons in a very reasonable measurement time of a few minutes. This device is now operational for specific accelerator studies to measure the level (or rather the total absence) of any unwanted electrons when fine-tuning the so-called cleaning system in the Booster-Injector-Ring. This work will continue with use of TCPC techniques to improve our diagnostics, and then also during user-mode, of measuring pollution in these specific ESRF filling patterns, where X-ray users demand such impurities as low as zero electron.

Primary author: Dr BURATIN, Elena (ESRF)**Presenter:** Dr BURATIN, Elena (ESRF)**Session Classification:** Tuesday morning

Contribution ID: 14

Type: **not specified**

Dump Button BPMs at the European XFEL

Tuesday 7 June 2022 14:00 (30 minutes)

The European XFEL is equipped with cavity, re-entrant and button BPMs up to the dump where the electron beam with up to 17.5 GeV hit graphite. The BPMs near to the dump get additional background signals which decreases the calculated beam position. The problem will be described and I hope we can discuss solutions.

Primary author: LIPKA, Dirk (DESY)**Presenter:** LIPKA, Dirk (DESY)**Session Classification:** Tuesday afternoon

Contribution ID: 15

Type: **not specified**

Difficulties in modifications of front-end X-ray Beam Position Monitors to cope with increased power loads from source point upgrades

Tuesday 7 June 2022 10:00 (30 minutes)

As Diamond Light Source moves towards its upgrade to a 4th generation synchrotron many of the beamlines are upgrading insertion devices resulting in source points with increased power. Consequently, the power loads expected on the front-end diagnostics will be significantly higher. Simulations of the X-ray beam have shown the power absorbed by the front-end tungsten blades could exceed the limits provided by the manufacturer. To mitigate this risk, in-house modifications were conducted to increase the separation of the blades to account for the more intense beam. These modifications had varying success and are some-what limited by the original design of the blade holders. This talk will discuss some of the challenges we have encountered.

Primary authors: Mr BLOOMER, Chris (Diamond Light Source); Ms HOUGHTON, Claire (Diamond Light Source); Mrs BOBB, Lorraine (Diamond Light Source)

Presenter: Ms HOUGHTON, Claire (Diamond Light Source)

Session Classification: Tuesday morning

Contribution ID: 16

Type: **not specified**

An optical diagnostic beamline for the BESSY II Booster

Wednesday 8 June 2022 09:00 (30 minutes)

As part of the global refurbishment of the injector at BESSY II, a new optical beamline has been installed in the booster. We report on the conceptual design: incorporating the beamline into an operational facility without downtime, the simulation and expectations of the optical transport line, mechanical installation and commissioning with beam. These first results with the present beam delivery system have already achieved source point imaging and bunch length measurements using a fast diode. With the additional PETRA cavity installed for this booster upgrade and connection to acquire RF power in the 2022 summer shutdown planned, the bunch length diagnostics are critical. The beamline will also undergo a final mechanical upgrade and then see the installation of a streak camera.

Primary author: ATKINSON, Terry (HZB)

Co-authors: RIES, Markus (Helmholtz-Zentrum Berlin); REHM, Günther (Helmholtz-Zentrum Berlin); SCHIWETZ, Gregor (BESSY II, HZB Berlin); HWANG, Ji-Gwang; WIESE, Stefan

Presenter: ATKINSON, Terry (HZB)

Session Classification: Wednesday morning

Contribution ID: 17

Type: **not specified**

Optical Beam Profiling @ BESSY II: Imaging, interferometry and more

Tuesday 7 June 2022 11:30 (30 minutes)

Optical beam diagnostics at BESSY II is and will further be upgraded for bunch selective measurements at three new beamlines on two bending magnets for visible light and THz radiation. This contribution focuses on the transverse beam-size resolution in addition to other (correlated) beam parameters.

Different methods such as

- double-slit interferometry vs.
- pi-polarization interferometry vs.
- direct imaging

are used for beam diagnostics at BESSY II and their specific advantages and disadvantages are discussed.

Beyond transverse spatial resolution, developments are focused on several directions

- pulse detection at good time resolution
- correlated 2D capabilities ("time" vs. "x" or "y" as well as "x" vs. "y")
- improved data acquisition time/exposure rate.

The current status and work in progress will be discussed, including lessons learned and open problems. During the BESSY II tour, most of our systems will be visited.

