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NB6 HBRR Science Design

Garrett E. Granroth

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Neutron Scattering Division

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LIST OF ABBREVIATIONS

$2\theta_m$	monochromator scattering angle
λ	neutron wavelength
E_i	Incident Energy
ν_{VS}	rotational speed of the velocity selector
CTAX	Cold Neutron Triple Axis Spectrometer
d	d spacing
HBRR	HFIR Beryllium Reflector Replacement
HFIR	High Flux Isotope Reactor
TAS	Triple Axis Spectrometer

ABSTRACT

This report describes the calculations and the Monte Carlo Ray Tracing simulations performed using the McStas package to determine the coatings and geometry for the NB-6 guide. It provides the information to inform the mechanical design, validation tests and verification that it meets the science requirements.

1. INTRODUCTION

The NB6 beamline is designed to hold a modern cold neutron Triple Axis Spectrometer (TAS). The principle of operation of a TAS is summarized elsewhere (Shirane, Shapiro, and Tranquada 2002) and will not be repeated here. The goal is to have a higher flux version of Cold Neutron Triple Axis Spectrometer (CTAX) that also has polarization capabilities and will support a multianalyzer backend. This report provides a summary of the current Monte Carlo Ray tracing simulations, covering the HFIR Beryllium Reflector Replacement (HBRR) scope, for the purposes of furthering the mechanical instrument design, validation steps that bound the performance of the guide, and checks that this design meets the science requirement documents. From the point of view of mechanical design, the path of the beamline has remained constant since the conceptual design report (Ehlers et al. 2020). Furthermore, the optimization process has been described elsewhere (Granroth et al. 2024) and will not be repeated here. The document begins with a brief overview of the instrument in Section 2. Section 3 provides analytical calculations that either describe the origin of parameters need for the engineering design or can be used to validate the Monte Carlo simulations. Section 4 describes the Mcstas calculations and Section 5 summarizes the results. Data and scripts used in the report are available from (G. Granroth 2025)

2. INSTRUMENT DESCRIPTION

2.1 PHYSICAL LAYOUT

The NB6 guide begins in the right most channel of the shutter. Right is with respect to facing the High Flux Isotope Reactor (HFIR). The guide in the shutter is described in previous documents (Frost et al. 2021). The beam comes out tilted 0.4° above vertical. In the horizontal direction, the guide has to curve through 2 existing holes in the bunker wall. The guide then goes to the velocity selector. A secondary shutter, just upstream of the velocity selector, is the end of the HBRR scope. Nevertheless, the beamline is optimized for a high flux cold neutron TAS instrument. Therefore, expected components from the velocity selector to the sample were included in the simulations to verify the science requirements. Specifically, a guide up to a virtual source, a double focusing monochromator, and monitors at the sample position were used. These components are described in detail in (Granroth et al. 2024) and are summarized in Table 1

Table 1. A Summary of the instrument components. Components labeled in yellow are not in the scope of HBRR

Name	Start (along flightpath)	Description	Length
Source	0m	HFIR cold Source	
Main Shutter		Channel 3, with guide	
Curved Guide	4.818m	3 channel curve in horizontal, Elliptically expanding in Vertical	13.808m
Randomizing section	18.626m	straight guide	3.262m
Elliptical Focusing 1	21.888m	Elliptical focusing in horizontal straight in vertical	1.701m
Velocity Selector	23.669m	Removes higher order contamination	0.250m
Elliptical Focusing 2	23.974m	Elliptical focusing in horizontal straight in vertical	2.270m
Virtual Source	26.404m	effective source for the rest of the instrument	N/A
Monochromator	28.004m	Double focusing 30cm wide × 16.8cm tall	N/A
Sample	29.604m	2cm × 2cm	N/A

2.2 OPERATION

For the scope of the HBRR, the beam components are static during operation. Nevertheless, the optimization of the guide involves the flux on the sample, which is coarsely monochromated by the velocity selector, and then finely monochromated and doubly focused by the monochromator. Both the rotational speed of the velocity selector, the angle of the monochromator with respect to the incident beam (θ_m) and monochromator scattering angle ($2\theta_m$) are controlled by the choice of Incident Energy (E_i).

The rotational speed of the velocity selector (ν_{VS}) is set for optimum transmission of a given E_i as long as it is slower than 471.667 Hz. If ν_{VS} would have to be faster than this for optimal transmission at the given E_i, then the speed is set to 471.667 Hz and the performance loss is deemed acceptable as will be shown in the simulation results. The expression for v_{VS} is defined as follows:

$$v_i = \sqrt{\frac{E_i}{5.227 \times 10^{-6}}} \quad (1)$$

$$v_{VS} = \frac{v_i \alpha_{VS}}{360.0^\circ l_{VS}} \quad (2)$$

where v_i is the velocity of the incident neutron, $\alpha_{VS} = 22.5^\circ$ is the blade twist and $l_{VS} = 250$mm is the length of the rotor (Dash and Sommers 1953). During operation the velocity selector can also be tilted to effectively shorten l_{VS}. Such a tilt then reduces the v_{VS} needed for a given E_i. This mitigates the locations of resonances in the rotor. Tilt has been neglected in the current analysis.

The rotation angle of the monochromator is controlled by the Bragg condition, E_i and the d spacing (d) of the crystal.

$$\lambda = \sqrt{\frac{81.81}{E_i}} \quad (3)$$

$$\theta_m = \sin^{-1}\left(\frac{\lambda}{2d}\right) \quad (4)$$

$$r_H = l_{sm} / \sin(\theta_m) \quad (5)$$

$$r_V = 2\frac{l_{sm} f_{eff}}{l_{sm} + f_{eff}} \sin(\theta_m) \quad (6)$$

where λ is neutron wavelength (λ), l_{sm} is the virtual source to monochromator distance, f_{eff} is the effective focal point for the vertical focusing, r_H is the radius of curvature for the Horizontal focusing (Willis and Carlile 2017), and r_V is the radius of curvature for the vertical focusing (Shirane, Shapiro, and Tranquada 2002).

The monochromator is also used to rotate the beam back in the horizontal plane from its 0.31° angle at which it exits the source. A transfer matrix approach was used to determine the appropriate transformation (Pedrotti and Pedrotti 1987). In short, given a tilted incident beam and the in-plane sample position, the matrix is determined that will appropriately transform a spherical optic. This calculation revealed that the appropriate transformation is a downward displacement. McStas simulatations were performed as a function of vertical translation and the optimum value for most values of E_i was confirmed to be a downward vertical translation of 7mm. Nevertheless there is an energy dependence and the monochromator needs to be able to move ±1cm about the nominal position.

The neutrons come off the monochromator at an angle of $2\theta_m$ with respect to the straight through beam. A drum around the monochromator (known as the monochromator drum) provides shielding to prevent neutrons or γ-rays from leaving the area except along the incoming and exiting beam path. To maximize the shielding, but still allow the neutrons to exit the monochromator, moveable wedges are lifted out of the way of the exiting beam when it is at the $2\theta_m$ value required for the requested E_i. The width of the monochromator requires more than one wedge to be lifted for the beam to exit. The center of the opening provided by the wedges is at $2\theta_m$ and the width is then provided by the number of open wedges. To minimize background the wedges should minimize any margin around the beam.

2.3 MCSTAS MODEL

McStas (Willendrup and Lefmann 2021) was the Monte Carlo ray tracing package used for these simulations. It assumes a right-handed coordinate system of z along the beam away from the source, y in the vertical, and x in the horizontal.

As described in detail in (Granroth et al. 2024) the neutron guide design is tightly constrained by the existing building and bunker shielding. Three different McStas models were used for the simulations. They are identical except for the velocity selector and the beam monitors. The instrument from the source up through the shutter is defined by the HB4 model curated by T. Huegle. (Thomas Huegle 2024) After the shutter, the guide is modeled as 3 channel sections through a piecewise approximated curve and single channel sections after the curve. In the vertical direction, the guide is elliptically expanding and pointed up. The ellipse is approximated piecewise by linear pieces of guide. After the straight section, an off file is provided to give a piecewise approximation of a converging ellipse in the horizontal direction and continued expansion in the vertical direction as it goes to the velocity selector. Guide components downstream of the shutter are modeled by the Tally components so guide optimization studies could be performed by setting the tally flag(T. Huegle 2023). At the velocity selector, the beam is 47mm wide by 130mm tall.

Monitors were placed immediately upstream of the velocity selector to monitor this location. Simulations that monitor the beam at the virtual source and at the back wall of the monochromator were white beam. In such simulations, the velocity selector was replaced with a section of guide. When the virtual source calculations were used for guide coating comparison, the tally flag was turned on. For the back wall calculation the tally flag was off and a partial cylindrical monitor was added at a radius that corresponds to the inside of the downstream wall of the monochromator drum.

The velocity selector is in place for simulations to the sample position. Its speed is set by the choice of E_i as described by equations 1 and 2 . The guide is designed such that after the virtual source, the neutron beam is rather divergent in the horizontal direction and approximately parallel in the vertical direction. Such a beam provides good coupling to the double focusing monochromator. The choice of E_i sets θ_m, $2\theta_m$, and both the horizontal and vertical radii of curvature as they are defined in section 2.2. The f_{eff} = 6.79m value is derived by using the 1.6m sample to detector focal distance for 5 meV neutrons and working back to f_{eff}. The distance between the virtual source and the the monochromator l_{sm} = 1.6m was determined largely by space constraints. For the purposes of these simulations symmetric Rowland focusing was used so the monochromator to sample distance is also 1.6m

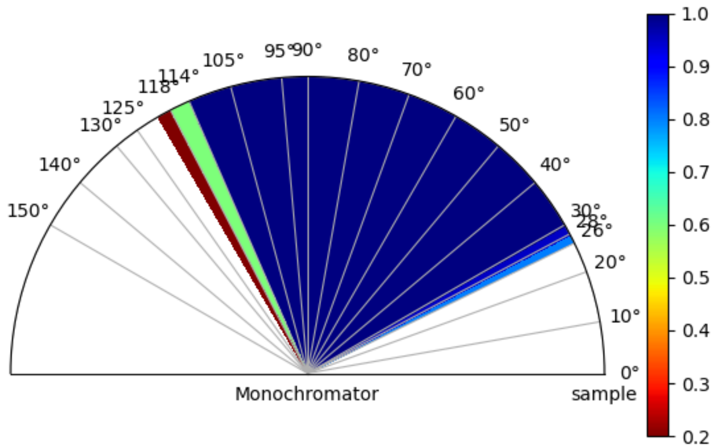
The simulations for the virtual source were run first to refine the guide coating values. Then these refined coating values were used in the rest of the simulations.

The simulations are organized as such and are provided in Appendix A. `MANTA_HBRR_sample.instr` is the top level instrument file. It contains other instr files that describe the various components of the instrument. Starting from the source, it uses `HB4_Main_Shutter.instr` to describe the common components until after the shutter. Next comes a set of beam monitors `NB6_PreBendMonitors.instr` (Appendix A.1) that monitor what goes into the rest of the guide system. Next comes `NB6_HBRR.instr` (Appendix A.2) which provides the guide up through the randomizing section that is in the HBRR scope. The focusing guide up to the velocity selector is located in the `MANTA_HBRR_sample.instr` and the guide is specified in the file `Horiz_parab_u4.off` (Appendix A.3). The remaining instrument files are not in the HBRR scope, but are included here for completeness. `NB6_VS2VirtSource.instr` (Appendix A.4) includes monitors just before the velocity selector (Appendix A.4.1) and the components from the velocity selector to the virtual source. This instr file includes the off file `Horiz_parab5.off` (Appendix A.4.2) which defines the elliptical focusing after the velocity selector. `NB6_VirtualSourceMonitors.instr` (Appendix A.5) includes monitors for checking the beam at the virtual source. `NB6_VirtualSource2Mono.instr` (Appendix A.6)is largely a place holder for parts between the virtual source and the monochromator. `NB6_MonoRowlandSymmDoublFocus.instr` (Appendix A.7) is the double focusing monochromator. Then in `MANTA_HBRR_sample.instr` comes the `NB6_Sample_CSYS` Arm that defines the sample position. Finally there is the `NB6_SampleMonitors.instr` (Appendix A.8)

3. ANALYTICAL CALCULATIONS

3.1 MONOCHROMATOR SCATTERING ANGLE LIMITS

Figure 1 shows the range needed for $2\theta_m$ to meet the E_i range requirements The table below the figure gives several E_i values as a function of $2\theta_m$. This table is determined by the Bragg equation assuming the



$2\theta_m(^\circ)$	$E_i(meV)$
0.0	inf
10.0	239.4
20.0	60.3
26.0	35.9
28.0	31.1
30.0	27.1
40.0	15.5
50.0	10.2
60.0	7.3
70.0	5.5
80.0	4.4
90.0	3.6
95.0	3.3
105.0	2.9
113.5	2.6
117.5	2.5
125.0	2.3
130.0	2.2
140.0	2.1
150.0	1.9

Figure 1. The necessary angle of the monochromator ($2\theta_m$) to meet the E_i range of the instrument.

monochromator is graphite and the 002 reflection with a d of 3.35395Å is used (Shirane, Shapiro, and

Tranquada 2002). This calculation starts with equations 3 and 4 and is detailed as follows,

$$d = 3.35395\text{Å} \quad (7)$$

$$E_i = \frac{81.81 meV\text{Å}^2}{\left(6.7079\text{Å}\sin(\theta_m)\right)^2} \quad (8)$$

$$E_i = \frac{1.8182 meV}{\sin^2(\theta_m)} \quad (9)$$

The upper limit of the scattering angle places constraints on the incident beam shielding thickness that is in the scope of the HBRR.

3.2 APPROXIMATE BEAM PERFORMANCE CALCULATIONS

The McStas simulations are compared against a calculation without a guide or a bend. Such a calculation provides a lower bound for the flux performance.

3.2.1 No guide, no bend

The flux at the source has been measured and was fit to three maxwellians (Frost et al. 2021). This provides the incident brightness on the sample as shown in Figure 2. The distance from the source to the velocity selector is 23.61m and the opening at the velocity selector is 45mm wide by 130mm tall. This provides a solid angle at the front end of the velocity selector to be

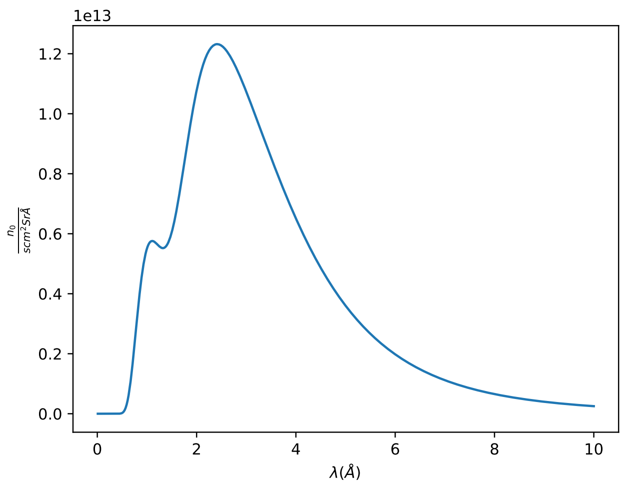


Figure 2. The brightness coming from the neutron source.

$$SA_{VS} = \frac{(45\text{mm})(130\text{mm})}{(23.61\text{m})^2} = 1.0495 \times 10^{-5} Sr \quad (10)$$

The brightness at the velocity selector is then determined by multiplying the SA_{vs} by the brightness in Figure 2. The result is plotted in Figure 3. Comparing this result to Figure 4(B) shows that the McStas simulation produces $\sim$ 10× more neutrons at the velocity selector. Or in short, the guide gain is greater than a factor of 10, which is a reasonable value for this kind of comparison.

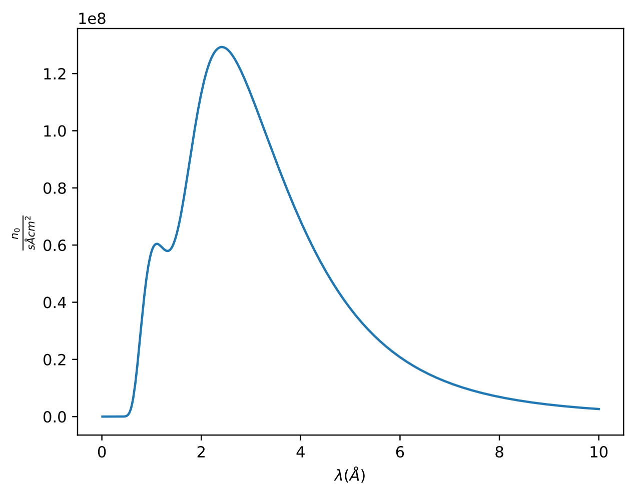


Figure 3. The intensity at the front of the velocity selector for the no guide no bend configuration.

4. MCSTAS CALCULATIONS

4.1 SIMULATIONS

The simulations for the virtual source with the tally components ran for 1×10^8 events. All other simulations were run for 1×10^9 events.

For all studies, the source provided 0-10Å neutrons. For studies at the sample position and the virtual source, 28 different E_i values, between 2 and 30meV, were run. The full 10Å bandwidth was used in all cases so the effectiveness of the velocity selector at suppressing shorter λ, which would cause higher order reflections from the monochromator, could be studied (Granroth et al. 2024).

4.2 RESULTS

The beam is sampled at four locations that are important for verification of the sample requirements and to assist with the instrument design. They are just upstream of the velocity selector, at the virtual source, at the back wall of the monochromator drum, and at the sample position. Simulation results are analyzed using python, specifically by using the numpy (Harris et al. 2020), pandas (The pandas development team 2024), and mcstasclasspy (G. E. Granroth 2023) libraries. The data for the results are in (G. Granroth 2025).

4.2.1 Before The Velocity Selector

As this is the point between the scope of the HBRR and the scope of subsequent projects, understanding the performance at this location is important for characterization and verification. This monitor is included in all simulations and the displayed values are from a study run at E_i = 20.6667meV. Nevertheless as this location is before the velocity selector and monochromator, E_i is irrelevant for this study. The monitors at this location are in Appendix A.4.1. Figure 4(A) shows the intensity as a function of position perpendicular to the beamline. It is created by the component `NB6_VS_Image` and the results are saved in `VS_win_size/18/NB6_VS_Image.dat`. Figure 4(B) shows the wavelength dependence. It is created by the component `NB6_VS_Spectrum` and saved in `VS_win_size/18/NB6_VS_spectrum.dat`. Figure 4 (C) shows the horizontal acceptance diagram. It is created by the component `NB6_VS_H_Div_Map` and the results are saved in `VS_win_size/18/NB6_VS_H_phase_space_map.dat` Figure 4 (D) shows the vertical acceptance diagram. It is created by the component `NB6_VS_V_Div_Map` and the results are saved in `VS_win_size/18/NB6_VS_V_phase_space_map.dat`

Comparing Figure 4(B) to Figure 3 shows that the guide improves the performance by more than an order of magnitude in the λ band of interest. A more detailed examinations shows that the transmission for neutrons though the guide quickly drops just above 30meV. Therefore the dip at λ = 1.36Å in Figure 3 is not observed in the Monte Carlo results.

4.2.2 Virtual Source

The virtual source is a convenient location for monitoring the beam, as it is after all of the guide components and before the monochromator. This location was used for white beam optimization of the neutron guide and efficient guide coating analysis. Specifically neutrons were propagated down the beam using the tally additions to McStas (T. Huegle 2023). This addition records each neutron event including its speed. It also adds to each event the angle of reflection for each bounce of that neutron. These two pieces of information can be used to calculate the m value required for that neutron to reflect. The results are stored in a series of HDF5 files in `HDF2\Manta_tally_<x>.h5`, where x is 1-51. The list of components is stored in `component_list.dat`. These files are then read into a jupyter notebook running

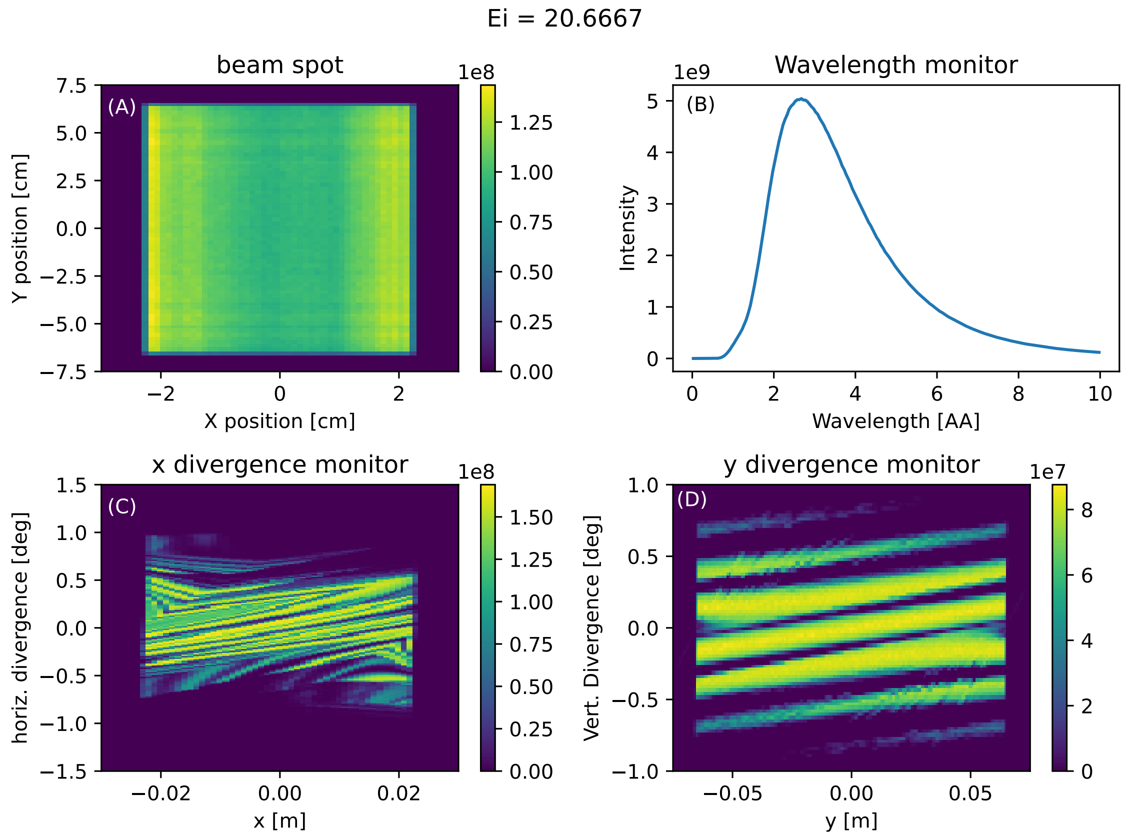


Figure 4. (A) The beam spot, (B)wavelength dependence, (C) horizontal acceptance diagram and (D) vertical acceptance diagram just upstream of the velocity selector.

python (`HFIR_GuideHall_MANTA-HDF_m_histo_after_NVS_move.ipynb`). This notebook generates a false color plot of histograms for each component along the beam path; showing the roll off with m. Then choosing an m value with a low probability of reflection should give no loss. Therefore this method allows for expedited guide optimization. This kind of analysis was performed in detail in the publication (Granroth et al. 2024). Subsequent to that work, the neutron velocity selector was relocated downstream by 1.4m to accommodate recently identified engineering constraints. Therefore the calculation was repeated for this report. Figure 5 is the result of performing this simulation and analysis on the configuration with the moved velocity selector. Subsequent monochromatic simulations that were monitored at the sample position (see section 4.2.4), revealed no noticeable loss by selecting coatings represented by the green curve. The green line shows where the m values are chosen for the design from the histogram.

4.2.3 Back Wall of the Monochromator Drum

The beam transmitted through the monochromator is important for determining the minimum $2\theta_m$, for sizing the beamstop, and for comparison to MCNP calculations (Werner et al. 2018; F X Gallmeier et al. 2009; F. X. Gallmeier et al. 2016; Magán and Bergmann 2020; Grammer and Gallmeier 2018; Grammer, Gallmeier, and Iverson 2019; Grammer and Gallmeier 2020; Grammer, Gallmeier, and Iverson 2020; Grammer 2024). The minimum $2\theta_m$ also determines the maximum E_i according to equations 3 and 4.

White beam simulations were calculated, with no velocity selector in place, for 1×10^9 traces. The simulation had no monochromator. Instead, it utilizes a monitor_nD component `NB6_Mono_drum_Monitors`

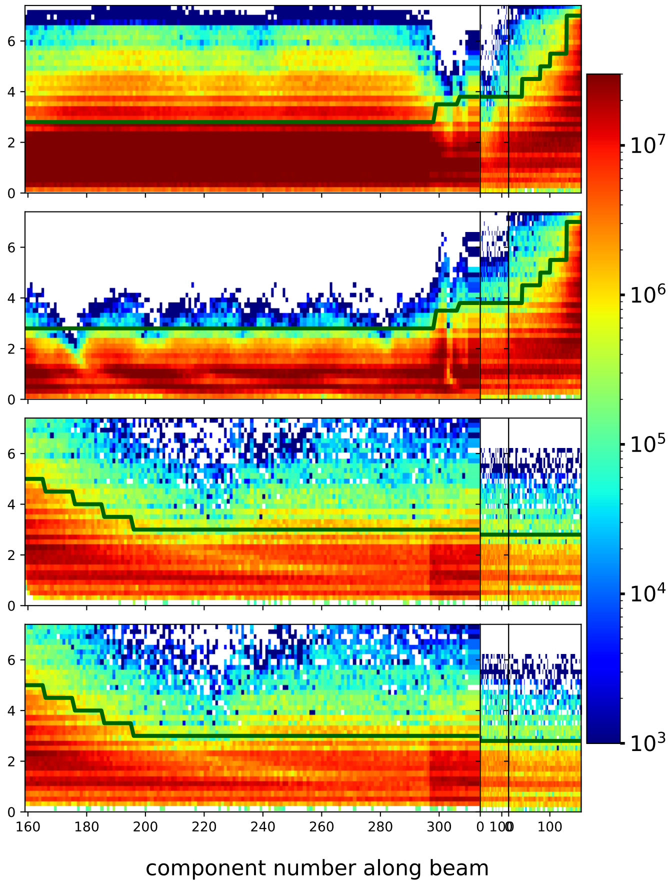


Figure 5. Guide coating histogram for each component of the guide. The green line is the requested guide coatings.

(Appendix B) to examine the simulated beam intensity as a function of angle around the monochromator position at a radius of 539.75 and at a height above and below the monochromator position. This radius corresponds to the inner surface of the monochromator drum. The simulation provided the data `NB6_drum_theta_y.th_y` which was analyzed using the `Mon_drum_beam_size.py` script. The observed beam spot is shown in Figure 6 on a log scale to clearly identify the location of the beam. For the current monochromator drum, the wedges are located on the side of negative angles in Figure 6. As described in section 2.2, the wedges provide a symmetric opening around the the $2\theta_m$ value for the beam to exit. But one must not only consider the beam that is reflected off the monochromator, but also those neutrons that are transmitted through the monochromator. Figure 6 shows that if the extreme side of a wedge is open at $2\theta_m$ of 15° then not only the desired beam, but also the edges of the straight through beam would be emitted through the wedges, increasing the background of the instrument. Figure 7 is a 100mm tall cut along $2\theta_m$ through the middle of the data in Figure 6. It can be used for a closer examination of the beam profile towards the wedge side. Specifically it shows that the neutron flux is down by more than 3 orders of magnitude for an angle of $\sim$ 16°. Thus background from the straight through beam would be a minimum if the lowest angle wedge is never open below a minimum $2\theta_m$ = 16°. The width of the wedges and the number of them that are open, fixes the minimum central $2\theta_m$ value and thus the maximum E_i. If the wedge size that is currently available at CTAX is used, then if four wedges are open the maximum E_i = 27.1meV.

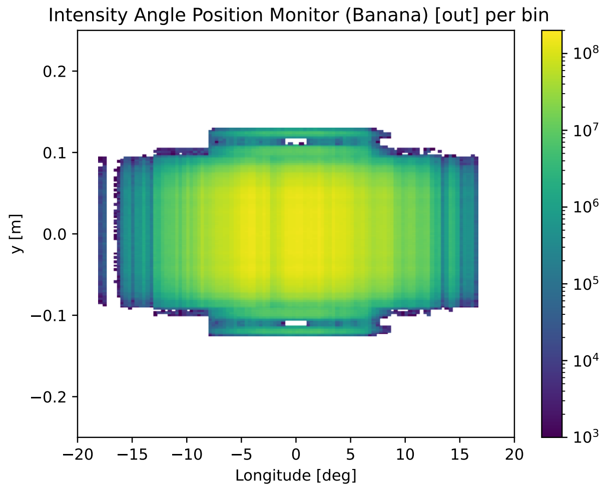


Figure 6. The beam spot on the back wall of the monochromator drum plotted on a log scale. The x axis is the angle away from the straight through beam with the origin being at the monochromator or the $2\theta_m$ value. The y axis is the vertical axis.

Such a value is below the maximum set in the science requirements. If three wedges are lifted, the values is E_i = 34.6meV. This choice provides plenty of margin for the science requirement of a maximum E_i = 30meV. The final design can be closer to the science requirement maximum.

4.2.4 Sample Position

The sample position is where the science requirements are checked. The relevant requirements are

- Flux on sample10-100 times the flux of CTAX between 5-20meV
- Maximum E_i > 20meV
- Beam size of 20mm × 20mm (FWHM)

To check these parameters, an image detector named `NeuB6_Sample_Image` at the sample position (Appendix A.8) is used. As mentioned in section 4.1, 28 different E_i values are simulated and the results are saved in subdirectories under `VS_win_size`. These results are analyzed with `Ei_ctax_cmp.py`. This script takes a 2cm tall strip across the image detector and fits it with a gaussian. The area under that curve is the flux value. This procedure is performed for each E_i. These results are plotted in Figure 8 showing the expected flux on sample for Manta as compared to HB-3 (Chi 2021) and CTAX (Hong 2021) from HFIR, SPINS and MACS at NCNR (Rodriguez et al. 2008), and Thales at the ILL(Boehm et al. 2015). Clearly the flux on sample will be competitive with other cold neutron TAS instruments around the world. Thales is the instrument that is most comparable to MANTA. However it has a larger view of the source. Therefore assuming optimized optics for both beamlines, it should have slightly more flux on sample. The MACS instrument has the most flux on sample, but has a broader Q resolution than is expected for MANTA. Therefore MACS was optimized for different parameters.

To determine a performance multiplier for MANTA, its flux curve in Figure 8 is interpolated and divided by the corresponding values for CTAX. Clearly for all E_i it is more that 10× larger, and it approaches 60× larger at the highest $E_i$values. Also note that MANTA will operate above 16meV. This enhancement provides more overlap with the thermal TAS and expands the upper incident energy range for cold neutron TAS at HFIR, where CTAX does not operate.

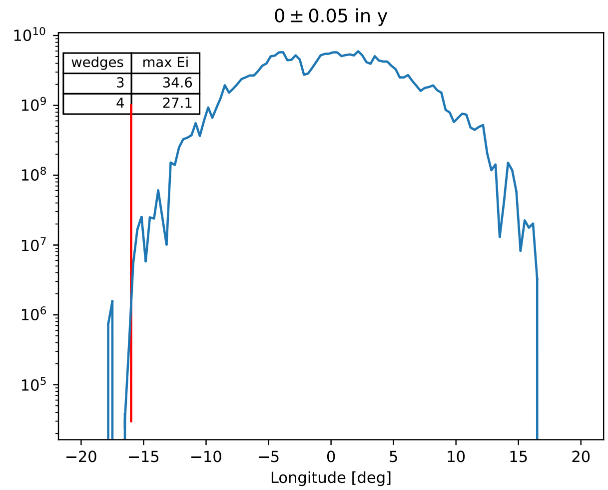


Figure 7. A horizontal cut through Figure 6. The red line indicates a cutoff with an acceptable amount of leakage from the straight through beam.

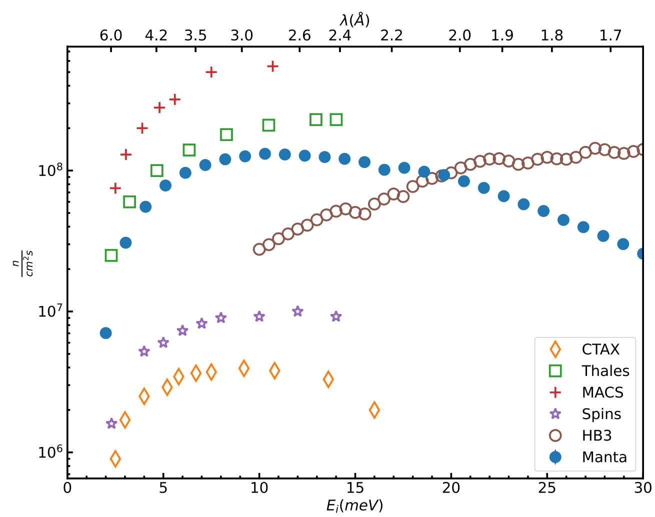


Figure 8. The predicted flux on sample for MANTA as compared to other beamlines.

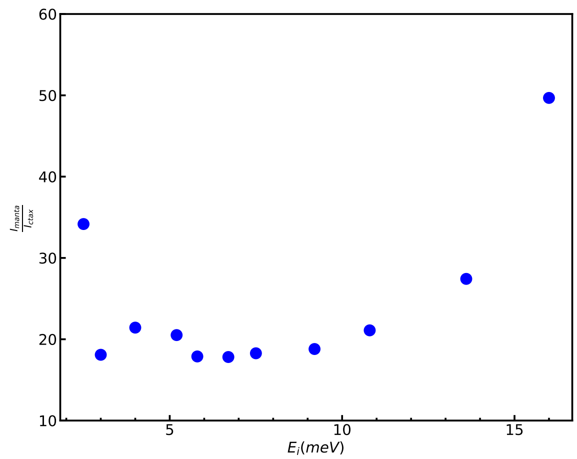


Figure 9. The ratio of MANTA flux on sample to the CTAX instrument.

5. SUMMARY

It has been demonstrated that the NB6 beamline, as represented in the McStas model, will provide the beam needed for a new cold neutron TAS at the HFIR. The details of the simulation effort has been presented. Analytical calculations are provided to validate these simulations and to understand the beam profile on the back wall of the monochromator drum.

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APPENDIX A. MANTA_HBRR_SAMPLE

APPENDIX A. MANTA_HBRR_SAMPLE

```
/*******************************************************************************
*         McStas instrument definition URL=http://www.mcstas.org
*
* Instrument: MANTA
*
* %Identification
* Written by: Garrett Granroth granrothge@ornl.gov
* Date: 26Feb2025
* Modified:
* Origin: ORNL
*
* %INSTRUMENT_SITE: ORNL
*
* %Description
*
* NOTE:  beamline no longer CG1.  Instead NB6.  Can be called NB6 in filenames.
* CANNOT be called NB6 in components due to McStas parameter naming convention
* THEREFORE use NeuB6 for component names along the guide instead
*
* Team approach to development:  MANTA.instr is the high-level which calls
* other 'instruments' which do NOT have the 'FINALLY' before the end.
*
* Any parameters are defined within the included instrument instead of the high-level
* MANTA instrument, except for the wavelength range
* (or do we want to change to energy at the MANTA level, then delcare Wavelength to stay
* consistent with universal HB4_Beamtube.instr used by all guide hall instruments???)
*
* In order to stay consistent with GitHub access, all file names for includes (and for that
* matter all python scripts) are RELATIVE instead of full file tree references, in order
* to minimize text changes for your customized setup.  This way, you choose a high-level
* tree directory location and work down the same way everyone else does.
*
* In addition, all RELATIVE references are 2-up / 2-down
* (except for monitor and components which are 2-up / 1-down because we don't play there).
* Team members are expected to optionally create their subdirectories for new options.
* Team members only work in the 2-down subdirectory, whose main editable file is the
* sub-instrument.
* They can copy the MANTA.instr file to that subdirectory, run mcstas or mcgui from there,
* and create subdirectories with sim and monitor output underneath.
*
*
* NOTE that HFIR drawings are generally in units of inches, so that IN2M is often
* used as a scale factor so the nominal HFIR dimensions are exposed and sometimes
* referenced from drawings.
*
*******************************************************************************/
```

```
DEFINE INSTRUMENT MANTA(Wavelength_Min = 0.0, //Min neutron wavelength to be generated.
                        Wavelength_Max = 10.0, //Max neutron wavelength to be generated.
                        double ei=5, //Incident energy to set monochromator angle
                        Channel=3) // set the correct shutter channel.
                                      // Overwrites the one in HB4 instrument

DECLARE
%{
  double IN2M = 25.4 / 1000.0;   // Unit conversion from inches to meters
  double bldg_angle; //angle to tilt if want in building coordinates
  double strt_shift; //shift if you want building coordinates
  char fn_mcpl[100];

  int Tally;       //Switch to record neutron tallies (histories)
//This is the tally DECLARE block
//It sets up the data constructs that the tally events will be saved into
  int    tally_flag;
  int    tally_neutron_index;
  int    tally_number_of_events;
  int    tally_event_component_index[1000];
  int    tally_event_component_type[1000];
  double tally_event_position[1000][3];
  double tally_event_velocity[1000][3];
  double tally_event_weight[1000];
  double tally_reflection_q[1000];
  int    tally_reflection_mirror_index[1000];
  FILE   *tally_event_list_fp;
  int    tally_number_of_components;
  int    tally_component_index[1000];
  int    tally_component_type[1000];
  char   tally_component_name[1000][255];
  char   tally_module_name[1000][128];
//End tally DECLARE block

%}

INITIALIZE
%{

//This is the tally INITIALIZE block
//It creates the output file
Tally =0;
  tally_flag = Tally;
  char tally_output_file_name[255];
  if (tally_flag == 1)
  {  sprintf(tally_output_file_name, "%s", "neutron_event_list.dat");
     tally_event_list_fp = fopen(tally_output_file_name, "w");
```

```
     if (tally_event_list_fp == NULL)
     {
         printf("Error opening file %s!\n", tally_output_file_name);
         exit(1);
     }
  }
//End tally INITIALIZE Block

   sprintf(fn_mcpl,"NB6_Ei_%0.2f_sample.mcpl",ei);
 %}



TRACE

//****************************************************************************
// Define the absolute instrument coordinate system
//   with the origin at the center line of the reactor pressure vessel.
// Many of the drawings of the HB-4 beamtube use this as the reference.
// The positive Z-axis is along the beamtube centerline.
// The positive Y-axis is pointing up.
// The positive X-axis is pointing to the left looking down the beamtube
//   toward the reactor core. (Right handed coordinate system)



COMPONENT DWG_Origin =Arm()
AT(0.0,0.0,0.0) ABSOLUTE
ROTATED (0.0,0.0,0.0) ABSOLUTE

%include "HB4_Main_Shutter.instr"

COMPONENT NeuB6_Coordinate_System_1 = Arm()
AT (0.05642596, 0.025164, 4.6983798) RELATIVE Source
  ROTATED (-0.31243, 0.68807, 0.0) RELATIVE Source

COMPONENT NeuB6_guide_Entrance_Mask = Slit(xwidth=0.050, yheight=0.114)  // Block the
//neutrons that won't enter the guide before characterizing the beam at the guide entrance
  AT (0.0, 0.0, 0.0) RELATIVE NeuB6_Coordinate_System_1

%include "NB6_PreBendMonitors.instr"

// Guide


%include "NB6_HBRR.instr"

//Piece of focusing guide upstream of the velocity selector
```

```
COMPONENT NB6_GuidePreVS = Guide_anyshape_r_tally(geometry="./Horiz_parab_u4.off",
                                                          Qc=0.0219, R0=0.99)
AT (0.0, 0.0, 0.0) RELATIVE Curve_End

%include "NB6_VS2VirtSource.instr"

%include "NB6_VirtualSourceMonitors.instr"

%include "NB6_VirtualSource2Mono.instr"

// Uses arm NB6_VirtualSource_CSYS (Virtual Source)
// and generates arm NeuB6_Coordinate_System_4 (at mono, direction 2theta)

// Premonochromator monitors
//%include "NB6_MonoMonitors.instr"

/* Monochromator */
%include "NB6_MonoRowlandSymmDoublFocus.instr"


// Stuff around the sample
// Uses arm NeuB6_Coordinate_System_4 and generates arm
// NB6_Sample_CSYS (at sample, direction TBD)
COMPONENT NB6_Sample_CSYS = Arm()
AT (0.0, 0.0, V_radius) RELATIVE NeuB6_Coordinate_System_4
/* OPTION:  SampleMonitorsOnly */
%include "NB6_SampleMonitors.instr"
/* OPTION:  MCPL_ouput upstream of sample position */
//COMPONENT NeuB6_Sample_Horizontal_wl = MCPL_output(filename="NB6_up_Sample.mcpl")
//AT (0.0, 0.0, V_radius-0.15) RELATIVE NeuB6_Coordinate_System_4


FINALLY
%{
    //This is the tally FINALLY block.
// A component list file is created that contains all tally enabled components,
// indexed and all.
    int i;
    char tally_event_list_filename[255];
    char tally_component_list_filename[255];

    if (tally_flag == 1)  fclose(tally_event_list_fp);

    if (tally_flag == 1)
    {  sprintf(tally_component_list_filename, "component_list.dat");
       FILE *fp = fopen(tally_component_list_filename, "w");
       for (i = 0; i < tally_number_of_components; i++)
       {
```

```
            fprintf(fp, "%5d %5d %-64s %s\n", tally_component_index[i],
                tally_component_type[i], tally_component_name[i],
                tally_module_name[i]);
        }
        fclose(fp);
    }
%}

END
```

A.1 NB6_PREBENDMONITORS

```
•*******************************************************************************
*          McStas instrument definition URL=http://www.mcstas.org
*
* Instrument: Baseline NB6 curved guide and short straight section
*
* %Identification
* Written by: Lee Robertson (robertsonjl@ornl.gov) mod by B Winn
* Date Created: 28may2018
* Date Modified: 12aug2019
* Origin: ORNL
* %INSTRUMENT_SITE: ORNL
*
* %Description
* Model of the new guide for the NB6 beamline, formerly CG-1 beamline
* %Parameters
* Shutter_m1[#]: Guide m value for the left vertical guide surface
* Shutter_m2[#]: Guide m value for the right vertical guide surface
* Shutter_m3[#]: Guide m value for the lower horizontal guide surface
* Shutter_m4[#]: Guide m value for the upper horizontal guide surface
*
* %Link
*
* %End
********************************************************************************/

DEFINE INSTRUMENT NB6_PreBendMonitors()
DECLARE
%{
%}

INITIALIZE
%{
%}

TRACE
```

```
//********************************************************************************************

COMPONENT NeuB6_Guide_Entrance_Flux = Monitor(xwidth = 0.2, yheight = 0.2)
  AT (0.0, 0.0, 0.0) RELATIVE NeuB6_Coordinate_System_1

COMPONENT NeuB6_Guide_Entrance_Image = PSD_monitor(nx = 100, ny = 100,
                       filename = "NB6_guide_entrance_image",
                       xmin = -.2, xmax = .2, ymin = -.2, ymax = .2)
  AT (0.0, 0.0, 0.0) RELATIVE NeuB6_Coordinate_System_1

COMPONENT NeuB6_Guide_Entrance_Spectrum = L_monitor(nL = 200,
                       filename = "NB6_guide_entrance_spectrum",
                       xmin = -0.2, xmax = 0.2, ymin = -0.2, ymax = 0.2,
                       Lmin = Wavelength_Min, Lmax = Wavelength_Max)
  AT (0.0, 0.0, 0.0) RELATIVE NeuB6_Coordinate_System_1

/*COMPONENT NeuB6_Guide_Entrance_Vertical_Divergence = Hdiv_monitor(nh = 41,
                           filename="NB6_guide_entrance_vertical_divergence",
                           xwidth = 0.2, yheight = 0.2, h_maxdiv=3.0)
  AT (0.0, 0.0, 0.0) RELATIVE NeuB6_Coordinate_System_1
  ROTATED (0.0, 0.0, 90.0) RELATIVE NeuB6_Coordinate_System_1

COMPONENT NeuB6_Guide_Entrance_Horizontal_Divergence = Hdiv_monitor(nh = 41,
                        filename="NB6_guide_entrance_horizontal_divergence",
                        xwidth = 0.2, yheight = 0.2, h_maxdiv=2.0)
  AT (0.0, 0.0, 0.0) RELATIVE NeuB6_Coordinate_System_1 */

COMPONENT NeuB6_Guide_Entrance_Divergence_Map = Divergence_monitor(nh = 40, nv = 40,
                        filename="NB6_guide_entrance_divergence_map",
                        xwidth = 0.2, yheight = 0.2, maxdiv_h = 2.0, maxdiv_v = 2.0)
  AT (0.0, 0.0, 0.0) RELATIVE NeuB6_Coordinate_System_1

COMPONENT NeuB6_Guide_Entrance_Horizontal_Phase_Space_Map = Monitor_nD(
xwidth=0.2, yheight = 0.5, restore_neutron=1,
filename="NB6_guide_entrance_horizontal_phase_space_map.dat",
options="square, x limits=[-0.2,0.2] bins=201, xdiv limits =[-2,2] bins=251"
)
AT (0.0, 0.0, 0.0) RELATIVE NeuB6_Coordinate_System_1

COMPONENT NeuB6_Guide_Entrance_Vertical_Phase_Space_Map = Monitor_nD(xwidth=0.2,
yheight = 0.5, restore_neutron=1,
 filename="NB6_guide_entrance_vertical_phase_space_map.dat",
options="square, y limits=[-0.2,0.2] bins=201, ydiv limits =[-2,2] bins=251"
)
AT (0.0, 0.0, 0.0) RELATIVE NeuB6_Coordinate_System_1

END
```

A.2 NB6_HBRR

```
/*******************************************************************************
*         McStas instrument definition URL=http://www.mcstas.org
*
* Instrument: Baseline NB6 curve guide
* %Identification* Written by:  G.E. Granroth
* Date Created: 28-Jan-2025
* Date Modified:
* Origin: ORNL
* %INSTRUMENT_SITE: ORNL
*
* %Description
* Model of the new guide for the NB6 beamline, formerly CG-1 beamline
* %Parameters
*
* %Link
*
* %End
*******************************************************************************/
DEFINE INSTRUMENT NB6_Baseline()
DECLARE
%{
%}

INITIALIZE
%{
%}

TRACE
//*************************************************************************************************

COMPONENT NeuB6_Guide1_1 = Guide_channeled_tally(w1=0.0486,h1=0.1029,w2=0.0486,h2=0.1032,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=5.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.000000) RELATIVE NeuB6_Coordinate_System_1 ROTATED (0.0000,0.0000,0.0) RELATIVE NeuB6_
COMPONENT NeuB6_Guide1_2 = Guide_channeled_tally(w1=0.0486,h1=0.1032,w2=0.0486,h2=0.1035,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=5.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_3 = Guide_channeled_tally(w1=0.0486,h1=0.1035,w2=0.0486,h2=0.1038,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=5.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_4 = Guide_channeled_tally(w1=0.0486,h1=0.1038,w2=0.0486,h2=0.1041,
```

```
                        nslit=3,l=0.099922,d=0.0005,
                        mx=2.8,my=5.0,
                       R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_5 = Guide_channeled_tally(w1=0.0486,h1=0.1041,w2=0.0486,h2=0.1044,
                        nslit=3,l=0.099922,d=0.0005,
                        mx=2.8,my=5.0,
                       R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_6 = Guide_channeled_tally(w1=0.0486,h1=0.1044,w2=0.0486,h2=0.1047,
                        nslit=3,l=0.099922,d=0.0005,
                        mx=2.8,my=5.0,
                       R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_7 = Guide_channeled_tally(w1=0.0486,h1=0.1047,w2=0.0486,h2=0.1050,
                        nslit=3,l=0.099922,d=0.0005,
                        mx=2.8,my=5.0,
                       R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_8 = Guide_channeled_tally(w1=0.0486,h1=0.1050,w2=0.0486,h2=0.1053,
                        nslit=3,l=0.099922,d=0.0005,
                        mx=2.8,my=5.0,
                       R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_9 = Guide_channeled_tally(w1=0.0486,h1=0.1053,w2=0.0486,h2=0.1056,
                        nslit=3,l=0.099922,d=0.0005,
                        mx=2.8,my=4.5,
                       R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_10 = Guide_channeled_tally(w1=0.0486,h1=0.1056,w2=0.0486,h2=0.1059,
                        nslit=3,l=0.099922,d=0.0005,
                        mx=2.8,my=4.5,
                       R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_11 = Guide_channeled_tally(w1=0.0486,h1=0.1059,w2=0.0486,h2=0.1062,
                        nslit=3,l=0.099922,d=0.0005,
                        mx=2.8,my=4.5,
                       R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_12 = Guide_channeled_tally(w1=0.0486,h1=0.1062,w2=0.0486,h2=0.1065,
                        nslit=3,l=0.099922,d=0.0005,
                        mx=2.8,my=4.5,
                       R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_13 = Guide_channeled_tally(w1=0.0486,h1=0.1065,w2=0.0486,h2=0.1068,
                        nslit=3,l=0.099922,d=0.0005,
                        mx=2.8,my=4.5,
                       R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
```

```
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_14 = Guide_channeled_tally(w1=0.0486,h1=0.1068,w2=0.0486,h2=0.1070,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=4.5,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_15 = Guide_channeled_tally(w1=0.0486,h1=0.1070,w2=0.0486,h2=0.1073,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=4.5,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_16 = Guide_channeled_tally(w1=0.0486,h1=0.1073,w2=0.0486,h2=0.1076,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=4.5,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_17 = Guide_channeled_tally(w1=0.0486,h1=0.1076,w2=0.0486,h2=0.1079,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=4.5,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_18 = Guide_channeled_tally(w1=0.0486,h1=0.1079,w2=0.0486,h2=0.1081,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=4.5,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_19 = Guide_channeled_tally(w1=0.0486,h1=0.1081,w2=0.0486,h2=0.1084,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=4.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_20 = Guide_channeled_tally(w1=0.0486,h1=0.1084,w2=0.0486,h2=0.1087,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=4.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_21 = Guide_channeled_tally(w1=0.0486,h1=0.1087,w2=0.0486,h2=0.1089,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=4.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_22 = Guide_channeled_tally(w1=0.0486,h1=0.1089,w2=0.0486,h2=0.1092,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=4.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_23 = Guide_channeled_tally(w1=0.0486,h1=0.1092,w2=0.0486,h2=0.1095,
                       nslit=3,l=0.099922,d=0.0005,
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                    mx=2.8,my=4.0,
                   R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_24 = Guide_channeled_tally(w1=0.0486,h1=0.1095,w2=0.0486,h2=0.1097,
                    nslit=3,l=0.099922,d=0.0005,
                    mx=2.8,my=4.0,
                   R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_25 = Guide_channeled_tally(w1=0.0486,h1=0.1097,w2=0.0486,h2=0.1100,
                    nslit=3,l=0.099922,d=0.0005,
                    mx=2.8,my=4.0,
                   R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_26 = Guide_channeled_tally(w1=0.0486,h1=0.1100,w2=0.0486,h2=0.1102,
                    nslit=3,l=0.099922,d=0.0005,
                    mx=2.8,my=4.0,
                   R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_27 = Guide_channeled_tally(w1=0.0486,h1=0.1102,w2=0.0486,h2=0.1105,
                    nslit=3,l=0.099922,d=0.0005,
                    mx=2.8,my=4.0,
                   R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_28 = Guide_channeled_tally(w1=0.0486,h1=0.1105,w2=0.0486,h2=0.1107,
                    nslit=3,l=0.099922,d=0.0005,
                    mx=2.8,my=4.0,
                   R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_29 = Guide_channeled_tally(w1=0.0486,h1=0.1107,w2=0.0486,h2=0.1110,
                    nslit=3,l=0.099922,d=0.0005,
                    mx=2.8,my=3.5,
                   R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_30 = Guide_channeled_tally(w1=0.0486,h1=0.1110,w2=0.0486,h2=0.1112,
                    nslit=3,l=0.099922,d=0.0005,
                    mx=2.8,my=3.5,
                   R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_31 = Guide_channeled_tally(w1=0.0486,h1=0.1112,w2=0.0486,h2=0.1115,
                    nslit=3,l=0.099922,d=0.0005,
                    mx=2.8,my=3.5,
                   R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_32 = Guide_channeled_tally(w1=0.0486,h1=0.1115,w2=0.0486,h2=0.1117,
                    nslit=3,l=0.099922,d=0.0005,
                    mx=2.8,my=3.5,
                   R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
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COMPONENT NeuB6_Guide1_33 = Guide_channeled_tally(w1=0.0486,h1=0.1117,w2=0.0486,h2=0.1120,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.5,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_34 = Guide_channeled_tally(w1=0.0486,h1=0.1120,w2=0.0486,h2=0.1122,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.5,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_35 = Guide_channeled_tally(w1=0.0486,h1=0.1122,w2=0.0486,h2=0.1125,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.5,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_36 = Guide_channeled_tally(w1=0.0486,h1=0.1125,w2=0.0486,h2=0.1127,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.5,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_37 = Guide_channeled_tally(w1=0.0486,h1=0.1127,w2=0.0486,h2=0.1129,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.5,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_38 = Guide_channeled_tally(w1=0.0486,h1=0.1129,w2=0.0486,h2=0.1132,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.5,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_39 = Guide_channeled_tally(w1=0.0486,h1=0.1132,w2=0.0486,h2=0.1134,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_40 = Guide_channeled_tally(w1=0.0486,h1=0.1134,w2=0.0486,h2=0.1136,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_41 = Guide_channeled_tally(w1=0.0486,h1=0.1136,w2=0.0486,h2=0.1138,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_42 = Guide_channeled_tally(w1=0.0486,h1=0.1138,w2=0.0486,h2=0.1141,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.0,
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                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_43 = Guide_channeled_tally(w1=0.0486,h1=0.1141,w2=0.0486,h2=0.1143,
                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_44 = Guide_channeled_tally(w1=0.0486,h1=0.1143,w2=0.0486,h2=0.1145,
                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_45 = Guide_channeled_tally(w1=0.0486,h1=0.1145,w2=0.0486,h2=0.1147,
                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_46 = Guide_channeled_tally(w1=0.0486,h1=0.1147,w2=0.0486,h2=0.1149,
                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_47 = Guide_channeled_tally(w1=0.0486,h1=0.1149,w2=0.0486,h2=0.1151,
                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_48 = Guide_channeled_tally(w1=0.0486,h1=0.1151,w2=0.0486,h2=0.1154,
                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_49 = Guide_channeled_tally(w1=0.0486,h1=0.1154,w2=0.0486,h2=0.1156,
                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_50 = Guide_channeled_tally(w1=0.0486,h1=0.1156,w2=0.0486,h2=0.1158,
                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_51 = Guide_channeled_tally(w1=0.0486,h1=0.1158,w2=0.0486,h2=0.1160,
                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_52 = Guide_channeled_tally(w1=0.0486,h1=0.1160,w2=0.0486,h2=0.1162,
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                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_53 = Guide_channeled_tally(w1=0.0486,h1=0.1162,w2=0.0486,h2=0.1164,
                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_54 = Guide_channeled_tally(w1=0.0486,h1=0.1164,w2=0.0486,h2=0.1166,
                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_55 = Guide_channeled_tally(w1=0.0486,h1=0.1166,w2=0.0486,h2=0.1168,
                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_56 = Guide_channeled_tally(w1=0.0486,h1=0.1168,w2=0.0486,h2=0.1170,
                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_57 = Guide_channeled_tally(w1=0.0486,h1=0.1170,w2=0.0486,h2=0.1172,
                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_58 = Guide_channeled_tally(w1=0.0486,h1=0.1172,w2=0.0486,h2=0.1174,
                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_59 = Guide_channeled_tally(w1=0.0486,h1=0.1174,w2=0.0486,h2=0.1176,
                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_60 = Guide_channeled_tally(w1=0.0486,h1=0.1176,w2=0.0486,h2=0.1178,
                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_61 = Guide_channeled_tally(w1=0.0486,h1=0.1178,w2=0.0486,h2=0.1180,
                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
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AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_62 = Guide_channeled_tally(w1=0.0486,h1=0.1180,w2=0.0486,h2=0.1181,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_63 = Guide_channeled_tally(w1=0.0486,h1=0.1181,w2=0.0486,h2=0.1183,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_64 = Guide_channeled_tally(w1=0.0486,h1=0.1183,w2=0.0486,h2=0.1185,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_65 = Guide_channeled_tally(w1=0.0486,h1=0.1185,w2=0.0486,h2=0.1187,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_66 = Guide_channeled_tally(w1=0.0486,h1=0.1187,w2=0.0486,h2=0.1189,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_67 = Guide_channeled_tally(w1=0.0486,h1=0.1189,w2=0.0486,h2=0.1191,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_68 = Guide_channeled_tally(w1=0.0486,h1=0.1191,w2=0.0486,h2=0.1192,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_69 = Guide_channeled_tally(w1=0.0486,h1=0.1192,w2=0.0486,h2=0.1194,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_70 = Guide_channeled_tally(w1=0.0486,h1=0.1194,w2=0.0486,h2=0.1196,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_71 = Guide_channeled_tally(w1=0.0486,h1=0.1196,w2=0.0486,h2=0.1198,
                       nslit=3,l=0.099922,d=0.0005,
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                    mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_72 = Guide_channeled_tally(w1=0.0486,h1=0.1198,w2=0.0486,h2=0.1199,
                    nslit=3,l=0.099922,d=0.0005,
                    mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_73 = Guide_channeled_tally(w1=0.0486,h1=0.1199,w2=0.0486,h2=0.1201,
                    nslit=3,l=0.099922,d=0.0005,
                    mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_74 = Guide_channeled_tally(w1=0.0486,h1=0.1201,w2=0.0486,h2=0.1203,
                    nslit=3,l=0.099922,d=0.0005,
                    mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_75 = Guide_channeled_tally(w1=0.0486,h1=0.1203,w2=0.0486,h2=0.1204,
                    nslit=3,l=0.099922,d=0.0005,
                    mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_76 = Guide_channeled_tally(w1=0.0486,h1=0.1204,w2=0.0486,h2=0.1206,
                    nslit=3,l=0.099922,d=0.0005,
                    mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_77 = Guide_channeled_tally(w1=0.0486,h1=0.1206,w2=0.0486,h2=0.1208,
                    nslit=3,l=0.099922,d=0.0005,
                    mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_78 = Guide_channeled_tally(w1=0.0486,h1=0.1208,w2=0.0486,h2=0.1209,
                    nslit=3,l=0.099922,d=0.0005,
                    mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_79 = Guide_channeled_tally(w1=0.0486,h1=0.1209,w2=0.0486,h2=0.1211,
                    nslit=3,l=0.099922,d=0.0005,
                    mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_80 = Guide_channeled_tally(w1=0.0486,h1=0.1211,w2=0.0486,h2=0.1212,
                    nslit=3,l=0.099922,d=0.0005,
                    mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
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COMPONENT NeuB6_Guide1_81 = Guide_channeled_tally(w1=0.0486,h1=0.1212,w2=0.0486,h2=0.1214,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_82 = Guide_channeled_tally(w1=0.0486,h1=0.1214,w2=0.0486,h2=0.1216,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_83 = Guide_channeled_tally(w1=0.0486,h1=0.1216,w2=0.0486,h2=0.1217,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_84 = Guide_channeled_tally(w1=0.0486,h1=0.1217,w2=0.0486,h2=0.1219,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_85 = Guide_channeled_tally(w1=0.0486,h1=0.1219,w2=0.0486,h2=0.1220,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_86 = Guide_channeled_tally(w1=0.0486,h1=0.1220,w2=0.0486,h2=0.1222,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_87 = Guide_channeled_tally(w1=0.0486,h1=0.1222,w2=0.0486,h2=0.1223,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_88 = Guide_channeled_tally(w1=0.0486,h1=0.1223,w2=0.0486,h2=0.1225,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_89 = Guide_channeled_tally(w1=0.0486,h1=0.1225,w2=0.0486,h2=0.1226,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_90 = Guide_channeled_tally(w1=0.0486,h1=0.1226,w2=0.0486,h2=0.1227,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
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                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_91 = Guide_channeled_tally(w1=0.0486,h1=0.1227,w2=0.0486,h2=0.1229,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_92 = Guide_channeled_tally(w1=0.0486,h1=0.1229,w2=0.0486,h2=0.1230,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_93 = Guide_channeled_tally(w1=0.0486,h1=0.1230,w2=0.0486,h2=0.1232,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_94 = Guide_channeled_tally(w1=0.0486,h1=0.1232,w2=0.0486,h2=0.1233,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_95 = Guide_channeled_tally(w1=0.0486,h1=0.1233,w2=0.0486,h2=0.1234,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_96 = Guide_channeled_tally(w1=0.0486,h1=0.1234,w2=0.0486,h2=0.1236,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_97 = Guide_channeled_tally(w1=0.0486,h1=0.1236,w2=0.0486,h2=0.1237,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_98 = Guide_channeled_tally(w1=0.0486,h1=0.1237,w2=0.0486,h2=0.1238,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_99 = Guide_channeled_tally(w1=0.0486,h1=0.1238,w2=0.0486,h2=0.1240,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_100 = Guide_channeled_tally(w1=0.0486,h1=0.1240,w2=0.0486,h2=0.1241,
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                         nslit=3,l=0.099922,d=0.0005,
                         mx=2.8,my=3.0,
                        R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_101 = Guide_channeled_tally(w1=0.0486,h1=0.1241,w2=0.0486,h2=0.1242,
                         nslit=3,l=0.099922,d=0.0005,
                         mx=2.8,my=3.0,
                        R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_102 = Guide_channeled_tally(w1=0.0486,h1=0.1242,w2=0.0486,h2=0.1243,
                         nslit=3,l=0.099922,d=0.0005,
                         mx=2.8,my=3.0,
                        R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_103 = Guide_channeled_tally(w1=0.0486,h1=0.1243,w2=0.0486,h2=0.1245,
                         nslit=3,l=0.099922,d=0.0005,
                         mx=2.8,my=3.0,
                        R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_104 = Guide_channeled_tally(w1=0.0486,h1=0.1245,w2=0.0486,h2=0.1246,
                         nslit=3,l=0.099922,d=0.0005,
                         mx=2.8,my=3.0,
                        R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_105 = Guide_channeled_tally(w1=0.0486,h1=0.1246,w2=0.0486,h2=0.1247,
                         nslit=3,l=0.099922,d=0.0005,
                         mx=2.8,my=3.0,
                        R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_106 = Guide_channeled_tally(w1=0.0486,h1=0.1247,w2=0.0486,h2=0.1248,
                         nslit=3,l=0.099922,d=0.0005,
                         mx=2.8,my=3.0,
                        R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_107 = Guide_channeled_tally(w1=0.0486,h1=0.1248,w2=0.0486,h2=0.1249,
                         nslit=3,l=0.099922,d=0.0005,
                         mx=2.8,my=3.0,
                        R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_108 = Guide_channeled_tally(w1=0.0486,h1=0.1249,w2=0.0486,h2=0.1251,
                         nslit=3,l=0.099922,d=0.0005,
                         mx=2.8,my=3.0,
                        R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_109 = Guide_channeled_tally(w1=0.0486,h1=0.1251,w2=0.0486,h2=0.1252,
                         nslit=3,l=0.099922,d=0.0005,
                         mx=2.8,my=3.0,
                        R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
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AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_110 = Guide_channeled_tally(w1=0.0486,h1=0.1252,w2=0.0486,h2=0.1253,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_111 = Guide_channeled_tally(w1=0.0486,h1=0.1253,w2=0.0486,h2=0.1254,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_112 = Guide_channeled_tally(w1=0.0486,h1=0.1254,w2=0.0486,h2=0.1255,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_113 = Guide_channeled_tally(w1=0.0486,h1=0.1255,w2=0.0486,h2=0.1256,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_114 = Guide_channeled_tally(w1=0.0486,h1=0.1256,w2=0.0486,h2=0.1257,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_115 = Guide_channeled_tally(w1=0.0486,h1=0.1257,w2=0.0486,h2=0.1258,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_116 = Guide_channeled_tally(w1=0.0486,h1=0.1258,w2=0.0486,h2=0.1259,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_117 = Guide_channeled_tally(w1=0.0486,h1=0.1259,w2=0.0486,h2=0.1260,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_118 = Guide_channeled_tally(w1=0.0486,h1=0.1260,w2=0.0486,h2=0.1261,
                       nslit=3,l=0.099922,d=0.0005,
                       mx=2.8,my=3.0,
                      R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_119 = Guide_channeled_tally(w1=0.0486,h1=0.1261,w2=0.0486,h2=0.1262,
                       nslit=3,l=0.099922,d=0.0005,
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                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_120 = Guide_channeled_tally(w1=0.0486,h1=0.1262,w2=0.0486,h2=0.1263,
                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_121 = Guide_channeled_tally(w1=0.0486,h1=0.1263,w2=0.0486,h2=0.1264,
                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_122 = Guide_channeled_tally(w1=0.0486,h1=0.1264,w2=0.0486,h2=0.1265,
                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_123 = Guide_channeled_tally(w1=0.0486,h1=0.1265,w2=0.0486,h2=0.1266,
                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_124 = Guide_channeled_tally(w1=0.0486,h1=0.1266,w2=0.0486,h2=0.1267,
                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_125 = Guide_channeled_tally(w1=0.0486,h1=0.1267,w2=0.0486,h2=0.1268,
                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_126 = Guide_channeled_tally(w1=0.0486,h1=0.1268,w2=0.0486,h2=0.1269,
                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_127 = Guide_channeled_tally(w1=0.0486,h1=0.1269,w2=0.0486,h2=0.1270,
                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_128 = Guide_channeled_tally(w1=0.0486,h1=0.1270,w2=0.0486,h2=0.1271,
                     nslit=3,l=0.099922,d=0.0005,
                     mx=2.8,my=3.0,
                    R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
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COMPONENT NeuB6_Guide1_129 = Guide_channeled_tally(w1=0.0486,h1=0.1271,w2=0.0486,h2=0.1272,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_130 = Guide_channeled_tally(w1=0.0486,h1=0.1272,w2=0.0486,h2=0.1273,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_131 = Guide_channeled_tally(w1=0.0486,h1=0.1273,w2=0.0486,h2=0.1273,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_132 = Guide_channeled_tally(w1=0.0486,h1=0.1273,w2=0.0486,h2=0.1274,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_133 = Guide_channeled_tally(w1=0.0486,h1=0.1274,w2=0.0486,h2=0.1275,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_134 = Guide_channeled_tally(w1=0.0486,h1=0.1275,w2=0.0486,h2=0.1276,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_135 = Guide_channeled_tally(w1=0.0486,h1=0.1276,w2=0.0486,h2=0.1277,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_136 = Guide_channeled_tally(w1=0.0486,h1=0.1277,w2=0.0486,h2=0.1277,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_137 = Guide_channeled_tally(w1=0.0486,h1=0.1277,w2=0.0486,h2=0.1278,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_Guide1_138 = Guide_channeled_tally(w1=0.0486,h1=0.1278,w2=0.0486,h2=0.1279,
                      nslit=3,l=0.099922,d=0.0005,
                      mx=2.8,my=3.0,
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                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100063) RELATIVE PREVIOUS ROTATED (0.0000,0.0167,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_straight1 = Guide_channeled_tally(w1=0.0486,h1=0.1279,w2=0.0486,h2=0.1281,
                      nslit=1,l=0.232873,d=0.0005,
                      mx=2.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.100056) RELATIVE PREVIOUS ROTATED (0.0000,0.0000,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_straight2 = Guide_channeled_tally(w1=0.0486,h1=0.1281,w2=0.0486,h2=0.1282,
                      nslit=1,l=0.232873,d=0.0005,
                      mx=2.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.233000) RELATIVE PREVIOUS ROTATED (0.0000,0.0000,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_straight3 = Guide_channeled_tally(w1=0.0486,h1=0.1282,w2=0.0486,h2=0.1284,
                      nslit=1,l=0.232873,d=0.0005,
                      mx=2.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.233000) RELATIVE PREVIOUS ROTATED (0.0000,0.0000,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_straight4 = Guide_channeled_tally(w1=0.0486,h1=0.1284,w2=0.0486,h2=0.1285,
                      nslit=1,l=0.232873,d=0.0005,
                      mx=3.5,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.233000) RELATIVE PREVIOUS ROTATED (0.0000,0.0000,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_straight5 = Guide_channeled_tally(w1=0.0486,h1=0.1285,w2=0.0486,h2=0.1287,
                      nslit=1,l=0.232873,d=0.0005,
                      mx=3.5,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.233000) RELATIVE PREVIOUS ROTATED (0.0000,0.0000,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_straight6 = Guide_channeled_tally(w1=0.0486,h1=0.1287,w2=0.0486,h2=0.1288,
                      nslit=1,l=0.232873,d=0.0005,
                      mx=3.5,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.233000) RELATIVE PREVIOUS ROTATED (0.0000,0.0000,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_straight7 = Guide_channeled_tally(w1=0.0486,h1=0.1288,w2=0.0486,h2=0.1289,
                      nslit=1,l=0.232873,d=0.0005,
                      mx=3.5,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.233000) RELATIVE PREVIOUS ROTATED (0.0000,0.0000,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_straight8 = Guide_channeled_tally(w1=0.0486,h1=0.1289,w2=0.0486,h2=0.1290,
                      nslit=1,l=0.232873,d=0.0005,
                      mx=3.5,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.233000) RELATIVE PREVIOUS ROTATED (0.0000,0.0000,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_straight9 = Guide_channeled_tally(w1=0.0486,h1=0.1290,w2=0.0486,h2=0.1292,
                      nslit=1,l=0.232873,d=0.0005,
                      mx=3.5,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.233000) RELATIVE PREVIOUS ROTATED (0.0000,0.0000,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_straight10 = Guide_channeled_tally(w1=0.0486,h1=0.1292,w2=0.0486,h2=0.1293,
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                      nslit=1,l=0.232873,d=0.0005,
                      mx=3.5,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.233000) RELATIVE PREVIOUS ROTATED (0.0000,0.0000,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_straight11 = Guide_channeled_tally(w1=0.0486,h1=0.1293,w2=0.0486,h2=0.1294,
                      nslit=1,l=0.232873,d=0.0005,
                      mx=3.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.233000) RELATIVE PREVIOUS ROTATED (0.0000,0.0000,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_straight12 = Guide_channeled_tally(w1=0.0486,h1=0.1294,w2=0.0486,h2=0.1295,
                      nslit=1,l=0.232873,d=0.0005,
                      mx=3.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.233000) RELATIVE PREVIOUS ROTATED (0.0000,0.0000,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_straight13 = Guide_channeled_tally(w1=0.0486,h1=0.1295,w2=0.0486,h2=0.1295,
                      nslit=1,l=0.232873,d=0.0005,
                      mx=3.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.233000) RELATIVE PREVIOUS ROTATED (0.0000,0.0000,0.0) RELATIVE PREVIOUS
COMPONENT NeuB6_straight14 = Guide_channeled_tally(w1=0.0486,h1=0.1295,w2=0.0486,h2=0.1296,
                      nslit=1,l=0.232873,d=0.0005,
                      mx=3.8,my=3.0,
                     R0=0.99,Qc=0.029,W=0.002,alphax=3.577,alphay=3.196)
AT(0,0,0.233000) RELATIVE PREVIOUS ROTATED (0.0000,0.0000,0.0) RELATIVE PREVIOUS
COMPONENT Curve_End = Arm()
            AT(0.000000,0.000000,0.233000) RELATIVE PREVIOUS
//Both "Holes" that the guide system has to weave through
COMPONENT Bulkhead_Shield1 = Shape(geometry="./Bulkhead_Shield1.off" )
            AT ((.726-1.12)/2, 0, (16.47+16.22)/2) RELATIVE Pressure_Vessel_CL_Coordinate_Syste
COMPONENT Bulkhead_Shield2 = Shape(geometry="./Bulkhead_Shield2.off")
            AT ((0.78994+0.39878)/2, 0, (20.97024+20.8661)/2) RELATIVE Pressure_Vessel_CL_Coord
END
```

A.3 HORIZ_PARAB_U4.OFF

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OFF
# ellipse upstream of NVS
140 136 0
0.0243 0.0647875 0.0002
0.0243 -0.0647875 0.0002
-0.0243 -0.0647875 0.0002
-0.0243 0.0647875 0.0002
0.0242985 0.0647875 0.0502412
0.0242985 -0.0647875 0.0502412
-0.0242985 -0.0647875 0.0502412
-0.0242985 0.0647875 0.0502412
0.024294 0.0647956 0.100282
0.024294 -0.0647956 0.100282
-0.024294 -0.0647956 0.100282
```

```
-0.024294 0.0647956 0.100282
0.0242865 0.0648037 0.150324
0.0242865 -0.0648037 0.150324
-0.0242865 -0.0648037 0.150324
-0.0242865 0.0648037 0.150324
0.0242761 0.0648115 0.200365
0.0242761 -0.0648115 0.200365
-0.0242761 -0.0648115 0.200365
-0.0242761 0.0648115 0.200365
0.0242626 0.0648192 0.250406
0.0242626 -0.0648192 0.250406
-0.0242626 -0.0648192 0.250406
-0.0242626 0.0648192 0.250406
0.0242462 0.0648267 0.300447
0.0242462 -0.0648267 0.300447
-0.0242462 -0.0648267 0.300447
-0.0242462 0.0648267 0.300447
0.0242267 0.0648341 0.350488
0.0242267 -0.0648341 0.350488
-0.0242267 -0.0648341 0.350488
-0.0242267 0.0648341 0.350488
0.0242042 0.0648413 0.400529
0.0242042 -0.0648413 0.400529
-0.0242042 -0.0648413 0.400529
-0.0242042 0.0648413 0.400529
0.0241787 0.0648484 0.450571
0.0241787 -0.0648484 0.450571
-0.0241787 -0.0648484 0.450571
-0.0241787 0.0648484 0.450571
0.0241502 0.0648552 0.500612
0.0241502 -0.0648552 0.500612
-0.0241502 -0.0648552 0.500612
-0.0241502 0.0648552 0.500612
0.0241187 0.064862 0.550653
0.0241187 -0.064862 0.550653
-0.0241187 -0.064862 0.550653
-0.0241187 0.064862 0.550653
0.024084 0.0648685 0.600694
0.024084 -0.0648685 0.600694
-0.024084 -0.0648685 0.600694
-0.024084 0.0648685 0.600694
0.0240464 0.0648749 0.650735
0.0240464 -0.0648749 0.650735
-0.0240464 -0.0648749 0.650735
-0.0240464 0.0648749 0.650735
0.0240056 0.0648812 0.700776
0.0240056 -0.0648812 0.700776
-0.0240056 -0.0648812 0.700776
```

```
-0.0240056 0.0648812 0.700776
0.0239618 0.0648873 0.750818
0.0239618 -0.0648873 0.750818
-0.0239618 -0.0648873 0.750818
-0.0239618 0.0648873 0.750818
0.0239148 0.0648932 0.800859
0.0239148 -0.0648932 0.800859
-0.0239148 -0.0648932 0.800859
-0.0239148 0.0648932 0.800859
0.0238647 0.064899 0.8509
0.0238647 -0.064899 0.8509
-0.0238647 -0.064899 0.8509
-0.0238647 0.064899 0.8509
0.0238114 0.0649046 0.900941
0.0238114 -0.0649046 0.900941
-0.0238114 -0.0649046 0.900941
-0.0238114 0.0649046 0.900941
0.023755 0.06491 0.950982
0.023755 -0.06491 0.950982
-0.023755 -0.06491 0.950982
-0.023755 0.06491 0.950982
0.0236954 0.0649153 1.00102
0.0236954 -0.0649153 1.00102
-0.0236954 -0.0649153 1.00102
-0.0236954 0.0649153 1.00102
0.0236326 0.0649204 1.05106
0.0236326 -0.0649204 1.05106
-0.0236326 -0.0649204 1.05106
-0.0236326 0.0649204 1.05106
0.0235665 0.0649254 1.10111
0.0235665 -0.0649254 1.10111
-0.0235665 -0.0649254 1.10111
-0.0235665 0.0649254 1.10111
0.0234972 0.0649302 1.15115
0.0234972 -0.0649302 1.15115
-0.0234972 -0.0649302 1.15115
-0.0234972 0.0649302 1.15115
0.0234245 0.0649348 1.20119
0.0234245 -0.0649348 1.20119
-0.0234245 -0.0649348 1.20119
-0.0234245 0.0649348 1.20119
0.0233485 0.0649393 1.25123
0.0233485 -0.0649393 1.25123
-0.0233485 -0.0649393 1.25123
-0.0233485 0.0649393 1.25123
0.0232692 0.0649436 1.30127
0.0232692 -0.0649436 1.30127
-0.0232692 -0.0649436 1.30127
```

```
-0.0232692 0.0649436 1.30127
0.0231864 0.0649478 1.35131
0.0231864 -0.0649478 1.35131
-0.0231864 -0.0649478 1.35131
-0.0231864 0.0649478 1.35131
0.0231003 0.0649518 1.40135
0.0231003 -0.0649518 1.40135
-0.0231003 -0.0649518 1.40135
-0.0231003 0.0649518 1.40135
0.0230106 0.0649557 1.45139
0.0230106 -0.0649557 1.45139
-0.0230106 -0.0649557 1.45139
-0.0230106 0.0649557 1.45139
0.0229175 0.0649593 1.50144
0.0229175 -0.0649593 1.50144
-0.0229175 -0.0649593 1.50144
-0.0229175 0.0649593 1.50144
0.0228207 0.0649629 1.55148
0.0228207 -0.0649629 1.55148
-0.0228207 -0.0649629 1.55148
-0.0228207 0.0649629 1.55148
0.0227204 0.0649662 1.60152
0.0227204 -0.0649662 1.60152
-0.0227204 -0.0649662 1.60152
-0.0227204 0.0649662 1.60152
0.0226164 0.0649694 1.65156
0.0226164 -0.0649694 1.65156
-0.0226164 -0.0649694 1.65156
-0.0226164 0.0649694 1.65156
0.0225087 0.0649725 1.7016
0.0225087 -0.0649725 1.7016
-0.0225087 -0.0649725 1.7016
-0.0225087 0.0649725 1.7016
4 0 1 5 4 3.8 3.044 0.0025
4 1 2 6 5 2.8 3.044 0.0025
4 2 3 7 6 3.8 3.044 0.0025
4 3 0 4 7 2.8 3.044 0.0025
4 4 5 9 8 3.8 3.044 0.0025
4 5 6 10 9 2.8 3.044 0.0025
4 6 7 11 10 3.8 3.044 0.0025
4 7 4 8 11 2.8 3.044 0.0025
4 8 9 13 12 3.8 3.044 0.0025
4 9 10 14 13 2.8 3.044 0.0025
4 10 11 15 14 3.8 3.044 0.0025
4 11 8 12 15 2.8 3.044 0.0025
4 12 13 17 16 3.8 3.044 0.0025
4 13 14 18 17 2.8 3.044 0.0025
4 14 15 19 18 3.8 3.044 0.0025
```

```
4 15 12 16 19 2.8 3.044 0.0025
4 16 17 21 20 3.8 3.044 0.0025
4 17 18 22 21 2.8 3.044 0.0025
4 18 19 23 22 3.8 3.044 0.0025
4 19 16 20 23 2.8 3.044 0.0025
4 20 21 25 24 3.8 3.044 0.0025
4 21 22 26 25 2.8 3.044 0.0025
4 22 23 27 26 3.8 3.044 0.0025
4 23 20 24 27 2.8 3.044 0.0025
4 24 25 29 28 3.8 3.044 0.0025
4 25 26 30 29 2.8 3.044 0.0025
4 26 27 31 30 3.8 3.044 0.0025
4 27 24 28 31 2.8 3.044 0.0025
4 28 29 33 32 3.8 3.044 0.0025
4 29 30 34 33 2.8 3.044 0.0025
4 30 31 35 34 3.8 3.044 0.0025
4 31 28 32 35 2.8 3.044 0.0025
4 32 33 37 36 3.8 3.044 0.0025
4 33 34 38 37 2.8 3.044 0.0025
4 34 35 39 38 3.8 3.044 0.0025
4 35 32 36 39 2.8 3.044 0.0025
4 36 37 41 40 3.8 3.044 0.0025
4 37 38 42 41 2.8 3.044 0.0025
4 38 39 43 42 3.8 3.044 0.0025
4 39 36 40 43 2.8 3.044 0.0025
4 40 41 45 44 3.8 3.044 0.0025
4 41 42 46 45 2.8 3.044 0.0025
4 42 43 47 46 3.8 3.044 0.0025
4 43 40 44 47 2.8 3.044 0.0025
4 44 45 49 48 3.8 3.044 0.0025
4 45 46 50 49 2.8 3.044 0.0025
4 46 47 51 50 3.8 3.044 0.0025
4 47 44 48 51 2.8 3.044 0.0025
4 48 49 53 52 3.8 3.044 0.0025
4 49 50 54 53 2.8 3.044 0.0025
4 50 51 55 54 3.8 3.044 0.0025
4 51 48 52 55 2.8 3.044 0.0025
4 52 53 57 56 3.8 3.044 0.0025
4 53 54 58 57 2.8 3.044 0.0025
4 54 55 59 58 3.8 3.044 0.0025
4 55 52 56 59 2.8 3.044 0.0025
4 56 57 61 60 3.8 3.044 0.0025
4 57 58 62 61 2.8 3.044 0.0025
4 58 59 63 62 3.8 3.044 0.0025
4 59 56 60 63 2.8 3.044 0.0025
4 60 61 65 64 3.8 3.044 0.0025
4 61 62 66 65 2.8 3.044 0.0025
4 62 63 67 66 3.8 3.044 0.0025
```

```
4 63 60 64 67 2.8 3.044 0.0025
4 64 65 69 68 3.8 3.044 0.0025
4 65 66 70 69 2.8 3.044 0.0025
4 66 67 71 70 3.8 3.044 0.0025
4 67 64 68 71 2.8 3.044 0.0025
4 68 69 73 72 3.8 3.044 0.0025
4 69 70 74 73 2.8 3.044 0.0025
4 70 71 75 74 3.8 3.044 0.0025
4 71 68 72 75 2.8 3.044 0.0025
4 72 73 77 76 3.8 3.044 0.0025
4 73 74 78 77 2.8 3.044 0.0025
4 74 75 79 78 3.8 3.044 0.0025
4 75 72 76 79 2.8 3.044 0.0025
4 76 77 81 80 3.8 3.044 0.0025
4 77 78 82 81 2.8 3.044 0.0025
4 78 79 83 82 3.8 3.044 0.0025
4 79 76 80 83 2.8 3.044 0.0025
4 80 81 85 84 3.8 3.044 0.0025
4 81 82 86 85 2.8 3.044 0.0025
4 82 83 87 86 3.8 3.044 0.0025
4 83 80 84 87 2.8 3.044 0.0025
4 84 85 89 88 3.8 3.044 0.0025
4 85 86 90 89 2.8 3.044 0.0025
4 86 87 91 90 3.8 3.044 0.0025
4 87 84 88 91 2.8 3.044 0.0025
4 88 89 93 92 3.8 3.044 0.0025
4 89 90 94 93 2.8 3.044 0.0025
4 90 91 95 94 3.8 3.044 0.0025
4 91 88 92 95 2.8 3.044 0.0025
4 92 93 97 96 3.8 3.044 0.0025
4 93 94 98 97 2.8 3.044 0.0025
4 94 95 99 98 3.8 3.044 0.0025
4 95 92 96 99 2.8 3.044 0.0025
4 96 97 101 100 3.8 3.044 0.0025
4 97 98 102 101 2.8 3.044 0.0025
4 98 99 103 102 3.8 3.044 0.0025
4 99 96 100 103 2.8 3.044 0.0025
4 100 101 105 104 3.8 3.044 0.0025
4 101 102 106 105 2.8 3.044 0.0025
4 102 103 107 106 3.8 3.044 0.0025
4 103 100 104 107 2.8 3.044 0.0025
4 104 105 109 108 3.8 3.044 0.0025
4 105 106 110 109 2.8 3.044 0.0025
4 106 107 111 110 3.8 3.044 0.0025
4 107 104 108 111 2.8 3.044 0.0025
4 108 109 113 112 3.8 3.044 0.0025
4 109 110 114 113 2.8 3.044 0.0025
4 110 111 115 114 3.8 3.044 0.0025
```

```
4 111 108 112 115 2.8 3.044 0.0025
4 112 113 117 116 3.8 3.044 0.0025
4 113 114 118 117 2.8 3.044 0.0025
4 114 115 119 118 3.8 3.044 0.0025
4 115 112 116 119 2.8 3.044 0.0025
4 116 117 121 120 3.8 3.044 0.0025
4 117 118 122 121 2.8 3.044 0.0025
4 118 119 123 122 3.8 3.044 0.0025
4 119 116 120 123 2.8 3.044 0.0025
4 120 121 125 124 3.8 3.044 0.0025
4 121 122 126 125 2.8 3.044 0.0025
4 122 123 127 126 3.8 3.044 0.0025
4 123 120 124 127 2.8 3.044 0.0025
4 124 125 129 128 3.8 3.044 0.0025
4 125 126 130 129 2.8 3.044 0.0025
4 126 127 131 130 3.8 3.044 0.0025
4 127 124 128 131 2.8 3.044 0.0025
4 128 129 133 132 3.8 3.044 0.0025
4 129 130 134 133 2.8 3.044 0.0025
4 130 131 135 134 3.8 3.044 0.0025
4 131 128 132 135 2.8 3.044 0.0025
4 132 133 137 136 3.8 3.044 0.0025
4 133 134 138 137 2.8 3.044 0.0025
4 134 135 139 138 3.8 3.044 0.0025
4 135 132 136 139 2.8 3.044 0.0025
```

A.4 NB6_VS2VIRTSOURCE

```
/*******************************************************************************
* Instrument: <instrument name>
*
* %I
* Written by: <your name (email)>
* Date: <current date>
* Origin: <your institution>
* %INSTRUMENT_SITE: Templates
*
* <instrument short description>
*
* %D
* <instrument description>
*
* Example: <parameters=values>
*
* %P
* <parameter1>: [<unit>] <parameter1 description>
* ...
*
```

```
* %L
* <reference/HTML link>
*
* %E
*******************************************************************************/
DEFINE INSTRUMENT HFocusing(
ht2=1.0,VS_Flag=1,
exit_slit_wid=0.1,nvs_tilt=0.0)

DECLARE
%{

double gap_length;
double NVS_len;
double nvs_nu;
double nvs_nv;
double nvs_alpha;
double eguide2_start;

long mVal_init(char *valFile, double *valList)
{
 MPI_MASTER(
 printf("\n Loading m-values for all mirror faces from file: %s\n", valFile);
 );

 FILE *mF = fopen(valFile, "r");

 if (mF == NULL) {
 MPI_MASTER(
 printf("Error reading file: %s\n", valFile);
 exit(1);
 );
 } else {
 int        i =   0;
 int   face_i =   0;
 double value = 0.0;

 char word1[50], word2[50];
 while (!feof(mF) && (i <= 80)) {
 i++; // not starting with index 0...
 fscanf(mF, "%s %s", word1, word2);
 face_i = atoi(word1);
 value  = atof(word2);
 valList[face_i] = value;
 }
 }
 return(1);
}
```

```
%}

INITIALIZE
%{
// gap_length = Dist_cs2mono - H_radius;
gap_length = 5.513-0.9974;
NVS_len =0.306;
nvs_nv = sqrt(ei)*SE2V;
// eguide2_start = 2.669;
nvs_alpha = 22.05;
nvs_nu = nvs_nv*nvs_alpha/360.0/0.250;
printf("nvs_speed = %0.2g\n",nvs_nu);
if (nvs_nu > 471.667){
nvs_nu = 471.667;
printf("Warning Ei is above optimimum for max velocity selector speed\n");
}

// BS_length = 0.125;

%}

TRACE
// Uses arm NeuB6_Coordinate_System_2 and generates arm NeuB6_Coordinate_System_3
// insert components here (e.g. Insert -> Source -> ...)


/* Create a new coordinate system at the center of the beam in the velocity selector */

COMPONENT NB6_VS_BeamCenter_CSYS = Arm()
AT (0.0, 0.0, gap_length-2.810+.05+0.125+.015+.01) RELATIVE Curve_End
ROTATED (0.0,0.0,0.0) RELATIVE Curve_End

%include "NB6_VS_Monitors.instr"

COMPONENT NB6_secondary_shutter = Shape(zdepth=0.020,xwidth=0.125,yheight=0.254)
AT (0,0,-0.175-0.012) RELATIVE NB6_VS_BeamCenter_CSYS

COMPONENT NB6_VS_Tilt_CSYS = Arm()
AT (0.0, 0.0, 0) RELATIVE NB6_VS_BeamCenter_CSYS
ROTATED (0,nvs_tilt,0) RELATIVE NB6_VS_BeamCenter_CSYS


//used to clock the VS around the beam.
COMPONENT NB6_VS_Clock_CSYS = Arm()
AT (0,0,-0.125-0.022) RELATIVE NB6_VS_Tilt_CSYS
ROTATED (0,0,90) RELATIVE NB6_VS_Tilt_CSYS

COMPONENT NB6_VS_housing = Shape(radius = 0.185,yheight=0.310)
```

```
AT (0,-0.12,0.125+0.02) RELATIVE NB6_VS_Clock_CSYS
ROTATED (90,0,0) RELATIVE NB6_VS_Clock_CSYS
// Put chopper or guide section in beam depending on VS_Flag
// radius of the rotor is radius + ymax
COMPONENT NB6_VS = Selector(ymin=-0.0225,ymax=0.0225,xmin=-0.065,xmax=0.065,
                               nslit=36,d=4e-4,alpha=nvs_alpha,length=0.250,radius=0.12,
   nu=nvs_nu)
WHEN (VS_Flag==1)
AT(0,0,0) RELATIVE NB6_VS_Clock_CSYS

COMPONENT NB6_VS_Guide = Guide_channeled(w1=0.135,h1=0.045,h2=0.045,w2=0.135,
l=0.250,
R0 = 0.99, Qc = 0.0219, alphax = 3.577, alphay = 3.196,
mx=0, my=0)
WHEN (VS_Flag==0)
AT(0,0,0) RELATIVE NB6_VS_Clock_CSYS

COMPONENT NB6_PostVSGuide_CSYS = Arm()
AT (0,0,gap_length-2.43) RELATIVE Curve_End

COMPONENT NB6_PostVSGuide_mcpl=MCPL_output(filename="NB6_After_VS",polarisationuse=1)
AT (0,0,-0.001) RELATIVE NB6_PostVSGuide_CSYS

COMPONENT NeuB6_Post_NVS = Guide_anyshape_r_tally(geometry="./Horiz_parab5.off",Qc=0.0219, R0=
AT (0.0, 0.0,0.00) RELATIVE NB6_PostVSGuide_CSYS

COMPONENT exit_slit = Slit(xwidth = exit_slit_wid, yheight=ht2)
AT (0.0, 0.0, gap_length+1e-5) RELATIVE Curve_End

COMPONENT NB6_VirtualSource_CSYS = Arm()
  AT (0.0, 0.0, gap_length+2e-5) RELATIVE Curve_End

END
```

A.4.1 NB6_VS_Monitors

```
/*******************************************************************************
*         McStas instrument definition URL=http://www.mcstas.org
*
* Instrument: Baseline NB6 at velocity selector
*
* %Identification
* Written by: Garrett Granroth
* Date Created: 15Feb2025
* Date Modified: 1
* Origin: ORNL
* %INSTRUMENT_SITE: ORNL
*
```

```
* %Description
* monitors at the velocity selector location
* %Parameters
*
* %Link
*
* %End
*******************************************************************************/

DEFINE INSTRUMENT NB6_VS_Monitors()
DECLARE
%{
%}

INITIALIZE
%{
%}

TRACE

//***********************************************************************************************

/* Put in some monitors to see if the beam exiting the CG4 guide makes sense */
COMPONENT NB6_VS_Flux = Monitor(xwidth = 0.2, yheight = 0.2)
  AT (0.0, 0.0, -0.165) RELATIVE NB6_VS_BeamCenter_CSYS

COMPONENT NB6_VS_Image = PSD_monitor(nx = 100, ny = 100, filename = "NB6_VS_image.dat", xmin =
  AT (0.0, 0.0, -0.165) RELATIVE NB6_VS_BeamCenter_CSYS

COMPONENT NB6_VS_Spectrum = L_monitor(nL = 200, filename = "NB6_VS_spectrum.dat", xmin = -0.2,
   AT (0.0, 0.0, -0.165) RELATIVE NB6_VS_BeamCenter_CSYS

COMPONENT NB6_VS_Div_Map = Divergence_monitor(nh = 40, nv = 40,
                           filename="NB6_VS_Div_map.dat",
                           xwidth = 0.2, yheight = 0.2, maxdiv_h = 2.0, maxdiv_v = 2.0)
   AT (0.0, 0.0, -0.165) RELATIVE NB6_VS_BeamCenter_CSYS

COMPONENT NB6_VS_H_Div_Map = DivPos_monitor(nb = 251, ndiv = 251, filename="NB6_VS_H_phase_spac
                             xwidth = 0.25, yheight = 0.25, maxdiv = 2.0)
   AT (0.0, 0.0, -0.165) RELATIVE NB6_VS_BeamCenter_CSYS

COMPONENT NB6_VS_V_Div_Map = Monitor_nD(xwidth = 0.25, yheight = 0.25, restore_neutron=1,
                             filename="NB6_VS_V_phase_space_map.dat",
                             options="square y limits=[-0.125,0.125] bins=251, ydiv limits=[-3
  AT (0.0, 0.0, -0.165) RELATIVE NB6_VS_BeamCenter_CSYS


END
```

A.4.2 Horiz_parab5.off

```
OFF
# ellipse downstream of NVS
184 180 0
0.021553 0.065 0
0.021553 -0.065 0
-0.021553 -0.065 0
-0.021553 0.065 0
0.0214094 0.065 0.0504444
0.0214094 -0.065 0.0504444
-0.0214094 -0.065 0.0504444
-0.0214094 0.065 0.0504444
0.0212615 0.0650442 0.100889
0.0212615 -0.0650442 0.100889
-0.0212615 -0.0650442 0.100889
-0.0212615 0.0650442 0.100889
0.0211089 0.0650884 0.151333
0.0211089 -0.0650884 0.151333
-0.0211089 -0.0650884 0.151333
-0.0211089 0.0650884 0.151333
0.0209518 0.0651326 0.201778
0.0209518 -0.0651326 0.201778
-0.0209518 -0.0651326 0.201778
-0.0209518 0.0651326 0.201778
0.02079 0.0651769 0.252222
0.02079 -0.0651769 0.252222
-0.02079 -0.0651769 0.252222
-0.02079 0.0651769 0.252222
0.0206233 0.0652211 0.302667
0.0206233 -0.0652211 0.302667
-0.0206233 -0.0652211 0.302667
-0.0206233 0.0652211 0.302667
0.0204516 0.0652653 0.353111
0.0204516 -0.0652653 0.353111
-0.0204516 -0.0652653 0.353111
-0.0204516 0.0652653 0.353111
0.0202748 0.0653095 0.403556
0.0202748 -0.0653095 0.403556
-0.0202748 -0.0653095 0.403556
-0.0202748 0.0653095 0.403556
0.0200929 0.0653537 0.454
0.0200929 -0.0653537 0.454
-0.0200929 -0.0653537 0.454
-0.0200929 0.0653537 0.454
0.0199055 0.0653979 0.504444
0.0199055 -0.0653979 0.504444
```

-0.0199055 -0.0653979 0.504444
-0.0199055 0.0653979 0.504444
0.0197127 0.0654422 0.554889
0.0197127 -0.0654422 0.554889
-0.0197127 -0.0654422 0.554889
-0.0197127 0.0654422 0.554889
0.0195141 0.0654864 0.605333
0.0195141 -0.0654864 0.605333
-0.0195141 -0.0654864 0.605333
-0.0195141 0.0654864 0.605333
0.0193097 0.0655306 0.655778
0.0193097 -0.0655306 0.655778
-0.0193097 -0.0655306 0.655778
-0.0193097 0.0655306 0.655778
0.0190993 0.0655748 0.706222
0.0190993 -0.0655748 0.706222
-0.0190993 -0.0655748 0.706222
-0.0190993 0.0655748 0.706222
0.0188826 0.065619 0.756667
0.0188826 -0.065619 0.756667
-0.0188826 -0.065619 0.756667
-0.0188826 0.065619 0.756667
0.0186595 0.0656632 0.807111
0.0186595 -0.0656632 0.807111
-0.0186595 -0.0656632 0.807111
-0.0186595 0.0656632 0.807111
0.0184296 0.0657074 0.857556
0.0184296 -0.0657074 0.857556
-0.0184296 -0.0657074 0.857556
-0.0184296 0.0657074 0.857556
0.0181928 0.0657517 0.908
0.0181928 -0.0657517 0.908
-0.0181928 -0.0657517 0.908
-0.0181928 0.0657517 0.908
0.0179488 0.0657959 0.958444
0.0179488 -0.0657959 0.958444
-0.0179488 -0.0657959 0.958444
-0.0179488 0.0657959 0.958444
0.0176972 0.0658401 1.00889
0.0176972 -0.0658401 1.00889
-0.0176972 -0.0658401 1.00889
-0.0176972 0.0658401 1.00889
0.0174378 0.0658843 1.05933
0.0174378 -0.0658843 1.05933
-0.0174378 -0.0658843 1.05933
-0.0174378 0.0658843 1.05933
0.0171702 0.0659285 1.10978
0.0171702 -0.0659285 1.10978

```
-0.0171702 -0.0659285 1.10978
-0.0171702 0.0659285 1.10978
0.016894 0.0659727 1.16022
0.016894 -0.0659727 1.16022
-0.016894 -0.0659727 1.16022
-0.016894 0.0659727 1.16022
0.0166087 0.0660169 1.21067
0.0166087 -0.0660169 1.21067
-0.0166087 -0.0660169 1.21067
-0.0166087 0.0660169 1.21067
0.016314 0.0660612 1.26111
0.016314 -0.0660612 1.26111
-0.016314 -0.0660612 1.26111
-0.016314 0.0660612 1.26111
0.0160092 0.0661054 1.31156
0.0160092 -0.0661054 1.31156
-0.0160092 -0.0661054 1.31156
-0.0160092 0.0661054 1.31156
0.0156938 0.0661496 1.362
0.0156938 -0.0661496 1.362
-0.0156938 -0.0661496 1.362
-0.0156938 0.0661496 1.362
0.0153672 0.0661938 1.41244
0.0153672 -0.0661938 1.41244
-0.0153672 -0.0661938 1.41244
-0.0153672 0.0661938 1.41244
0.0150285 0.066238 1.46289
0.0150285 -0.066238 1.46289
-0.0150285 -0.066238 1.46289
-0.0150285 0.066238 1.46289
0.0146771 0.0662822 1.51333
0.0146771 -0.0662822 1.51333
-0.0146771 -0.0662822 1.51333
-0.0146771 0.0662822 1.51333
0.0143118 0.0663265 1.56378
0.0143118 -0.0663265 1.56378
-0.0143118 -0.0663265 1.56378
-0.0143118 0.0663265 1.56378
0.0139317 0.0663707 1.61422
0.0139317 -0.0663707 1.61422
-0.0139317 -0.0663707 1.61422
-0.0139317 0.0663707 1.61422
0.0135355 0.0664149 1.66467
0.0135355 -0.0664149 1.66467
-0.0135355 -0.0664149 1.66467
-0.0135355 0.0664149 1.66467
0.0131217 0.0664591 1.71511
0.0131217 -0.0664591 1.71511
```

```
-0.0131217 -0.0664591 1.71511
-0.0131217 0.0664591 1.71511
0.0126887 0.0665033 1.76556
0.0126887 -0.0665033 1.76556
-0.0126887 -0.0665033 1.76556
-0.0126887 0.0665033 1.76556
0.0122342 0.0665475 1.816
0.0122342 -0.0665475 1.816
-0.0122342 -0.0665475 1.816
-0.0122342 0.0665475 1.816
0.011756 0.0665917 1.86644
0.011756 -0.0665917 1.86644
-0.011756 -0.0665917 1.86644
-0.011756 0.0665917 1.86644
0.011251 0.066636 1.91689
0.011251 -0.066636 1.91689
-0.011251 -0.066636 1.91689
-0.011251 0.066636 1.91689
0.0107153 0.0666802 1.96733
0.0107153 -0.0666802 1.96733
-0.0107153 -0.0666802 1.96733
-0.0107153 0.0666802 1.96733
0.0101441 0.0667244 2.01778
0.0101441 -0.0667244 2.01778
-0.0101441 -0.0667244 2.01778
-0.0101441 0.0667244 2.01778
0.00953106 0.0667686 2.06822
0.00953106 -0.0667686 2.06822
-0.00953106 -0.0667686 2.06822
-0.00953106 0.0667686 2.06822
0.00886746 0.0668128 2.11867
0.00886746 -0.0668128 2.11867
-0.00886746 -0.0668128 2.11867
-0.00886746 0.0668128 2.11867
0.00814096 0.066857 2.16911
0.00814096 -0.066857 2.16911
-0.00814096 -0.066857 2.16911
-0.00814096 0.066857 2.16911
0.00733289 0.0669012 2.21956
0.00733289 -0.0669012 2.21956
-0.00733289 -0.0669012 2.21956
-0.00733289 0.0669012 2.21956
0.00641248 0.0669455 2.27
0.00641248 -0.0669455 2.27
-0.00641248 -0.0669455 2.27
-0.00641248 0.0669455 2.27
4 0 1 5 4 3.8 3.044 0.0025
4 1 2 6 5 2.8 3.044 0.0025
```

```
4 2 3 7 6 3.8 3.044 0.0025
4 3 0 4 7 2.8 3.044 0.0025
4 4 5 9 8 3.8 3.044 0.0025
4 5 6 10 9 2.8 3.044 0.0025
4 6 7 11 10 3.8 3.044 0.0025
4 7 4 8 11 2.8 3.044 0.0025
4 8 9 13 12 3.8 3.044 0.0025
4 9 10 14 13 2.8 3.044 0.0025
4 10 11 15 14 3.8 3.044 0.0025
4 11 8 12 15 2.8 3.044 0.0025
4 12 13 17 16 3.8 3.044 0.0025
4 13 14 18 17 2.8 3.044 0.0025
4 14 15 19 18 3.8 3.044 0.0025
4 15 12 16 19 2.8 3.044 0.0025
4 16 17 21 20 3.8 3.044 0.0025
4 17 18 22 21 2.8 3.044 0.0025
4 18 19 23 22 3.8 3.044 0.0025
4 19 16 20 23 2.8 3.044 0.0025
4 20 21 25 24 3.8 3.044 0.0025
4 21 22 26 25 2.8 3.044 0.0025
4 22 23 27 26 3.8 3.044 0.0025
4 23 20 24 27 2.8 3.044 0.0025
4 24 25 29 28 3.8 3.044 0.0025
4 25 26 30 29 2.8 3.044 0.0025
4 26 27 31 30 3.8 3.044 0.0025
4 27 24 28 31 2.8 3.044 0.0025
4 28 29 33 32 3.8 3.044 0.0025
4 29 30 34 33 2.8 3.044 0.0025
4 30 31 35 34 3.8 3.044 0.0025
4 31 28 32 35 2.8 3.044 0.0025
4 32 33 37 36 3.8 3.044 0.0025
4 33 34 38 37 2.8 3.044 0.0025
4 34 35 39 38 4.5 3.044 0.0025
4 35 32 36 39 2.8 3.044 0.0025
4 36 37 41 40 4.5 3.044 0.0025
4 37 38 42 41 2.8 3.044 0.0025
4 38 39 43 42 4.5 3.044 0.0025
4 39 36 40 43 2.8 3.044 0.0025
4 40 41 45 44 4.5 3.044 0.0025
4 41 42 46 45 2.8 3.044 0.0025
4 42 43 47 46 4.5 3.044 0.0025
4 43 40 44 47 2.8 3.044 0.0025
4 44 45 49 48 4.5 3.044 0.0025
4 45 46 50 49 2.8 3.044 0.0025
4 46 47 51 50 4.5 3.044 0.0025
4 47 44 48 51 2.8 3.044 0.0025
4 48 49 53 52 4.5 3.044 0.0025
4 49 50 54 53 2.8 3.044 0.0025
```

```
4 50 51 55 54 4.5 3.044 0.0025
4 51 48 52 55 2.8 3.044 0.0025
4 52 53 57 56 4.5 3.044 0.0025
4 53 54 58 57 2.8 3.044 0.0025
4 54 55 59 58 4.5 3.044 0.0025
4 55 52 56 59 2.8 3.044 0.0025
4 56 57 61 60 4.5 3.044 0.0025
4 57 58 62 61 2.8 3.044 0.0025
4 58 59 63 62 4.5 3.044 0.0025
4 59 56 60 63 2.8 3.044 0.0025
4 60 61 65 64 4.5 3.044 0.0025
4 61 62 66 65 2.8 3.044 0.0025
4 62 63 67 66 4.5 3.044 0.0025
4 63 60 64 67 2.8 3.044 0.0025
4 64 65 69 68 4.5 3.044 0.0025
4 65 66 70 69 2.8 3.044 0.0025
4 66 67 71 70 4.5 3.044 0.0025
4 67 64 68 71 2.8 3.044 0.0025
4 68 69 73 72 4.5 3.044 0.0025
4 69 70 74 73 2.8 3.044 0.0025
4 70 71 75 74 4.5 3.044 0.0025
4 71 68 72 75 2.8 3.044 0.0025
4 72 73 77 76 4.5 3.044 0.0025
4 73 74 78 77 2.8 3.044 0.0025
4 74 75 79 78 4.5 3.044 0.0025
4 75 72 76 79 2.8 3.044 0.0025
4 76 77 81 80 4.5 3.044 0.0025
4 77 78 82 81 2.8 3.044 0.0025
4 78 79 83 82 5 3.044 0.0025
4 79 76 80 83 2.8 3.044 0.0025
4 80 81 85 84 5 3.044 0.0025
4 81 82 86 85 2.8 3.044 0.0025
4 82 83 87 86 5 3.044 0.0025
4 83 80 84 87 2.8 3.044 0.0025
4 84 85 89 88 5 3.044 0.0025
4 85 86 90 89 2.8 3.044 0.0025
4 86 87 91 90 5 3.044 0.0025
4 87 84 88 91 2.8 3.044 0.0025
4 88 89 93 92 5 3.044 0.0025
4 89 90 94 93 2.8 3.044 0.0025
4 90 91 95 94 5 3.044 0.0025
4 91 88 92 95 2.8 3.044 0.0025
4 92 93 97 96 5 3.044 0.0025
4 93 94 98 97 2.8 3.044 0.0025
4 94 95 99 98 5 3.044 0.0025
4 95 92 96 99 2.8 3.044 0.0025
4 96 97 101 100 5 3.044 0.0025
4 97 98 102 101 2.8 3.044 0.0025
```

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4 98 99 103 102 5 3.044 0.0025
4 99 96 100 103 2.8 3.044 0.0025
4 100 101 105 104 5 3.044 0.0025
4 101 102 106 105 2.8 3.044 0.0025
4 102 103 107 106 5.5 3.044 0.0025
4 103 100 104 107 2.8 3.044 0.0025
4 104 105 109 108 5.5 3.044 0.0025
4 105 106 110 109 2.8 3.044 0.0025
4 106 107 111 110 5.5 3.044 0.0025
4 107 104 108 111 2.8 3.044 0.0025
4 108 109 113 112 5.5 3.044 0.0025
4 109 110 114 113 2.8 3.044 0.0025
4 110 111 115 114 5.5 3.044 0.0025
4 111 108 112 115 2.8 3.044 0.0025
4 112 113 117 116 5.5 3.044 0.0025
4 113 114 118 117 2.8 3.044 0.0025
4 114 115 119 118 5.5 3.044 0.0025
4 115 112 116 119 2.8 3.044 0.0025
4 116 117 121 120 5.5 3.044 0.0025
4 117 118 122 121 2.8 3.044 0.0025
4 118 119 123 122 5.5 3.044 0.0025
4 119 116 120 123 2.8 3.044 0.0025
4 120 121 125 124 5.5 3.044 0.0025
4 121 122 126 125 2.8 3.044 0.0025
4 122 123 127 126 5.5 3.044 0.0025
4 123 120 124 127 2.8 3.044 0.0025
4 124 125 129 128 5.5 3.044 0.0025
4 125 126 130 129 2.8 3.044 0.0025
4 126 127 131 130 5.5 3.044 0.0025
4 127 124 128 131 2.8 3.044 0.0025
4 128 129 133 132 5.5 3.044 0.0025
4 129 130 134 133 2.8 3.044 0.0025
4 130 131 135 134 5.5 3.044 0.0025
4 131 128 132 135 2.8 3.044 0.0025
4 132 133 137 136 5.5 3.044 0.0025
4 133 134 138 137 2.8 3.044 0.0025
4 134 135 139 138 5.5 3.044 0.0025
4 135 132 136 139 2.8 3.044 0.0025
4 136 137 141 140 5.5 3.044 0.0025
4 137 138 142 141 2.8 3.044 0.0025
4 138 139 143 142 5.5 3.044 0.0025
4 139 136 140 143 2.8 3.044 0.0025
4 140 141 145 144 5.5 3.044 0.0025
4 141 142 146 145 2.8 3.044 0.0025
4 142 143 147 146 7 3.044 0.0025
4 143 140 144 147 2.8 3.044 0.0025
4 144 145 149 148 7 3.044 0.0025
4 145 146 150 149 2.8 3.044 0.0025
```

```
4 146 147 151 150 7 3.044 0.0025
4 147 144 148 151 2.8 3.044 0.0025
4 148 149 153 152 7 3.044 0.0025
4 149 150 154 153 2.8 3.044 0.0025
4 150 151 155 154 7 3.044 0.0025
4 151 148 152 155 2.8 3.044 0.0025
4 152 153 157 156 7 3.044 0.0025
4 153 154 158 157 2.8 3.044 0.0025
4 154 155 159 158 7 3.044 0.0025
4 155 152 156 159 2.8 3.044 0.0025
4 156 157 161 160 7 3.044 0.0025
4 157 158 162 161 2.8 3.044 0.0025
4 158 159 163 162 7 3.044 0.0025
4 159 156 160 163 2.8 3.044 0.0025
4 160 161 165 164 7 3.044 0.0025
4 161 162 166 165 2.8 3.044 0.0025
4 162 163 167 166 7 3.044 0.0025
4 163 160 164 167 2.8 3.044 0.0025
4 164 165 169 168 7 3.044 0.0025
4 165 166 170 169 2.8 3.044 0.0025
4 166 167 171 170 7 3.044 0.0025
4 167 164 168 171 2.8 3.044 0.0025
4 168 169 173 172 7 3.044 0.0025
4 169 170 174 173 2.8 3.044 0.0025
4 170 171 175 174 7 3.044 0.0025
4 171 168 172 175 2.8 3.044 0.0025
4 172 173 177 176 7 3.044 0.0025
4 173 174 178 177 2.8 3.044 0.0025
4 174 175 179 178 7 3.044 0.0025
4 175 172 176 179 2.8 3.044 0.0025
4 176 177 181 180 7 3.044 0.0025
4 177 178 182 181 2.8 3.044 0.0025
4 178 179 183 182 7 3.044 0.0025
4 179 176 180 183 2.8 3.044 0.0025
```

A.5 NB6_VIRTUALSOURCEMONITORS

```
/*******************************************************************************
*         McStas instrument definition URL=http://www.mcstas.org
*
* Instrument: Baseline NB6 curved guide and short straight section
*
* %Identification
* Written by: Lee Robertson (robertsonjl@ornl.gov) mod by B Winn
* Date Created: 28may2018
* Date Modified: 12aug2019
* Origin: ORNL
* %INSTRUMENT_SITE: ORNL
```

```
*
* %Description
* Model of the new guide for the NB6 beamline, formerly CG-1 beamline
* %Parameters
*
* %Link
*
* %End
*******************************************************************************/

DEFINE INSTRUMENT NB6_VirtualSourceMonitors()
DECLARE
%{
%}

INITIALIZE
%{
%}

TRACE

//*********************************************************************************************

/* Put in some monitors to see if the beam exiting the CG4 guide makes sense */
COMPONENT NB6_VirtSource_Flux = Monitor(xwidth = 0.2, yheight = 0.2)
  AT (0.0, 0.0, 0.0) RELATIVE NB6_VirtualSource_CSYS

COMPONENT NB6_VirtSource_Image = PSD_monitor(nx = 200, ny = 400, filename = "NB6_VirtSource_ima
  AT (0.0, 0.0, 0.0) RELATIVE NB6_VirtualSource_CSYS

COMPONENT NB6_VirtSource_Spectrum = L_monitor(nL = 200, filename = "NB6_VirtSource_spectrum", x
  AT (0.0, 0.0, 0.0) RELATIVE NB6_VirtualSource_CSYS

COMPONENT NB6_VirtSource_Vertical_Divergence = