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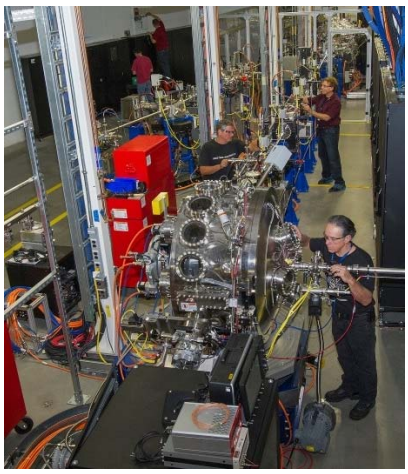
Doc No: NSLSII-7ID-PRC-001

NSLS-II PROCEDURE: BEAMLINES SST-1 AND SST-2 (7-ID) RADIATION SURVEY PROCEDURE

December 11, 2018

Rev. 5

S. Chitra



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National Synchrotron Light Source II, Brookhaven National Laboratory			
Doc No. NSLSII-7ID-PRC-001	Author: S. Chitra	Review Frequency: 3yrs	Rev. 5
Title: Beamlines SST-1 and SST-2 (7-ID) Radiation Survey Procedure			Effective Date: 11DEC2018

ESH Review:

12/13/2018

X Kim Wehunt

Kim Wehunt
Facility Support Representative
Signed by: Wehunt, Kimberly

By signing this Procedure I acknowledge that it complies with all ESH requirements and if performed correctly, will not present a significant hazard to personnel or equipment.

Beamline Review:

12/13/2018

X Cherno Jaye

Cherno Jaye
SST-1 Lead Beamline Scientist
Signed by: Jaye, Cherno

12/13/2018

X Conan Weiland

Conan Weiland
SST-2 Lead Beamline Scientist
Signed by: Weiland, Conan

By signing this Procedure I acknowledge that it is comprehensive and can be performed as written at the beamline.

Authorization Basis Review:

12/13/2018

X

Steve Moss
Authorization Basis Manager
Signed by: Moss, Steven H

By signing this Procedure I acknowledge that a USI Screening/Evaluation has been performed and this Procedure does not adversely impact the NSLS-II Authorization Basis Documents.

Approved:

12/12/2018

X

Robert Lee
ESH Manager
Signed by: Lee, Robert J

By approving this Procedure I agree that the appropriate personnel have reviewed this document and I authorize this work to commence as written.

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REVISION HISTORY

REVISION	SECTION(S)	PAGE	DATE	List of Reviewers	DESCRIPTION
1	All	All	05JAN2018	Ackerman, A Benmerrouche, M Broadbent, A Fischer, D Quackenbush, N Robinson, H	First Issue.
2	Attachment A	A20 A30	13FEB2018	See page ii	Added slits and FS as scatter targets. Steps 3.3 and 4.1.
3	Attachment A	A22	19SEP2018	See page ii	Added I0_UP mesh step 3.5.
4	Attachment A	A22	04DEC2018	See page ii	Added RSoXS end station as step 3.5, before I0_UP mesh.
5	Attachment A	A22	11DEC2018	See page ii	Added PSH10. Changed PSH7 to PSH10 for steps 4.1 to 4.8 in Attachment A.

ACRONYMS

ALARA	As Low as Reasonably Achievable
ARM	Area Radiation Monitor
BSS	Bremsstrahlung Shield
BST	Bremsstrahlung Stop
C	Center
DCM	Double Crystal Monochromator
DM	Diagnostic Module
DS	Downstream
EPU	Elliptically polarized Undulator
ESH	Environment, Safety and Health
FE	Front End
FM	Fixed Mask
FOE	First Optical Enclosure
FS	Fluorescent Screen
GB	Gas Bremsstrahlung
GeV	Giga Electron Volts
H	Horizontal
ID	Insertion Device
IFB	Indistinguishable From Background
L*n*	n^{th} Mirror On L Branch.
m	Meter
M*n*	n^{th} mirror On M Branch.
mrad	Millirad
mrem/hr	millirem per hour
NSLS-II	National Synchrotron Light Source II
PBS	Pink Beam Stop
PGM	Plane Grating Monochromator
PSD	Photon Science Division
PSH	Photon Shutter
RCT	Radiological Control Technician
RSC	Radiation Safety Components
SAF	Safety Approval Form
SBMS	Standards Based Management System
SBS	Secondary Bremsstrahlung Shield
SLT	XY Slit
SR	Synchrotron Radiation
SST	Spectroscopy Soft and Tender
TLD	Thermo Luminescent Dosimeter
U	Undulator
US	Upstream
V	Vertical
WBS	White Beam Stop

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1 PURPOSE AND SCOPE

The purpose of this procedure is to perform a comprehensive commissioning radiation survey on the 07-ID beamline, as directed by NSLSII-PSD-PDN-001, *Beamline Radiation Safety Commissioning.*

The survey scenarios are covered in the *Beamlines SST-1 and SST-2 (07-ID, U42 and EPU60) Comprehensive Commissioning Radiation Survey*, provided as Attachment A.

2 PREREQUISITES

2.1 Authorization/approval from the NSLS-II Director to initiate commissioning of the beamline has been received.

2.2 A Beamline System Readiness Checklist has been completed in accordance with PS-C-XFD-PRC-003, *Enabling Beamlines for Operations.*

2.3 The area(s) around the beamline are posted in accordance with SBMS Program Description: *Radiological Control Manual.*

2.4 All shutters are closed.

2.5 FE slits are fully open (near maximum extent range).

Note: If FE slits cannot be fully open, record the FE slits parameter here: _____

2.6 All beamline slits are fully open.

2.7 All mirrors and filters are retracted out from beam.

3 HAZARDS, CONTROLS AND LIMITS

3.1 If at any point during performance of this procedure a radiation dose rate of 5 mrem/hr or higher on contact is identified, the radiation survey shall be terminated, and the cause investigated, and any hazards shall be mitigated before continuing.

3.2 Minor deviations on Attachment A are allowed in the field; however, the deviation shall be documented and submitted to the PSD Director and the ESH Manager for review after the survey.

4 PROCEDURE

Note: Execution of this Comprehensive Commissioning Radiation Survey, along with the evaluation of the data collected, may only be used as a basis by the PSD Director and the ESH Manager to approve commissioning activities at an electron beam current of up to 3 times the electron beam current measured during this survey. Approval of commissioning of the beamline at a higher electron beam current requires re-execution of this Comprehensive Commissioning Radiation Survey.

Note: The step sequences of the survey may be completed out of sequence.

4.1 Authorized Beamline Staff and RCTs establish the initial conditions and record them on Attachment A, *Beamline SST-1 and SST-2 (07-ID, U42 AND EPU60) Comprehensive Commissioning Radiation Survey*.

4.2 Authorized Beamline Staff and RCTs complete the Comprehensive Commissioning Radiation Survey in accordance with Attachment A.

4.3 Throughout the radiation survey, Authorized Beamline Staff ensure that the photon beam is where it should be using the appropriate diagnostic tools AND ensure that the FE shutter remains open.

Note: Attachment A, with the filled information from the measurements, acts as the Beamline Radiation Survey Interim Report.

4.4 After the survey, the RCT provides the completed Beamline Radiation Survey Interim Report to the PSD Director and the ESH Manager for review.

5 REFERENCES

5.1 NSLSII-DPT-PDN-001, *Management of NSLS-II Documents and Records*

5.2 PS-C-XFD-PRC-003, *Enabling Beamlines for Operations*

5.3 NSLSII-PSD-PDN-001, *Beamline Radiation Safety Commissioning*

5.4 NSLSII-ESH-PRC-042, *Beamline Photon Shutter Centrally Controlled Lockout/Tagout*

5.5 SBMS Program Description: *Radiological Control Manual*

6 ATTACHMENTS

Attachment A, *Beamline SST-1 and SST-2 (07-ID, U42 AND EPU60) Comprehensive Commissioning Radiation Survey*

Attachment B, *Beamline Enclosure Diagram for07-ID-A*

Attachment C, *Diagram of the Beamlines on the Floor*

7 DOCUMENTATION

The following records are generated as a result of this procedure, and shall be maintained in accordance with NSLSII-DPT-PDN-001, *Management of NSLS-II Documents and Records*:

- Completed Comprehensive Commissioning Radiation Surveys/Beamline Radiation Survey Interim Report

8 DEFINITIONS

None.

If you have any questions or feedback regarding this document, please click this link.

Attachment A

Beamlines SST-1 and SST-2 (07-ID, U42 and EPU60)

Comprehensive Commissioning Radiation Survey

Date: _____

The following scenarios are covered for GB/SR Radiation Survey:

1. Integrity of the 07-ID-A, transport pipe, RSCs and PSH with GB and SR (white and pink beam) on beamline fixed/moveable components.

Survey Conditions:

HOLD POINT: Evaluate and ensure that all applicable controls listed in the Commissioning SAF are in place, including LOTO requirements for the beamline photon shutters (in accordance with NSLSII-ESH-PRC-042, *Beamline Photon Shutter Centrally Controlled Lockout/Tagout*).

HOLD POINT: Before opening safety shutters in the FE, survey the upstream wall of the FOE to make sure no radiation comes through.

RSLs to Be Identified:	FE Slits, Electron Beam Current

NOTE:

If the photon shutter PSH6 is not present/installed, the survey should be carried out up to the SS flange that replaces it. Certain steps should be carried out when the PSH is installed.

General Area Surveys:
For general area surveys, the following steps identify the "key targets" to use during the surveys at a minimum (see the appropriate sections below for details):

1.2, 1.6, 2.1, 2.3, 3.2, 3.3, 3.6

Place neutron monitors;

(1) Outside the side wall where the ARM is located.
(2) Outside the downstream wall next to the guillotine, inboard side where the additional shield is installed.

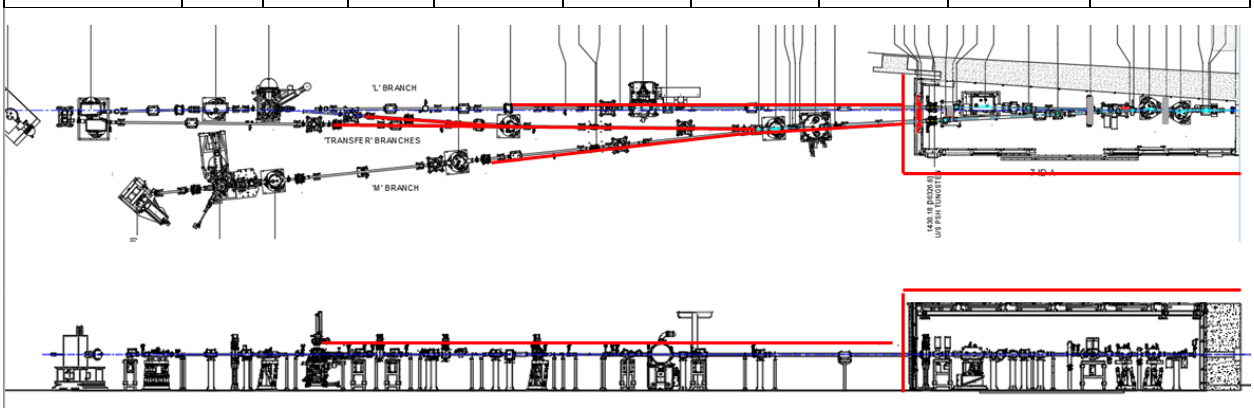
1 Scatter Targets inside the FOE

Keep FE slits fully open and FE photon shutter open.