Primary authors: Prof. SCHIWETZ, Gregor (Helmholtz-Zentrum Berlin, BESSY II); HWANG, Ji-Gwang (Helmholtz-Zentrum Berlin); RIES, Markus (Helmholtz-Zentrum Berlin); Dr KOOPMANS, Marten (HZB)

Presenter: Prof. SCHIWETZ, Gregor (Helmholtz-Zentrum Berlin, BESSY II)

Session Classification: Tuesday morning

Contribution ID: 18

Type: **not specified**

Recent progress on the development of button BPMs in BESSY II

Tuesday 7 June 2022 14:30 (30 minutes)

The research and development of the new button BPM initiated by the BESSY VSR upgrade project have progressed in various physical and engineering aspects. Over the past years, the underlying idea such as impedance matching structure has been demonstrated experimentally and engineering details for applying a glass insulator is studied. This presentation will discuss the facts verified in the experiment and the engineering aspects learned in the development of glass sealing feedthrough.

Primary authors: Mr WOLK, Daniel (Helmholtz-Zentrum Berlin); HWANG, Ji-Gwang (Helmholtz-Zentrum Berlin); REHM, Günther (Helmholtz-Zentrum Berlin); ATKINSON, Terry (HZB); DÜRR, Volker (Helmholtz-Zentrum Berlin)

Presenter: HWANG, Ji-Gwang (Helmholtz-Zentrum Berlin)

Session Classification: Tuesday afternoon

Contribution ID: 19

Type: **not specified**

Polarization Switch Operation Mode at ALBA

Tuesday 7 June 2022 09:30 (30 minutes)

Since beginning of 2022, the Polarization Switch operation mode is available for users of the MIS-TRAL beamline at ALBA synchrotron light source. This mode allows users to select the synchrotron radiation polarization by generating a bump in the electron beam in order to change the angle at the beamline source point. The bump is generated by modifying the offset of a BPM and an xBPM included in the Fast Orbit FeedBack loop.

In this report we present the working principle, commissioning, and operation of this new operation mode.

Primary authors: MOLDES, Jairo (ALBA-CELLS); TORINO, Laura (ALBA-CELLS); IRISO, Ubaldo (ALBA-CELLS); MARTI, Zeus (ALBA-CELLS); YEPEZ, David (ALBA-CELLS)

Presenter: TORINO, Laura (ALBA-CELLS)

Session Classification: Tuesday morning

Contribution ID: 20

Type: **not specified**

Development of a new BPM electronic system for the PETRA pre-accelerator chain

Wednesday 8 June 2022 11:00 (30 minutes)

There is a large range of bandwidth needed for the BPM electronics for the Petra pre-accelerators. The bunch length will vary from the ns to ps range. Also a new bunch burst mode is requested for the Petra IV first turn operation. The new BPM electronics is developed as a universal peak detector hardware in a mtca.4 environment. Automatic adjusted delay lines or 2x2 cross point switch technique will be tested for self calibration. The goal is a universal mtca.4 based electronics for button BPMs. The limitation of this detector electronic is the bunch spacing of at least 100ns.

Primary authors: LORBEER, Bastian; DUHME, Hans-Thomas

Presenter: DUHME, Hans-Thomas

Session Classification: Wednesday morning

Contribution ID: 21

Type: **not specified**

Bunch by bunch measure at SOLEIL

Wednesday 8 June 2022 09:30 (30 minutes)

Recent measures at SOLEIL lead us to install the Libera Digit500 on BPM pick ups to check bunch by bunch position evolution during injection.

This presentation will focus on some results and issues we encountered.

We will open the discussion on the behaviors still unexplained and the improvement of this diagnostic.

Primary author: BROUCQUART, Romain (Synchrotron SOLEIL)

Presenter: BROUCQUART, Romain (Synchrotron SOLEIL)

Session Classification: Wednesday morning

Contribution ID: 22

Type: **not specified**

Beam position interlock for Elettra 2.0 storage ring

Wednesday 8 June 2022 11:30 (1 hour)

Currently we are in the final design phase of Elettra 2.0. The new machine will have a maximum current of 400 mA, an energy of 2.4 GeV and an emittance of 212 pm-rad. In order to protect the components inside the vacuum chamber and the chamber itself, a beam position interlock is mandatory. In this report we will present the existing interlock system of the current machine, explaining its mode of operation and specifying why a more complex interlock system is required for the new storage ring. In fact, the adopted lattice imposes strict rules on machine operation that can vary, depending on type and position of the insertion devices. For this reason, we propose a new beam orbit interlock based on our new pilot tone based eBPM system. Hoping then to start a useful discussion about interlocks and safe operation of storage rings with the participants, thanks to their experience in the lightsources field.

