|  |  |
| --- | --- |
| european-xfel-logo-497x497 | Undulator Radiation Task Force |
| MINUTES |

|  |  |  |
| --- | --- | --- |
| Date 14 June 2018 Time 10:00 – 11:30 Ort XHQ E2-042 Agenda  * Presentations * Plans * Recommendations   **Minutes**  J. Pflüger | Participants S. Liu (SL)  Y. Li (YL)  J. Pflüger (JP)  F. Schmidt-Föhre (FS)  W. Decking (WD)  H. Sinn (HS)  S. Karabekyan (SK)  T. Wohlenberg (TW)  M. Scholz (MS) Distribution: D. Nölle (DN)  T. Wamsat (TW)  F. Wolff-Fabris (FW) | T. Tschentscher (TS)  Y. Li (YL)  A. Leuschner (AL)  L. Fröhlich (LF)  **Viewgraphs:**  <https://indico.desy.de/indico/event/20809/> |

Presentations:

1. F. Wolff-Fabris: Dosis Overview  
   Presentation given by J. Pflüger

Dose Base Line set in April:

SASE1 DU about 40Gy; 5-m segments < 20 Gy

SASE3 all cells < 10Gy

Dose increases are moderate.  
The recovery from a magnet failure led to a sudden dose increase of 14Gy in cell9 (see also TOP 2).Around cells 31 the dose increase scales with the number of bunches.  
A test with 4mm lead hats was made in cell 31 with the lower Radfet. The Radfet position needs to be moved 10mm away from the beam. The unshielded radiation intensity was estimated to be reduced from 9Gy in the upper to 3.1Gy in the lower position. The test showed that with the lead hat no dose could be detected. This does not allow an estimate of the reduction.

1. M. Scholz: Analysis of the “Singular Events” June 2nd
   * There were repeated magnet failures in the morning of June 2nd .
   * The machine was operated in single bunch mode during the recovery.
   * Reason for the losses: The operator optimized the trajectory with closed undulator gaps. The beam was miss-steered and dumped in the undulator. This could have been avoided.
   * It is believed that only one bunch caused the exposure: Maximum dose is 14Gy in cell 9.
   * This incident is due to human error. As a consequence awareness of operators has been and still is increased by more instructions.
   * Similar incidents should be avoided but cannot be 100% excluded in future.
2. T. Wohlenberg: Plans for the Tune-Up Shutter  
   Tune-up shutters are planned in front of all three undulators. Installation is planned for the winter shut down. In a tune-up shutter a tungsten block of 139mm x 134mm x 200mm (Height, Width, Length) can be moved to completely block the electron beam. For operation the following conditions need to be fulfilled:
   * Single bunch mode only
   * The number of bunches which can be deposited is limited, i.e. counting is required, exact conditions tbd.
   * Neutron shielding is required for the tune-up dump. Details to be defined.

An additional BPM will be installed in front of each tune-up shutter. Plan for operation: With the tune-up shutter closed the beam can be conditioned without entering the undulator. After opening it passes through the undulator without losses. The tune-up shutter can also be used to prevent any radiation exposure of the undulator when using the wire scanner.

1. F. Schmidt-Föhre: Results from the Lead Hat test in Cell 31 and Status of the Lead Hats:
   * Manufacturing of the Lead Hats is delayed by the slow purchasing process.
   * Earliest availability is week 30, last week of July. This is too late for installation in SASE1/3 in the shut down.
   * Total installation time for all lead hats is estimated to be 80 hours.
   * The plan is to completely install the lead hats in SASE2, since SASE2 will continue to be open. In SASE1/3 they will have to be gradually installed during operation in service days and weeks.
   * A very similar situation appear in the manufacturing of the parts needed to install Radfets directly on the vacuum chambers.

Since a second prototype lead hat is available a second shielding test is proposed. This should be made at the beginning in SASE1/Cell#3.

1. Plans, suggestions
   * The first 60 Glass scintillators will arrive in time during the shut-down. It is planned to install them in the rear part of the SASE1 and SASE3 where high photon levels are expected.
   * Aperture measurements along the undulators are planned.
   * The whole undulator system should be used, especially the last five segments should be closed. Careful dose monitoring should be done by FW. Do the last segments contribute to lasing?

The last two point are “Leftover Items”, see RDTF 17.5.2018. In order not to jeopardize the user run they are now scheduled after the shut-down in July.

1. Recommendations

With the present knowledge it cannot be definitely decided to what extent the doses measured in cells 31 and ff. are harmful to the undulator. An ultimate result can only be obtained by re-measuring one of the undulators in cells 31-35 after receiving a reasonably high dose, about 800-1000Gy. However, unneeded, superfluous irradiation of undulators should be avoided. Since for the rest of 2018 operation with long bunch trains is planned dose levels are expected to rapidly increase.

If radiation damage due to synchrotron radiation can be detected in cells > 30 threshold dose levels need to be redefined and suitable countermeasured have to be developed.