1.1 L1 and M1 as scatter targets for Gas Bremsstrahlung (GB)

With ID gaps fully open, insert L1 and M1. Survey outside the walls and roof of 07-ID-A and the beamline up to the downstream photon shutters PSH2, PSH5, PSH6 and PSH7 on the floor (see Attachments B and C).

Component:	L1	M1	L2	PSH1	PSH4	PSH2	PSH5	PSH6	PSH7
Position:	In	In	Out	Closed	Closed	Closed	Closed	Closed	Closed



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of L1_____***Position of M1***_____***Position of L2***_____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Dose Rate Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

_____
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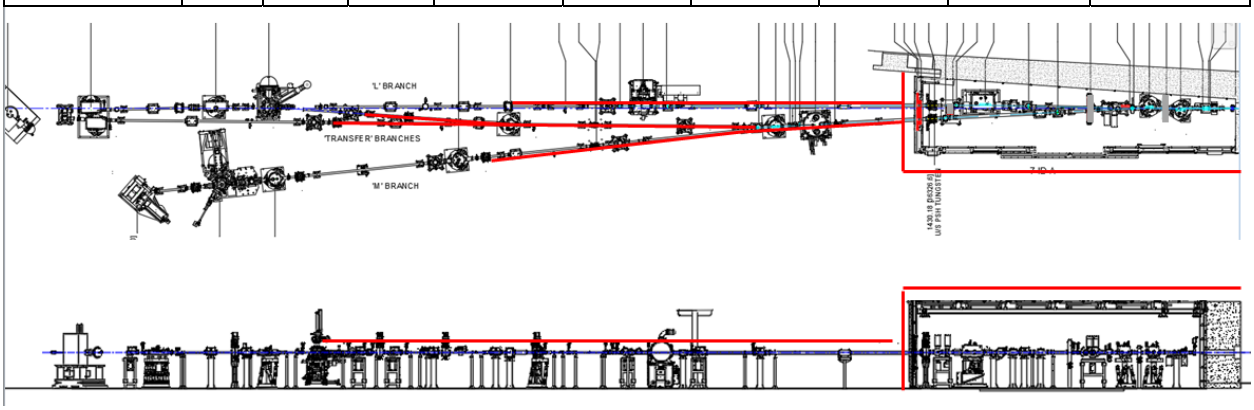
_____
_____
_____
_____
_____

Signature (ESH) _____ ***Signature (Beamline)*** _____

1.2 WBS as scatter target for GB

With ID gaps fully open, retract L1 and M1. Survey outside the walls and roof of 07-ID-A and the beamline up to the downstream photon shutters PSH2, PSH5, PSH6 and PSH7 on the floor (see Attachments B and C).

Component:	L1	M1	L2	PSH1	PSH4	PSH2	PSH5	PSH6	PSH7
Position:	Out	Out	Out	Closed	Closed	Closed	Closed	Closed	Closed



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of L1_____***Position of M1***_____***Position of L2***_____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Dose Rate Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

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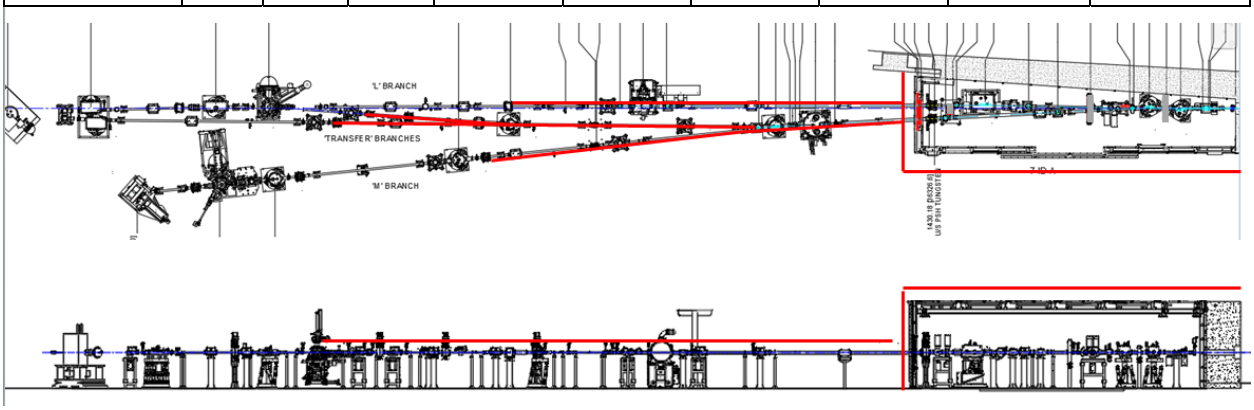
Signature (ESH) _____ ***Signature (Beamline)*** _____

1.3 WBS as scatter target

With the ID gaps at its minimum, and L1 and M1 retracted, dump both of the white beams on WBS. Survey outside the walls and roof of 07-ID-A and the beamline up to the downstream photon shutters PSH2, PSH5, PSH6 and PSH7 on the floor (see Attachments B and C).

Component:	L1	M1	L2	PSH1	PSH4	PSH2	PSH5	PSH6	PSH7
Position:	Out	Out	Out	Closed	Closed	Closed	Closed	Closed	Closed



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of L1_____***Position of M1***_____***Position of L2***_____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Dose Rate Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

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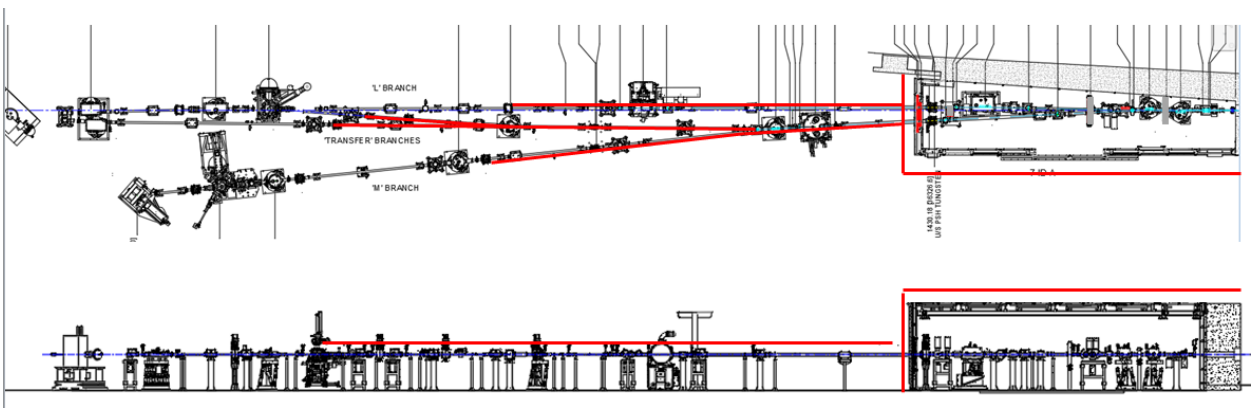
Signature (ESH) _____ ***Signature (Beamline)*** _____

1.4 L1 and M1 as scatter targets

With the ID gaps at its minimum, insert L1 and M1 and dump both white beams on these mirrors. Survey outside the walls and roof of 07-ID-A and the beamline up to the downstream photon shutters PSH2, PSH5, PSH6 and PSH7 on the floor (see Attachments B and C).

Component:	L1	M1	L2	PSH1	PSH4	PSH2	PSH5	PSH6	PSH7
Position:	In	In	Out	Closed	Closed	Closed	Closed	Closed	Closed



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of L1_____***Position of M1***_____***Position of L2***_____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Dose Rate Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

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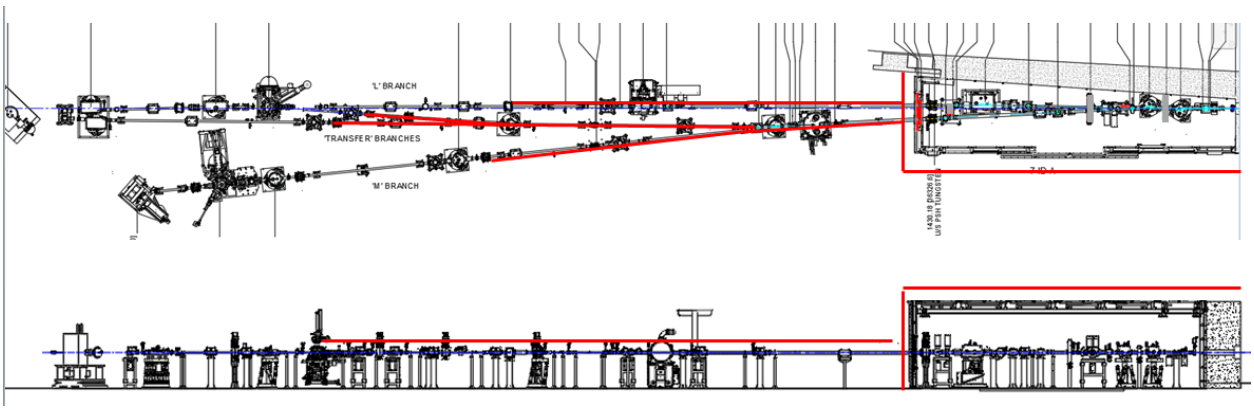
_____

Signature (ESH) _____ ***Signature (Beamline)*** _____

1.5 FM2 and FM4 as scatter target

Use L1 and M1 to deflect the pink beams to the outboard side of FM2 and FM4. Survey outside the walls and roof of 07-ID-A and the beamline up to the downstream photon shutters PSH2, PSH5, PSH6 and PSH7 on the floor (see Attachments B and C)

Component:	L1	M1	L2	PSH1	PSH4	PSH2	PSH5	PSH6	PSH7
Position:	In	In	NA	Closed	Closed	Closed	Closed	Closed	Closed



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of L1_____***Position of M1***_____***Position of L2***_____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Dose Rate Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