Primary authors: Mr BRAJNIK, Gabriele (Elettra-Sincrotrone Trieste); Mr DE MONTE, Raffaele (Elettra-Sincrotrone Trieste)

Presenter: Mr DE MONTE, Raffaele (Elettra-Sincrotrone Trieste)

Session Classification: Wednesday morning

Contribution ID: 23

Type: **not specified**

A non-destructive vertical Halo-monitor on the ESRF electron beam

Wednesday 8 June 2022 14:00 (30 minutes)

A vertical Halo-monitor was installed in this May shutdown, and is now in permanent operation and yielding very satisfying results that will be shown in details, and in relation with studies on the electron beam and the accelerator components like variation of current, filling-patterns, vertical emittance, settings of the undulator gaps, collimators, scrapers etc. and in direct correlation with measurements of our 128 beamloss detectors and beam lifetime.

The principle and the components of this non-destructive diagnostic will also be explained. It uses the available X-rays in an non-used Front-End.

Primary author: SCHEIDT, Kees (ESRF - European Synchrotron Radiation Facility)

Co-authors: BURATIN, Elena (ESRF); Mr ROCHE, Benoît (ESRF - European Synchrotron Radiation Facility); Mrs FRIEDERIKE, Ewald (ESRF - European Synchrotron Radiation Facility)

Presenter: SCHEIDT, Kees (ESRF - European Synchrotron Radiation Facility)

Session Classification: Wednesday afternoon

Contribution ID: 24

Type: **not specified**

Electronic components market challenges for the Libera instruments

Wednesday 8 June 2022 10:00 (30 minutes)

Technical requirements have long been the main challenge for engineers that had to push the performance boundaries higher and higher. In the last years, the performance challenges were silently replaced by the electronic component availability issue that spread worldwide. Even companies with established supply chains are faced with long and non-predictable lead times, in addition to extreme price increases. As some components are not available in the market anymore, replacements and workarounds must be implemented.

This contribution will present how the shortage of components has affected Instrumentation Technologies and what are the countermeasures the company has taken to still provide its customers with high-quality instrumentation in relatively short and reasonable delivery times.

Primary author: Mr LEBAN, Peter (Instrumentation Technologies d.o.o.)

Presenter: Mr LEBAN, Peter (Instrumentation Technologies d.o.o.)

Session Classification: Wednesday morning

Contribution ID: 25

Type: **not specified**

ELI Beamlines: Overview of a control system of a high-power laser research facility

Tuesday 7 June 2022 13:30 (30 minutes)

ELI Beamlines is an international laser research facility located outside Prague, CZ. Four high-power (up to 10 PW) femtosecond pulse lasers serve as light sources for experiments in several branches of physics. Although control of a high-power laser beam poses different challenges than a synchrotron does, there is a common ground in the operation of support systems, safety, timing, data acquisition etc. This presentation is an overview of the approach taken by ELI laser controls team.

Primary author: Mr MAJER, Karel (ELI Beamlines)

Presenter: Mr MAJER, Karel (ELI Beamlines)

Session Classification: Tuesday afternoon

Contribution ID: 26

Type: **not specified**

Recent progress on the development of the fast orbit feedback for PETRA IV

Wednesday 8 June 2022 13:30 (30 minutes)

A fast orbit feedback (FOFB) system is under development for the upcoming PETRA IV ring at DESY, Hamburg, Germany. PETRA IV shall be a fourth-generation state-of-the art light source with stringent requirements of electron beam stability at the insertion devices in order to achieve a diffraction-limited photon beam quality of 1 Angstrom. The proposed topology and the FOFB subsystem modeling and design considerations are discussed. They include e.g. vacuum chamber, corrector magnets and power supply parameters. The closed-loop SISO (single-input-single-output) simulations are also presented for a target of 1 kHz cross-over frequency for disturbance rejection.

Primary author: MIRZA, Sajjad Hussain**Presenter:** MIRZA, Sajjad Hussain**Session Classification:** Wednesday afternoon

Contribution ID: 27

Type: **not specified**

Discussion: Should DEELS be virtual, in-person or hybrid in the future?

Wednesday 8 June 2022 14:30 (30 minutes)

We have all experienced a range of workshops and conferences in shades of virtualisation over the past years, and found that all offer advantages and challenges. Which do we believe is the most appropriate one for DEELS in the future?

Session Classification: Wednesday afternoon

Contribution ID: **28**

Type: **not specified**

Registration

Tuesday 7 June 2022 09:00 (15 minutes)

Session Classification: Tuesday morning