



Memo

Date: October 4, 2017
To: Christopher Amundsen, Mohamed Benmerrouche, and Sushil Sharma
From: Zhong Zhong (chair), Photon Science Radiation Safety Committee
Subject: Review of the ray-tracing designs of the SST (7-ID) front-ends

Dear Chris, Mo and Sushil,

The Photon Science Radiation Safety Committee (RSC)'s ray-tracing subcommittee concluded review of the front-end ray-tracing drawings of the SST (7-ID) On September 14.

Subjects reviewed include the synchrotron max-fan and Bremsstrahlung drawings. Since the max. fan drawings are sufficient for assuring the safety of the front-end against synchrotron radiation, the nominal synchrotron and interlocked ray-tracings, included in the drawing packages on sheets 2 and 3, were not reviewed by the RSC.

Documents Reviewed

The following documents were submitted to the RSC on September 7, 2017 for review:

1. SST front-end assembly drawing, SR-FE-IVU07-1001, Rev. C by D. Puleo.
2. SST front-end Bremsstrahlung ray-tracing, SR-FE-IVU07-1001, Rev. C, sheets 4 and 5 for horizontal and vertical projections, respectively.
3. SST front-end max. synchrotron ray-tracing, SR-FE-IVU07-1001, Rev. C sheets 6 and 7 for horizontal and vertical projections, respectively.
4. Rev. B of the above drawings.
5. Memo from Chris Amundsen to the RSC, dated September 6, 2017. The memo details changes made in Rev. C compared to prior version Rev. B.

Notes

The SST front-end Rev. B was reviewed by the RSC in 2016. The memo for that review is attached for completeness. The current version Rev. C contains minor updates from Rev. B., as detailed in Chris Amundsen's memo.

Conclusions

Based on our assessment of the ray-tracing drawings, the RSC finds the Bremsstrahlung and synchrotron shielding design for the SST front-end meeting the NSLS-II shielding policy.

Memo from prior review of SST ray-tracing rev. B.

Date: March 3, 2016

To: Daniel Fischer, Andrew Broadbent, and John Hill

From: Zhong Zhong (chair), Photon Science Radiation Safety Committee

Subject: Review of the ray-tracing design of the NIST SST and BMM NSLS-II beamlines

Dear Dan, Andy and John,

The Photon Science Radiation Safety Committee (RSC)'s ray-tracing subcommittee concluded review of the front-end ray-tracing for the SST and BMM beamlines.

Subjects reviewed include synchrotron max-fan and Bremsstrahlung drawings for the front-end. The Secondary Bremsstrahlung and synchrotron radiation shielding analysis and thermal analysis were not reviewed, nor were the beamline ray-tracing drawings.

Please note that current review concerns only with the front-end ray-tracing drawings for SST and BMM beamlines. The beamline drawings must be updated based on the released front-end drawings. These drawings, along with shielding analysis and thermal analysis (if needed) should be presented to the RSC for review later, ideally months before the SST and BMM IRR.

Written documents

The following documents were submitted to the RSC on January 13, 2016 for review:

6. BMM frontend ray-tracing drawing package, SR-FE-3PW-8001, Rev. B, by J.Fabijanac, "Front end, BMM, Cell6 Ray Tracing". Sheets 3 and 4 are for horizontal and vertical max. synchrotron ray-tracing. Sheets 6 and 7 are for horizontal and vertical Bremsstrahlung ray-tracing.
7. SST frontend ray-tracing drawing package, SR-FE-IVU07-1001, Rev. B, by D. Fuleo, "Front end, SST Beamline Ray Tracing". Sheets 6 and 7 are for horizontal and vertical max. synchrotron ray-tracing. Sheets 4 and 5 are for horizontal and vertical Bremsstrahlung ray-tracing.

Recommendations

1. The current, approved front-end drawings, for both SST and BMM, include much-larger, hence more conservative, source definitions for the max. synchrotron. Thus, The SST and BMM beamline max. synchrotron ray-tracing drawings must be updated to accommodate the new source definition. The updated beamline shielding will require new masks in the SST FOE to contain possibly mis-steered pink-beam.
2. The NSLS-II shielding guideline was updated in late 2014, resulting in requirement to shield against secondary Bremsstrahlung radiation using secondary Bremsstrahlung shielding. Thus the SST and BMM beamline Bremsstrahlung shielding must be updated to include secondary Bremsstrahlung shielding in their respective First Optical Enclosures (FOE). For the same reason, the pink-beam transport pipe for M branch of SST, not shielded in the current beamline design, should be lead-wrapped from the FOE to the PGM to shield against secondary Bremsstrahlung radiation.
3. Once the beamline drawing is updated according to recommendations 1 and 2, please coordinate with Mohamed Benmerrouche to perform the shielding analysis validation. The analysis for SST should be performed as soon as possible given concern over the SST pink-beam beam transports.

Conclusions

Based on our assessment of the ray-tracing drawings, the RSC find the SST and BMM front-end Bremsstrahlung and synchrotron shielding design meets the NSLS-II shielding policy.

Radiation Safety Committee

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