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Radiation Safety Memo

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Subject: Dose rates on contact with the New Beam Stop inside the Holography Chamber at 23ID-1 (CSX) Beamline

Date: July 17, 2018

This note describes the radiation analysis of the new monochromatic beam stop that is planned to be installed as part of the new holography chamber at 23ID-1 (CSX) beamline. The following storage ring and insertion device parameters [1] are used for the calculations herein:

- Electron Energy: 3 GeV
- Stored beam Current: 500 mA
- Elliptically Polarized Undulator Source:
    - Number of periods: 76
    - Period Length: 49.2 mm
    - Maximum Magnetic Field: 0.97 T

The analytical code STAC8 v. 2.3 [2] is used to estimate the dose rates on contact with copper beam stop. The monochromatic beam directly striking the monochromatic beam stop is conservatively simulated as a zero-order beam generated by a 3-mirror configuration (gold coated mirrors at 1.17 degrees angle of incidence) [1]. The current 23ID-1 beamline is equipped with a 2.75” diameter blank flange which acts as a monochromatic beam stop. The new holography chamber will be connected directly to 23ID-1 beamline by removing this blank flange and connecting to an upstream beam pipe with bellows. The fast CCD camera of the new chamber will be the new monochromatic beam stop for 23ID-1 and the monochromatic beam is completely stopped by the camera detector. There is a minimum of 3.56 mm thick Cu block covering the camera in addition to a thick cold finger made of copper just downstream of it [3].

The resulting dose rates on contact with the new beam stop are negligible (< 0.001 mrem/h).

References

1. Z. Xia , "*23-ID CSX Beamline Radiation Shielding Analysis*", NSLS-II Technical Note 135, August 06 2014.
2. Y. Asano, "*A study on radiation shielding and safety analysis for a synchrotron radiation beamline*," JAERI-Research-2001-006, March 2001. Y. Asano and N. Sasamoto, "*Development of Shielding Design Code for Synchrotron Radiation Beamline*," Radia. Phys. Chem. 44 (1994) 133.
3. 23-ID-1 (CSX) Holography Chamber Final Design Review, PS-DRR-1067, July 17 2018