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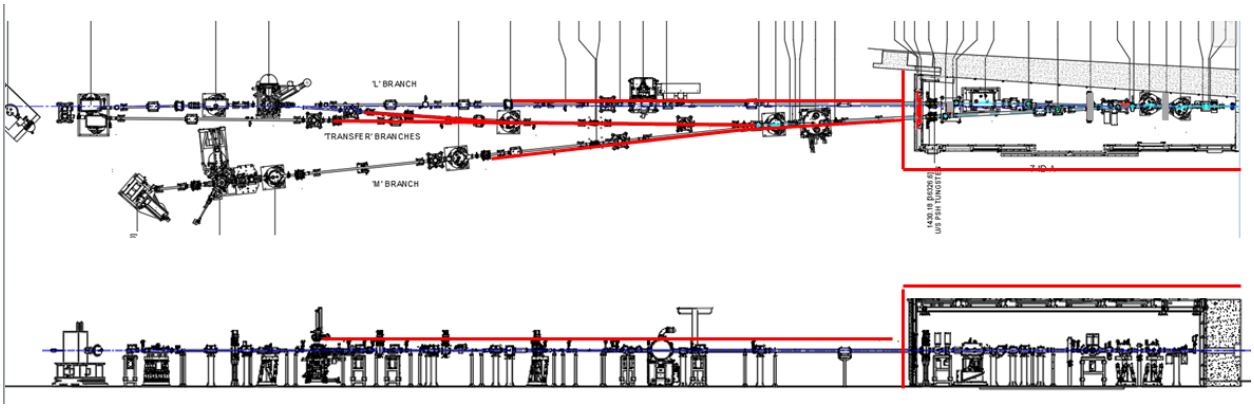
Signature (ESH) _____ ***Signature (Beamline)*** _____

1.6 PSH1 and PSH4 as scatter targets

Insert L1, M1 and L2 at nominal angles. Dump both of the pink beams on PSH1 and PSH4. Survey outside the walls and roof of 07-ID-A and the beamline up to the downstream photon shutters PSH2, PSH5, PSH6 and PSH7 on the floor (see Attachments B and C).

Component:	L1	M1	L2	PSH1	PSH4	PSH2	PSH5	PSH6	PSH7
Position:	In	In	In	Closed	Closed	Closed	Closed	Closed	Closed



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of L1_____***Position of M1***_____***Position of L2***_____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Dose Rate Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

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Signature (ESH) _____ ***Signature (Beamline)*** _____

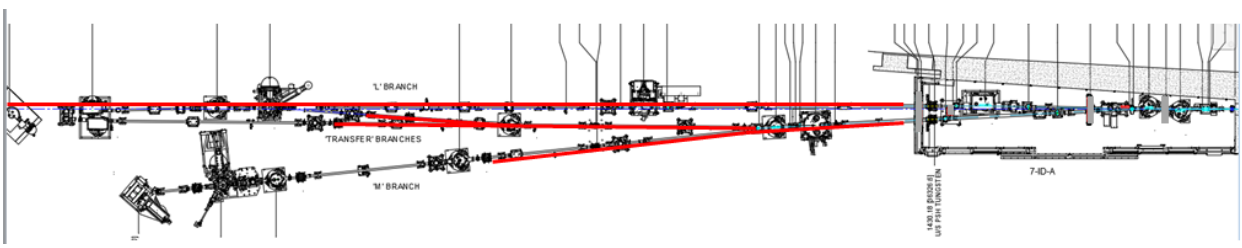
2 Scatter Targets on the L Branch

For the steps described in this section, keep ID gaps at minimum, FE slits fully open and FE photon shutter open. Keep L1 & L2 at 0.53°and M1 at nominal angle. Keep photon shutters PSH4, PSH5, PSH6 and PSH7 closed.

2.1 PBS (L) as scattering target

Open photon shutter PSH1.With the DCM first crystal kept flat, dump the pink beam on the pink beam stop on L branch. Survey the full L-branch beamline and the other beamlines up to photon shutters PSH5, PSH6 and PSH7 (See Attachment C).

Component	PSH1	PSH4	DCM	PSH2	HAXPES	L3	PSH3	L4	VPPEM
Position	Open	Closed	Out	Closed	NA	NA	Open	NA	NA



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of L1_____ ***L2***_____ ***L3***_____***L4*** _____

Angle of DCM_____ ***Gap of the DCM***_____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Dose Rate Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

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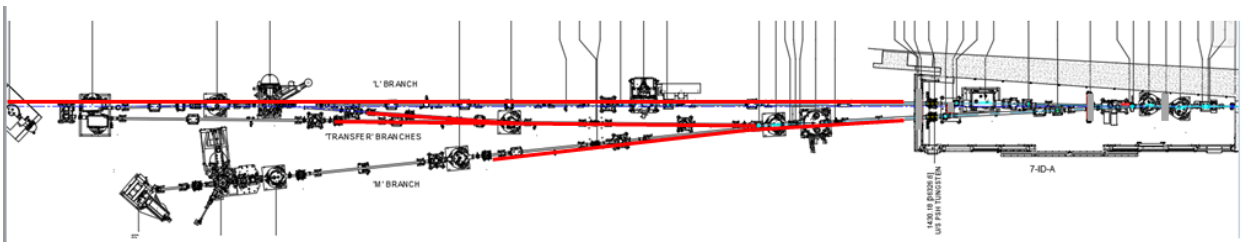
Signature (ESH) _____ ***Signature (Beamline)*** _____

2.2 DCM as scatter target

With the first crystal of the DCM at nominal position, dump the pink beam on the DCM. Survey the full L-branch beamline with emphasis on the bellows adjacent to the DCM and the other beamlines up to photon shutters PSH5, SH6 and PSH7 (See Attachment C). Repeat for various DCM angles/gaps.

Component	PSH1	PSH4	DCM	PSH2	HAXPES	L3	PSH3	L4	VPPEM
Position	Open	Closed	In	Closed	NA	NA	Open	Out	NA



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of L1_____ ***L2***_____ ***L3***_____***L4*** _____

Step	***DCM angle***	***DCM angle/gap***	***Direct Frisk***
2.2.1			☐IFB ☐other (described below)
2.2.2			☐IFB ☐other (described below)
2.2.3			☐IFB ☐other (described below)

Dose Rate Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

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_____
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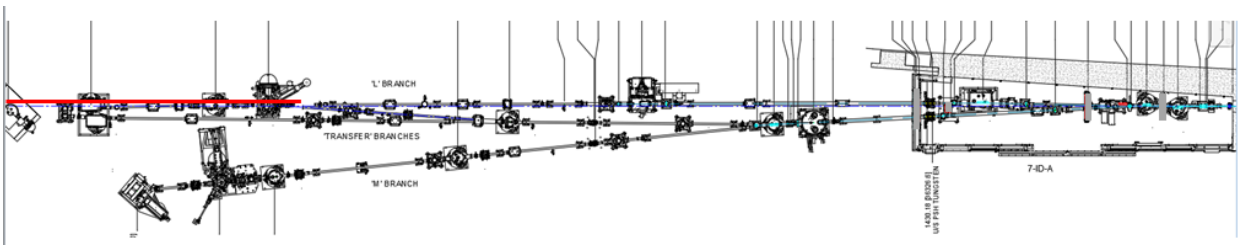
_____

Signature (ESH) _____ ***Signature (Beamline)*** _____

2.3 Generic target in HAXPES end station

Close PSH3. Open PSH2 to direct the beam from L branch to a generic sample in the HAXPES end station. Survey the end station and L branch up to the VPPEM end station (see Attachment C). Retract the sample and repeat.

Component	PSH1	PSH4	DCM	PSH2	HAXPES	L3	PSH3	L4	VPPEM
Position	Open	Closed	In	Open	In	NA	Closed	NA	NA



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of L1_____***L2***_____ ***L3***_____***L4*** _____

Angle of DCM_____ ***Gap of the DCM***_____

Step	**Sample**	**Direct frisk survey results**
2.3.1	*Sample in*	☐IFB ☐other (described below)
2.3.2	*Sample out*	☐IFB ☐other (described below)

Additional information/comments:

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_____
_____
_____
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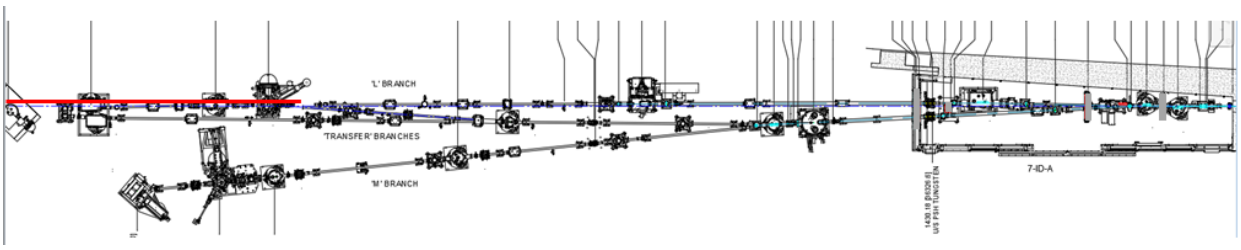
Signature (ESH) _____ ***Signature (Beamline)*** _____

2.4 L3/PSH3 as scatter targets

Retract the sample from the HAXPES end station. Use L3 to direct the beam to the photon shutter PSH3. Survey the L branch from HAXPES to the VPPEM end stations (see Attachment C).

Component	PSH1	PSH4	DCM	PSH2	HAXPES	L3	PSH3	L4	VPPEM
Position	Open	Closed	In	Open	Out	In	Closed	NA	NA



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of L1_____ ***L2***_____ ***L3***_____***L4*** _____

Angle of DCM_____ ***Gap of the DCM***_____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

_____
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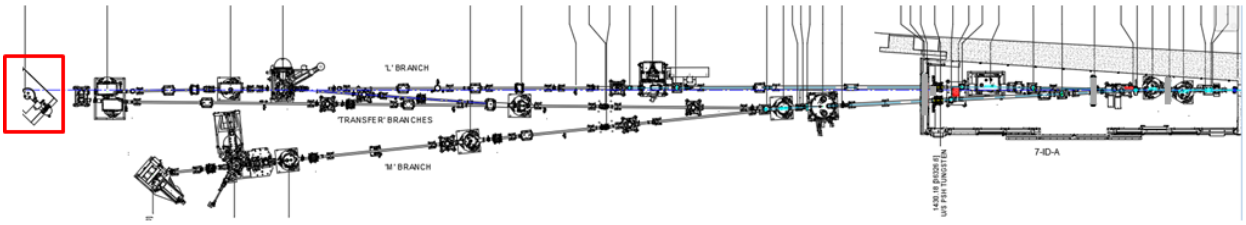
Signature (ESH) _____ ***Signature (Beamline)*** _____

2.5 Generic target in VPPEM end station

Open PSH3. Use L3 and L4 to direct the beam on to a sample in the VPPEM end station. Survey the end station (see Attachment C).

Component	PSH1	PSH4	DCM	PSH2	HAXPES	L3	PSH3	L4	VPPEM
Position	Open	Closed	In	Open	Out	In	Open	In	In



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of L1_____ ***L2***_____ ***L3***_____***L4*** _____

Angle of DCM_____ ***Gap of the DCM***_____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

_____
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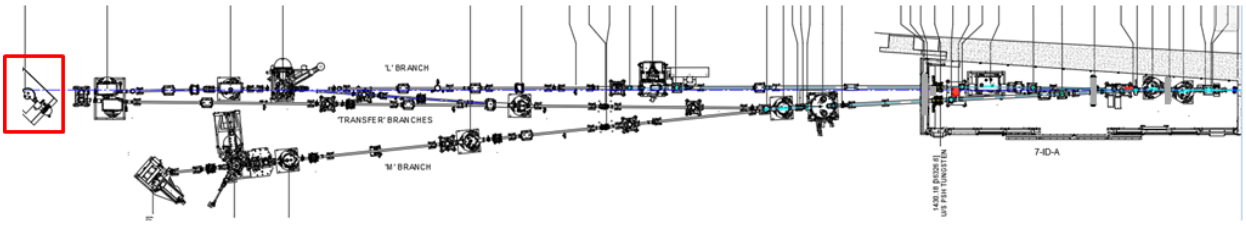
Signature (ESH) _____ ***Signature (Beamline)*** _____

2.6 Beam stop in VPPEM end station

Retract the sample from the VPPEM end station, dump the monochromatic beams on the beam stop of the VPPEM. Survey the beam stop and the VPPEM end station (see Attachment C).

Component	PSH1	PSH4	DCM	PSH2	HAXPES	L3	PSH3	L4	VPPEM
Position	Open	Closed	In	Open	Out	In	Open	In	Out



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of L1_____ ***L2***_____ ***L3***_____***L4*** _____

Angle of DCM_____ ***Gap of the DCM***_____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

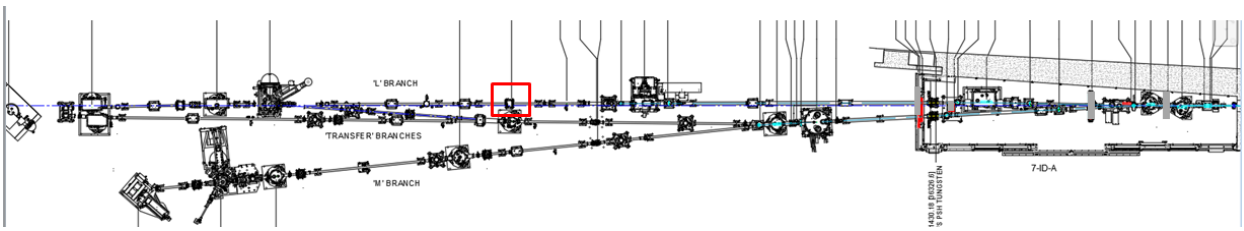
_____
_____
_____
_____
_____
_____

Signature (ESH) _____ ***Signature (Beamline)*** _____

2.7 Photon shutter PSH2 as scatter target

Insert photon PSH2 and survey around it.

Component	PSH1	PSH4	DCM	PSH2	HAXPES	L3	PSH3	L4	VPPEM
Position	Open	Closed	In	Closed	Out	NA	Closed	NA	Out



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of L1_____ ***L2***_____ ***L3***_____***L4*** _____

Angle of DCM_____ ***Gap of the DCM***_____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

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Signature (ESH) _____ ***Signature (Beamline)*** _____

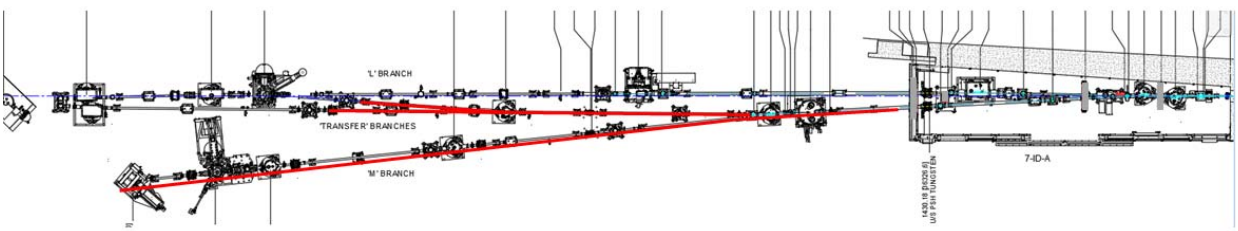
3 Scatter Targets on the M Branch

For the steps described here, keep ID gaps at minimum, FE shutter open, FE slits fully open, L1 and L2 at nominal positions, M1 at 1.32°, photon shutters PSH5 and PSH6 closed. Close PSH2, open PSH1 and PSH4, and park the L-branch beam on PSH2 with DCM in.

3.1 PGM/M2 as scatter target

Insert M2 and position it at the minimum angle. Dump the pink beam on the M2 mirror and survey the PGM chamber with emphasis on the adjacent bellows, the full M-branch beamline and the transfer beamlines up to photon shutters PSH5 and PSH6 (see Attachment C).

Component	PGM/M2	M3AB/C	PSH10	FS12/Slits	Slit C	Slit AB	PSH7	M4C/M4D	I0_UP mesh	µCAL	LARIAT-1	PSH8	M5C	NEXAFS	PSH9	LARIAT-2
Position	In	NA	Closed	NA	Open	Open	Closed	NA	Out	NA	NA	Open	NA	NA	Open	NA



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of M1_____***M2***_____***M3( )***_____ ***M4( )*** _____***M5( )***_____

Position of the grating_____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

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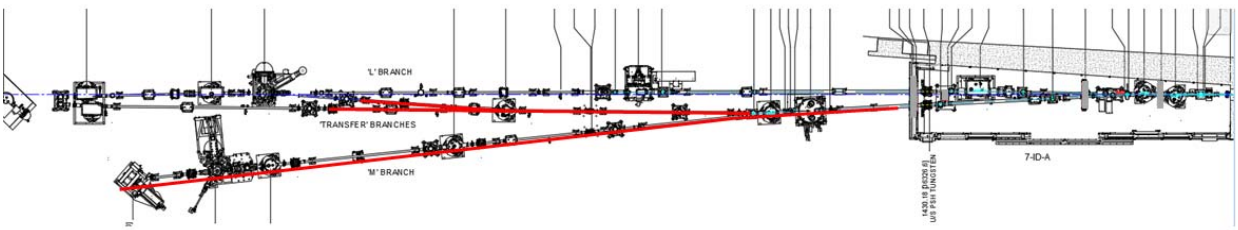
Signature (ESH) _____ ***Signature (Beamline)*** _____

3.2 PBS (M) as scatter target

Retract M3. Dump the pink beam on the PBS on M branch. Survey the full M-branch beamline and the transfer beamlines up to photon shutters PSH5 and PSH6 (see Attachment C).

Component	PGM	M3AB/C	PSH10	FS12/Slits	Slit C	Slit AB	PSH7	M4C/M4D	I0_UP mesh	µCAL	LARIAT-1	PSH8	M5C	NEXAFS	PSH9	LARIAT-2
Position	In	Out	Closed	NA	Open	Open	Closed	NA	Out	NA	NA	Open	NA	NA	Open	NA



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of M1_____ ***M2***_____***M3( )***_____ ***M4( )*** _____***M5( )***_____

Position of the grating_____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

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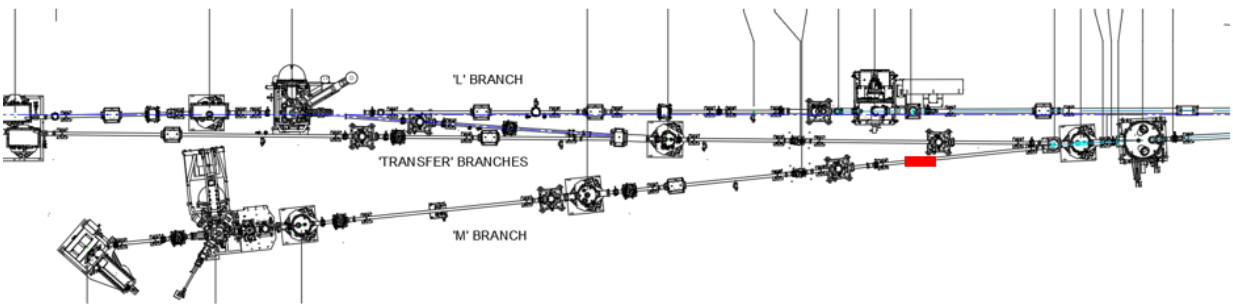
Signature (ESH) _____ ***Signature (Beamline)*** _____

3.3 PSH10 as scatter target

Close photon shutter 10. Retract the generic sample in the RSoXS end station. Survey the shutter and upto the downstream end of the RSoXS end station.

Component	PGM	M3C	PSH10	FS12/Slits	Slit C	PSH7	M4C/M4D	I0_UP mesh	µCAL	LARIAT-1	PSH8	M5C	NEXAFS	PSH9	LARIAT-2
Positio	In	In	Closed	NA	Closed	Closed	NA	Out	NA	NA	Open	NA	NA	Open	NA



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of M1_____ ***M2***_____***M3( )***_____ ***M4( )*** _____***M5( )***_____

Additional information/comments:

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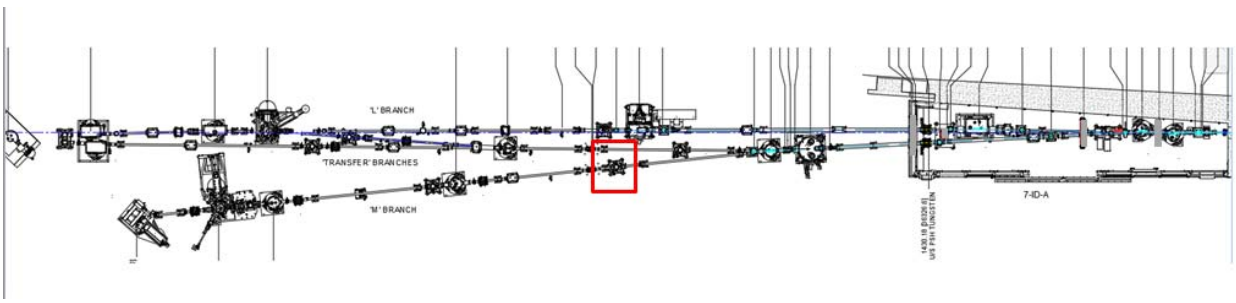
Signature (ESH) _____ ***Signature (Beamline)*** _____

3.4 Fluorescent screen (FS12) and slits of DM6 as scatter targets

Insert M3C and direct the beam on to the Fluorescent screen (FS12). Survey around the DM6. Repeat with slits of DM6 closed.

Component	PGM	M3C	PSH10	FS12/Slits	Slit C	RSoXS	PSH7	M4C/M4D	I0_UP mesh	µCAL	LARIAT-1	PSH8	M5C	NEXAFS	PSH9	LARIAT-2
Positi	In	In	Open	In	Closed	NA	Closed	NA	Out	NA	NA	Open	NA	NA	Open	NA



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of M1_____ ***M2***_____***M3( )***_____ ***M4( )*** _____***M5( )***_____

Angle of PGM Position/Angle of M2_____

Step	***Scatter target***	***Direct Frisk Survey Results***
3.4.1	**FS12 of DM6**	☐IFB ☐other (described below)
3.4.2	**Slits of DM6**	☐IFB ☐other (described below)

Additional information/comments:

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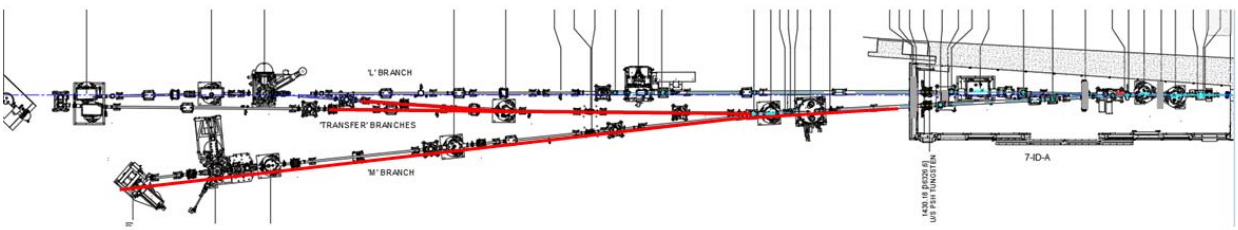
Signature (ESH) _____ ***Signature (Beamline)*** _____

3.5 Slit-C as scatter target

Remove FS12 and direct the beam on to the precision slit C. Survey the full M-branch beamline and the transfer beamlines up to photon shutters PSH5 and PSH6 (see Attachment C). Repeat for various angles of PGM/M2.

Component	PGM	M3C	PSH10	FS12/Slits	Slit C	RSoXS	PSH7	M4C/M4D	I0_UP mesh	µCAL	LARIAT-1	PSH8	M5C	NEXAFS	PSH9	LARIAT-2
Position	In	In	Open	Out	Closed	NA	Closed	NA	Out	NA	NA	Open	NA	NA	Open	NA



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of M1_____ ***M2***_____***M3( )***_____ ***M4( )*** _____***M5( )***_____

Step	***Angle of PGM***	***Position/Angle of M2***	***Direct Frisk Survey Results***
3.5.1			☐IFB ☐other (described below)
3.5.2			☐IFB ☐other (described below)

Additional information/comments:

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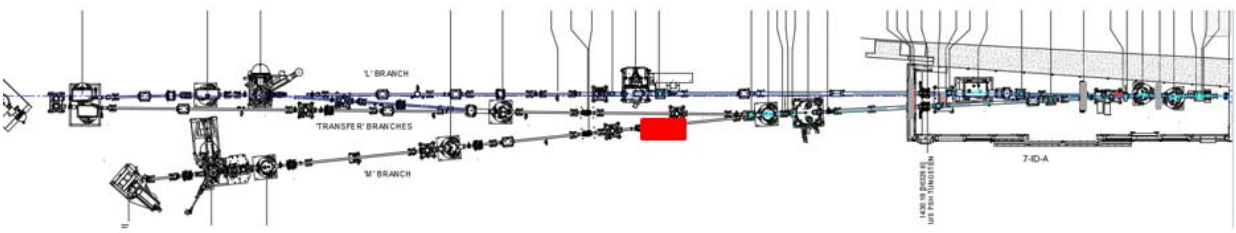
Signature (ESH) _____ ***Signature (Beamline)*** _____

3.6 Generic target in RSoXS end station

Close PSH7 and open PSH10. Direct the beam on to a generic sample in the experimental station. Survey around the chamber. Repeat without the sample.

Component	PGM	M3C	PSH10	FS12/Slits	Slit C	RSoXS	PSH7	M4C/M4D	I0_UP mesh	µCAL	LARIAT-1	PSH8	M5C	NEXAFS	PSH9	LARIAT-2
Position	In	In	Open	Out	Closed	In	Closed	NA	Out	NA	NA	Open	NA	NA	Open	NA



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of M1_____ ***M2***_____***M3( )***_____ ***M4( )*** _____***M5( )***_____

Position of sample_____

Step	***Angle of PGM***	***Position of M2***	***Direct Frisk Survey Results***
3.6.1			☐IFB ☐other (described below)
3.6.2			☐IFB ☐other (described below)

Additional information/comments:

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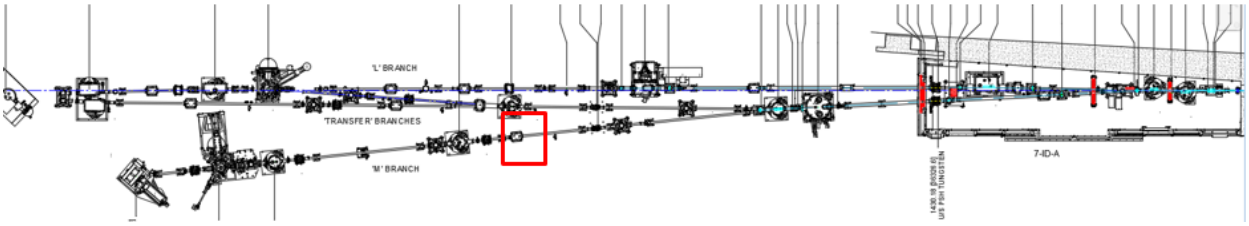
Signature (ESH) _____ ***Signature (Beamline)*** _____

3.7 I0_UP mesh as scattering target

Close PSH8, open PSH7 and insert I0_UP mesh. Use M4C to direct the beam to a the I0 mesh. Survey the vacuum chamber holding the mesh.

Component	PGM	M3C	PSH10	FS12/Slits	Slit C	RSoXS	PSH7	M4C	I0_UP mesh	µCAL	LARIAT-1	PSH8	M5C	NEXAFS	PSH9	LARIAT-2
Position	In	In	Open	Out	Open	Out	Closed	In	In	In	NA	Closed	NA	NA	Open	NA



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of M1_____ ***M2***_____***M3( )***_____ ***M4( )*** _____***M5( )***_____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

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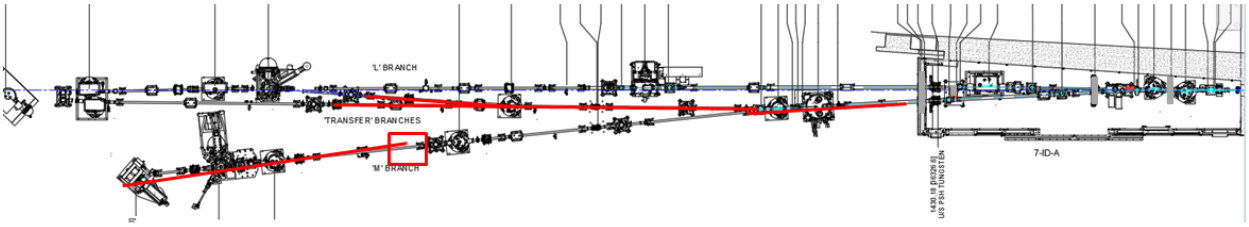
Signature (ESH) _____ ***Signature (Beamline)*** _____

3.8 Generic target in µCAL end station

Close PSH8 and open PSH7. Use M4C to direct the beam to a generic sample in the µCAL end station. Survey the end station, downstream M-branch beamline and the other beamlines up to photon shutters PSH2, PSH5 and PSH6 (see Attachment C). Repeat for various angles of PGM/M2.

Component	PGM	M3C	PSH10	FS12/Slits	Slit C	RSoXS	PSH7	M4C	I0_UP mesh	µCAL	LARIAT-1	PSH8	M5C	NEXAFS	PSH9	LARIAT-2
Position	In	In	Open	Out	Open	Out	Open	In	Out	In	NA	Closed	NA	NA	Open	NA



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of M1_____ ***M2***_____***M3( )***_____ ***M4( )*** _____***M5( )***_____

Position of sample_____

Step	***Angle of PGM***	***Position of M2***	***Direct Frisk Survey Results***
3.8.1			☐IFB ☐other (described below)
3.8.2			☐IFB ☐other (described below)

Additional information/comments:

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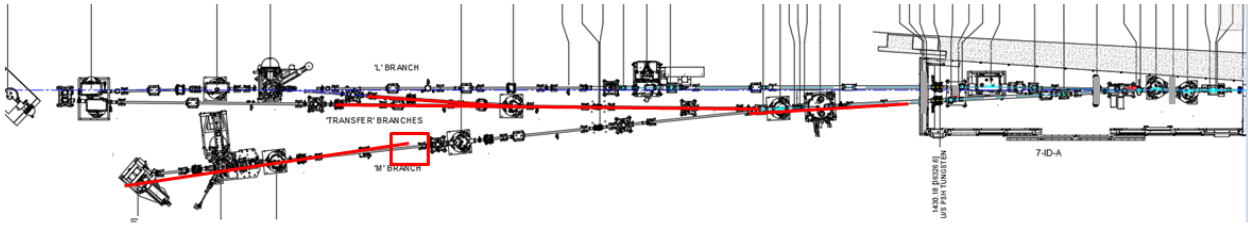
Signature (ESH) _____ ***Signature (Beamline)*** _____

3.9 Beam in µCAL end station without sample

Retract sample from the previous step and repeat for various angles of PGM/M2.

Component	PGM	M3C	PSH10	FS12/Slits	Slit C	RSoXS	PSH7	M4C	I0_UP mesh	µCAL	LARIAT-1	PSH8	M5C	NEXAFS	PSH9	LARIAT-2
Position	In	In	Open	Out	Open	Out	Open	In	Out	Out	NA	Closed	NA	NA	Open	NA



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of M1_____ ***M2***_____***M3( )***_____ ***M4( )*** _____***M5( )***_____

Position of sample_____

Step	***Angle of PGM***	***Position of M2***	***Direct Frisk Survey Results***
3.9.1			☐IFB ☐other (described below)
3.9.2			☐IFB ☐other (described below)

Additional information/comments:

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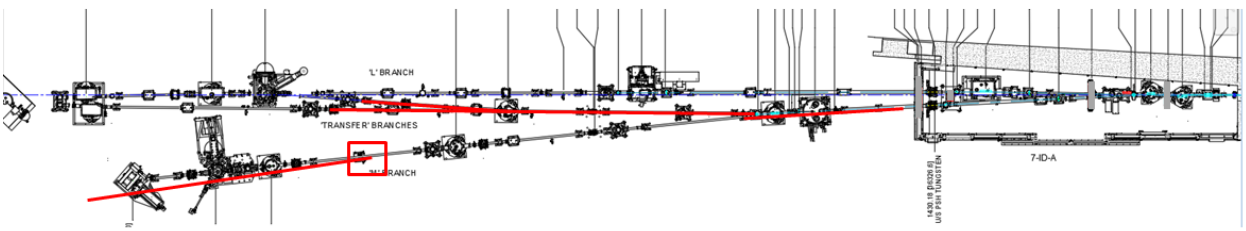
Signature (ESH) _____ ***Signature (Beamline)*** _____

3.10 Generic target in LARIAT-1 end station

Use M4C/D and the (wobbling) mirror in the end station to direct the beam to a generic sample in the LARIAT-1 end station. Survey the end station, downstream M-branch beamline and the transfer beamlines up to photon shutters PSH5 and PSH6. Repeat without the sample (see Attachment C).

Componen	PGM	M3C	PSH10	FS12/Slits	Slit C	RSoXS	PSH7	M4C	I0_UP	µCAL	LARIAT-1	PSH8	M5C	NEXAFS	PSH9	LARIAT-2
Positi	In	In	Open	Out	Open	Out	Open	In	Out	Out	In	Closed	NA	NA	Open	NA



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of M1_____ ***M2***_____***M3( )***_____ ***M4( )*** _____***M5( )***_____

Step	***Sample***	***Direct Frisk Survey Results***
3.10.1	*Sample In*	☐IFB ☐other (described below)
3.10.2	*Sample Out*	☐IFB ☐other (described below)

Additional information/comments:

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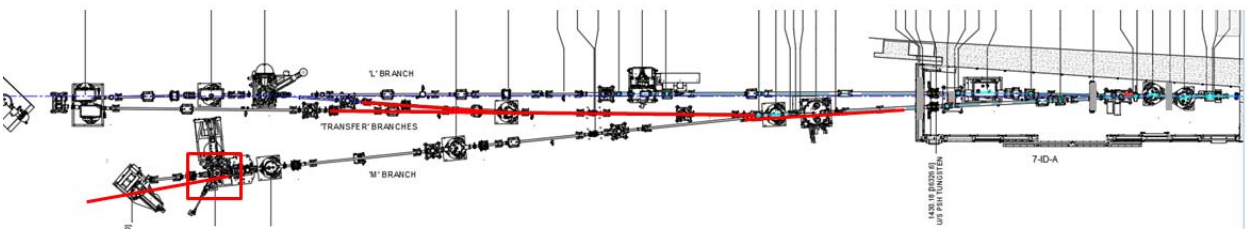
Signature (ESH) _____ ***Signature (Beamline)*** _____

3.11 Generic target in NEXAFS end station

Close PSH9 and open PSH8. Use M4C/D and M5C to direct the beam to a generic sample in the NEXAFS end station. Survey the end station, downstream M-branch beamline and the transfer beamlines up to photon shuttersPSH5 and PSH6(See Attachment C). Retract sample and repeat.

Component	PGM	M3C	PSH10	FS12/Slits	Slit C	RSoXS	PSH7	M4C/M4D	I0_UP mesh	µCAL	LARIAT-1	PSH8	M5C	NEXAFS	PSH9	LARIAT-2
Position	In	In	Open	Out	Open	Out	Open	In	Out	Out	Out	Open	In	In	Closed	NA



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of M1_____ ***M2***_____***M3( )***_____ ***M4( )*** _____***M5( )***_____

Step	***Sample***	***Direct Frisk Survey Results***
3.11.1	*Sample In*	☐IFB ☐other (described below)
3.11.2	*Sample Out*	☐IFB ☐other (described below)

Additional information/comments:

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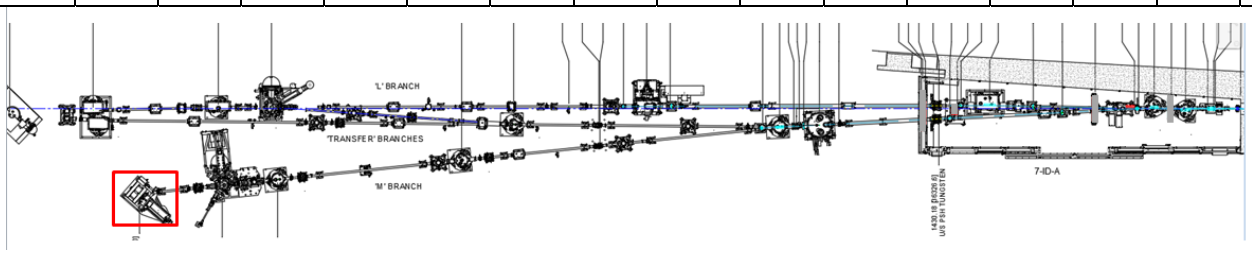
Signature (ESH) _____ ***Signature (Beamline)*** _____

3.12 Generic target in LARIAT-2 end station

OpenPSH9 and direct the beam to the LARIAT-2 end station without a sample. Survey the end station. Repeat with a generic sample in the LARIAT-2 end station (see Attachment C).

Component	PGM	M3C	PSH10	FS12/Slits	Slit C	RSoXS	PSH7	M4D	I0_UP mesh	µCAL	LARIAT-1	PSH8	M5C	NEXAFS	PSH9	LARIAT-2
Position	In	In	Open	Out	Open	Out	Open	In	Out	Out	NA	Open	Out	Out	Open	In



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of M1_____ ***M2***_____***M3( )***_____ ***M4( )*** _____***M5( )***_____

Step	***Sample***	***Direct Frisk Survey Results***
3.12.1	*Sample out*	☐IFB ☐other (described below)
3.12.2	*Sample In*	☐IFB ☐other (described below)

Additional information/comments:

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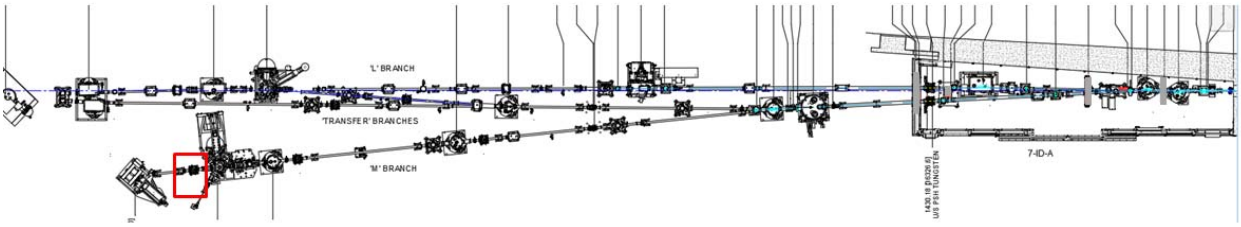
Signature (ESH) _____ ***Signature (Beamline)*** _____

3.13 Photon shutter PSH9 as scatter target

Close PSH9 and survey the shutter.

Component	PGM	M3C	PSH10	FS12/Slits	Slit C	RSoXS	PSH7	M4C	I0_UP mesh	µCAL	LARIAT-1	PSH8	M5C	NEXAFS	PSH9	LARIAT-2
Position	In	In	Open	Out	Open	Out	Open	In	Out	Out	Out	Open	Out	Out	Closed	NA



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of M1_____ ***M2***_____***M3( )***_____ ***M4( )*** _____***M5( )***_____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

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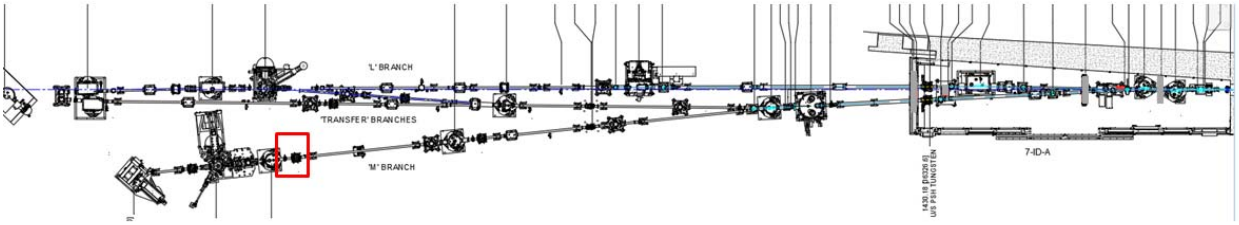
Signature (ESH) _____ ***Signature (Beamline)*** _____

3.14 Photon shutter PSH8 as scatter target

Close PSH8 and survey the shutter.

Component	PGM	M3C	PSH10	FS12/Slits	Slit C	RSoXS	PSH7	M4C	I0_UP mesh	µCAL	LARIAT-1	PSH8	M5C	NEXAFS	PSH9	LARIAT-2
Position	In	In	Open	Out	Open	Out	Open	In	Out	Out	Out	Closed	NA	NA	Closed	NA



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of M1_____ ***M2***_____***M3( )***_____ ***M4( )*** _____***M5( )***_____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

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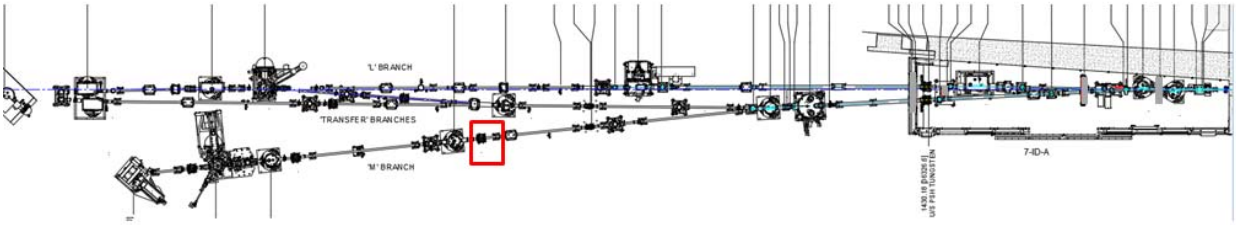
Signature (ESH) _____ ***Signature (Beamline)*** _____

3.15 Photon shutter PSH7 as scatter target

Close PSH7 and survey the shutter.

Component	PGM	M3C	PSH10	FS12/Slits	Slit C	RSoXS	PSH7	M4C	I0_UP mesh	µCAL	LARIAT-1	PSH8	M5C	NEXAFS	PSH9	LARIAT-2
Position	In	In	Open	Out	Open	Out	Closed	In	Out	NA	NA	Closed	NA	NA	Closed	NA



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of M1_____ ***M2***_____***M3( )***_____ ***M4( )*** _____***M5( )***_____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

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Signature (ESH) _____ ***Signature (Beamline)*** _____

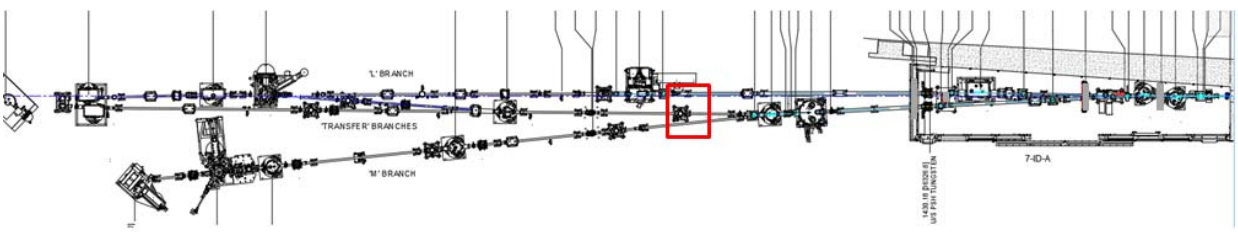
4 Scatter Targets on the Transfer and L Branches

For the steps described here, keep ID gaps at minimum, FE shutter open, FE slits fully open. Keep L1 and L2 at 0.53°, M1 at 1.32°, M2 at its minimum angle and PGM, DCM and M3AB in nominal positions. Keep photon shutters PSH1 and PSH4 open. Park the L-branch beam on PSH2 in closed position for steps 4.1 and 4.2.

4.1 Fluorescent screen (FS8) and slits of DM3 as scattering targets

Use M3AB to direct the beam to the Fluorescent screen (FS8). Survey around the screen. (See Attachment C).

Component	FS8/Slits	PSH2	PSH3	M3AB	PSH10	Slit AB	M4A	PSH5	PSH6	HAXPES	M4B	L3	L4	VPPEM
Position	In	Closed	Open	In	Closed	Closed	NA	Closed	Closed	NA	NA	NA	NA	NA



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of L1_____ ***L2***_____ ***L3***_____ ***L4*** _____

Position of M3AB_____ ***M4A***_____ ***M4B***_____

Step	***Scatter target***	***Direct Frisk Survey Results***
4.1.1	**FS8 of DM3**	☐IFB ☐other (described below)
4.1.2	**Slits of DM3**	☐IFB ☐other (described below)

Additional information/comments:

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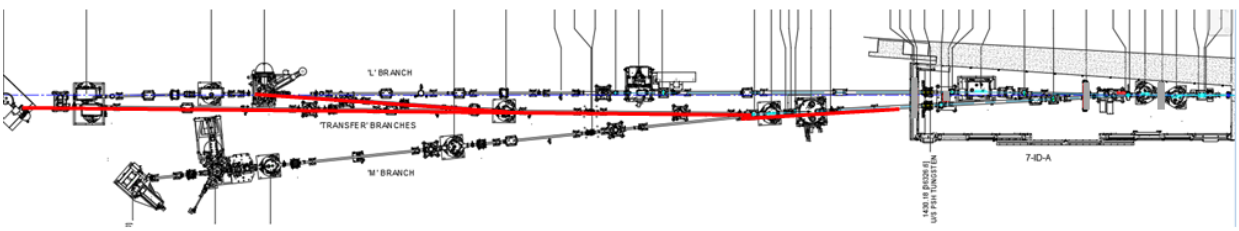
Signature (ESH) _____ ***Signature (Beamline)*** _____

4.2 Slit AB as a scattering target

Remove FS8 to direct the beam to the precision slit AB. Survey the transfer branches up to the end stations (see Attachment C).

Component	FS8/Slits	PSH2	PSH3	M3AB	PSH10	Slit AB	M4A	PSH5	PSH6	HAXPES	M4B	L3	L4	VPPEM
Position	Out	Closed	Open	In	Closed	Closed	NA	Closed	Closed	NA	NA	NA	NA	NA



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of L1_____ ***L2***_____ ***L3***_____ ***L4*** _____

Position of M3AB_____ ***M4A***_____ ***M4B***_____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

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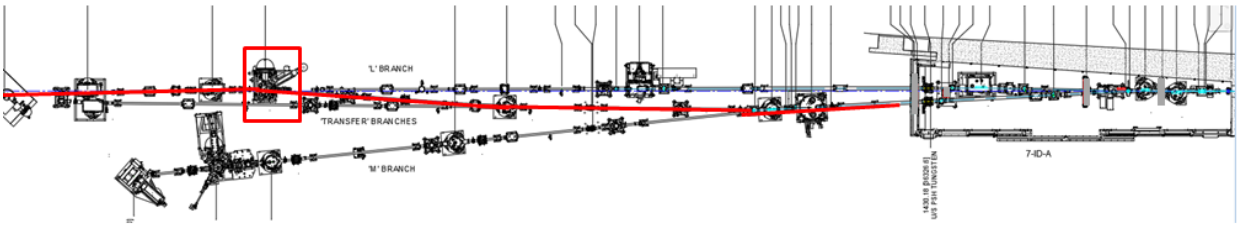
Signature (ESH) _____ ***Signature (Beamline)*** _____

4.3 Generic target in HAXPES end station

Close PSH3 and open PSH5. Use M4A to direct the M-branch beam to a generic sample in the HAXPES end station. Open PSH2 to direct the beam from L branch to the same sample. Survey the end station and L branch up to the VPPEM (see Attachment C). Repeat without the sample.

Component	FS8/Slits	PSH2	PSH3	M3AB	PSH10	Slit AB	M4A	PSH5	PSH6	HAXPES	M4B	L3	L4	VPPEM
Position	Out	Open	Closed	In	Closed	Open	In	Open	Closed	In	NA	NA	NA	NA



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of L1_____ ***L2***_____ ***L3***_____ ***L4*** _____

Position of M3AB_____ ***M4A***_____ ***M4B***_____

Step	***Sample***	***Direct Frisk Survey Results***
4.3.1	***Sample out***	☐IFB ☐other (described below)
4.3.2	***Sample In***	☐IFB ☐other (described below)

Additional information/comments:

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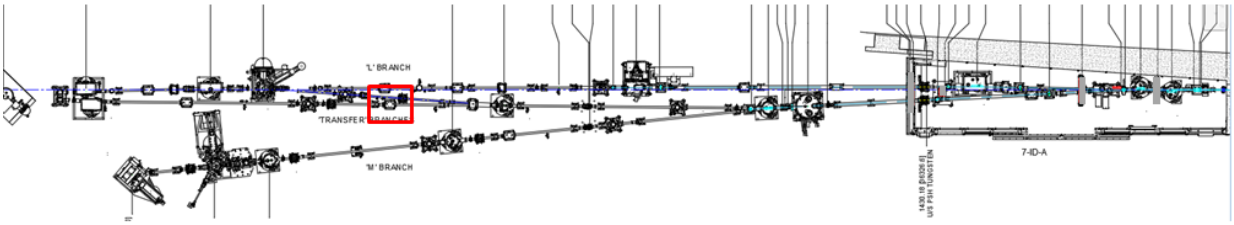
_____

Signature (ESH) _____ ***Signature (Beamline)*** _____

4.4 PSH5 as scatter target

Close PSH5 and survey around it.

Component	FS8/Slits	PSH2	PSH3	M3AB	PSH10	Slit AB	M4A	PSH5	PSH6	HAXPES	M4B	L3	L4	VPPEM
Position	Out	Open	Closed	In	Closed	Open	In	Closed	Closed	In	NA	NA	NA	NA



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of L1_____ ***L2***_____ ***L3***_____ ***L4*** _____

Position of M3AB_____ ***M4A***_____ ***M4B***_____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

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_____

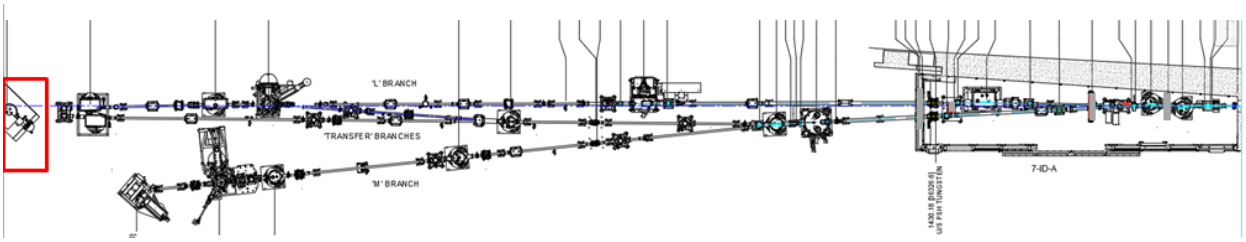
Signature (ESH) _____ ***Signature (Beamline)*** _____

4.5 Generic target in VPPEM end station

If PSH6 is not installed, skip step. Return to complete this step when the PSH is installed.

Use M3AB and M4B to direct the beam from the M branch to VPPEM end station. Open PSH3and use L3 and L4 to direct the L-branch beam to the same end station. Survey the VPPEM end station (see Attachment C).

Component	PSH1	PSH4	FS8/Slits	PSH2	PSH3	M3AB	PSH10	Slit AB	M4A	PSH5	PSH6	HAXPES	M4B	L3	L4	VPPEM
Position	Open	Open	Out	Open	Open	In	Closed	Open	Out	Closed	Open	Out	In	In	In	In



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of L1_____ ***L2***_____ ***L3***_____ ***L4*** _____

Position of M3AB_____ ***M4A***_____ ***M4B***_____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

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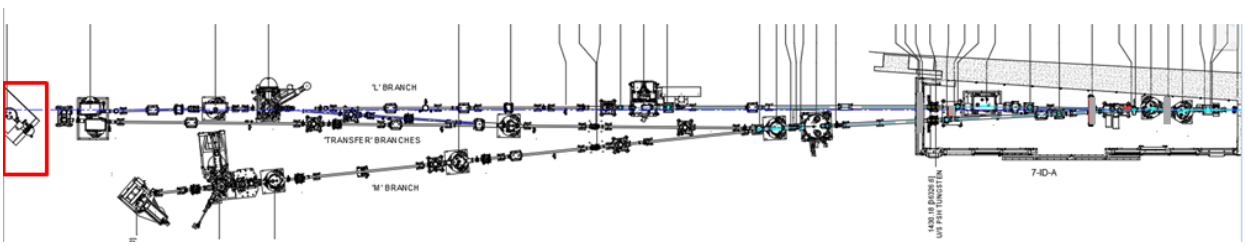
Signature (ESH) _____ ***Signature (Beamline)*** _____

4.6 Beam stop in VPPEM end station

If PSH6 is not installed, skip step. Return to complete this step when the PSH is installed.

Retract the sample from the VPPEM end station, dump both the monochromatic beams on the beam stop of the VPPEM. Survey the beam stop and the VPPEM end station (see Attachment C).

Component	PSH1	PSH4	FS8/Slits	PSH2	PSH3	M3AB	PSH10	Slit AB	M4A	PSH5	PSH6	HAXPES	M4B	L3	L4	VPPEM
Position	Open	Open	Out	Open	Open	In	Closed	Open	Out	Closed	Open	Out	In	In	In	Out



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of L1_____ ***L2***_____ ***L3***_____ ***L4*** _____

Position of M3AB_____ ***M4A***_____ ***M4B***_____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

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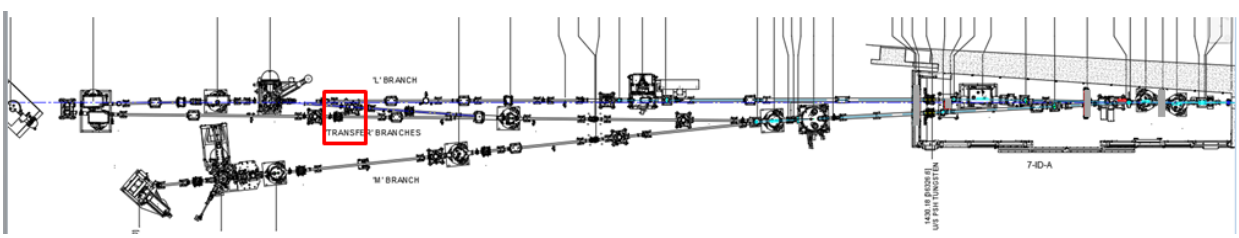
Signature (ESH) _____ ***Signature (Beamline)*** _____

4.7 SS flange instead of PSH6

If PSH6 is installed, skip this step.

Close PSH1 to stop the L-branch beam in the FOE. Dump the monochromatic M beam on the SS flange. Survey the beam stop and the VPPEM end station (see Attachment C).

Component	PSH1	PSH4	FS8/Slits	PSH2	PSH3	M3AB	PSH10	Slit AB	M4A	PSH5	PSH6 (SS flange)	HAXPES	M4B	L3	L4	VPPEM
Position	Closed	Open	Out	Open	Open	In	Closed	Open	Out	Closed	Closed	NA	NA	NA	NA	NA



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of L1_____ ***L2***_____ ***L3***_____ ***L4*** _____

Position of M3AB_____ ***M4A***_____ ***M4B***_____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

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_____

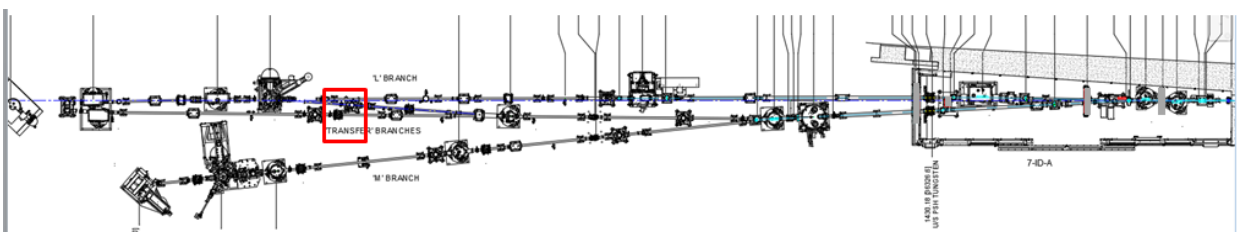
Signature (ESH) _____ ***Signature (Beamline)*** _____

4.8 PSH6 as scatter target

If PSH6 is not installed, skip step. Return to complete this step when the PSH is installed.

Close PSH1 to stop the L-branch beam in the FOE. Close PSH6 and survey around it.

Component	PSH1	PSH4	FS8/Slits	PSH2	PSH3	M3AB	PSH10	Slit AB	M4A	PSH5	PSH6	HAXPES	M4B	L3	L4	VPPEM
Position	Closed	Open	Out	Open	Open	In	Closed	Open	Out	Closed	Closed	Out	NA	NA	NA	NA



Straight Section Vacuum Conditions: _____

ID gap U42_____***EPU60***_____

Position of L1_____ ***L2***_____ ***L3***_____ ***L4*** _____

Position of M3AB_____ ***M4A***_____ ***M4B***_____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

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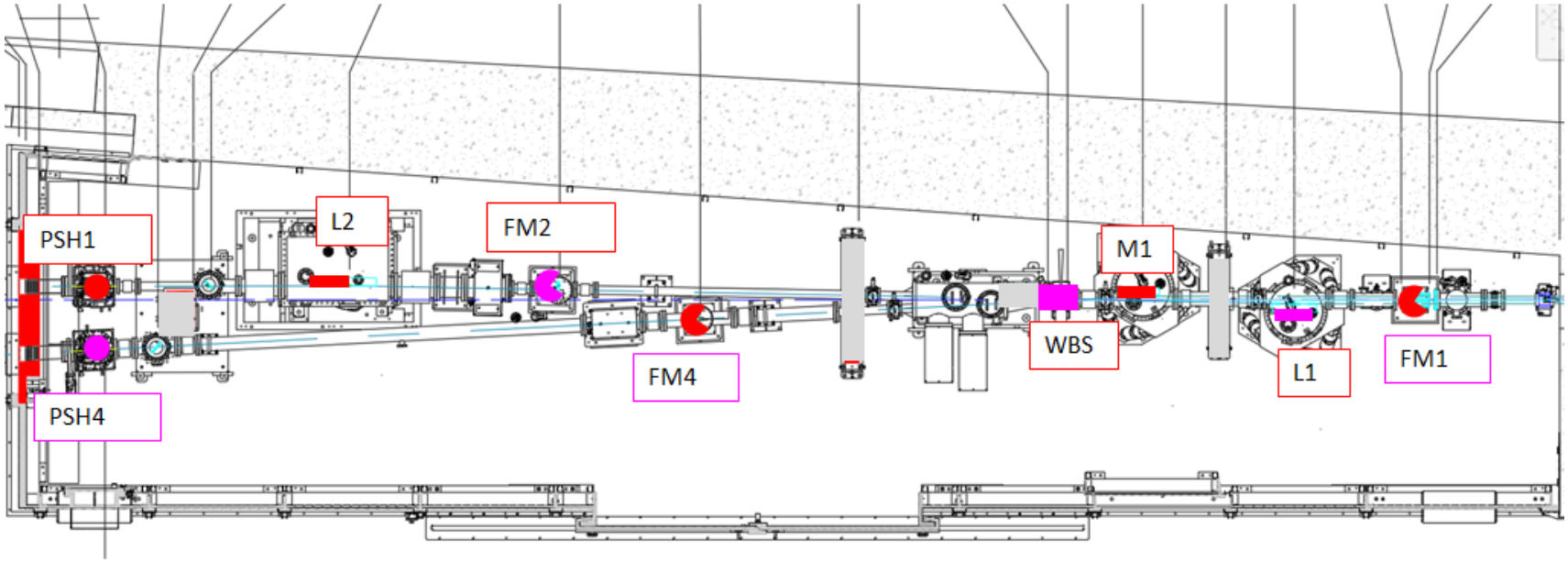
Signature (ESH) _____ ***Signature (Beamline)*** _____

Attachment B – Beamline Enclosure Diagram for 07-ID-A



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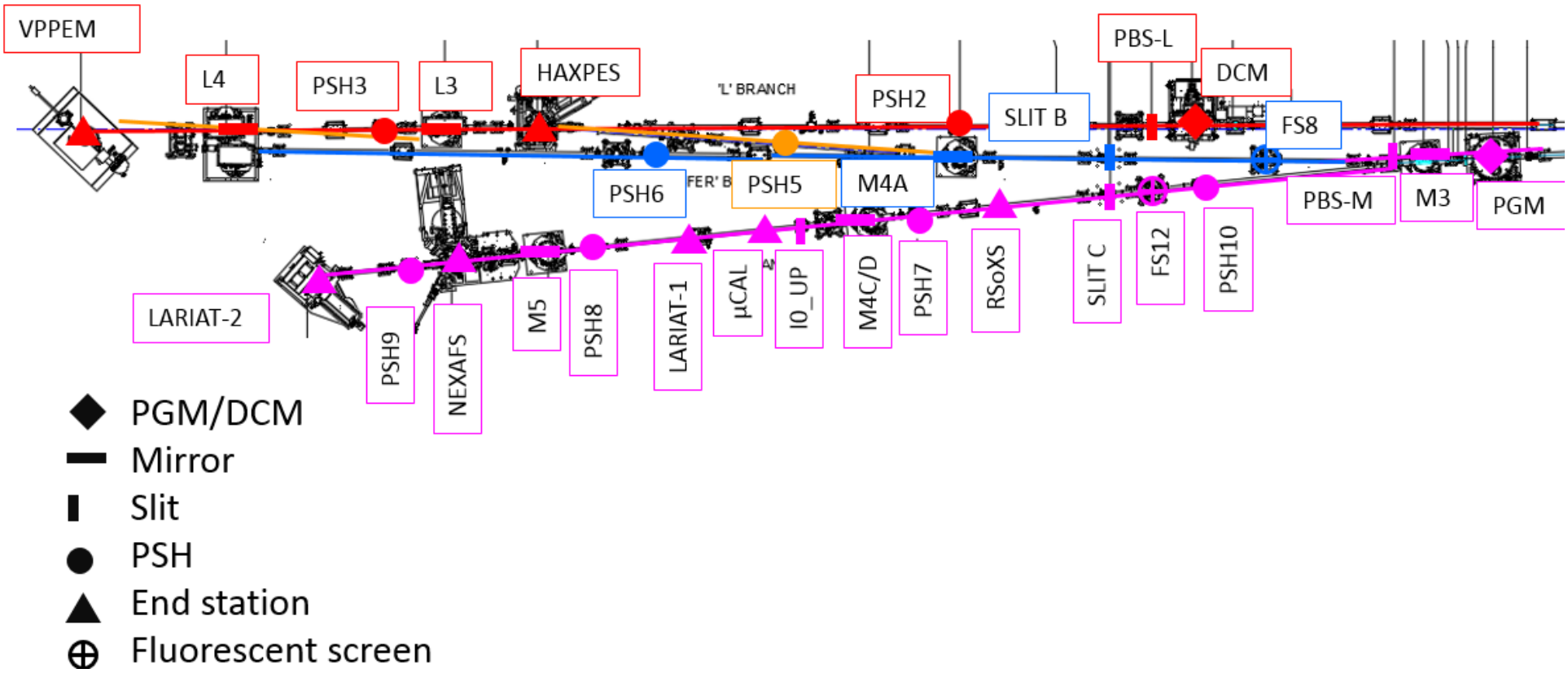
Attachment C – Diagram of the Beamlines on the Floor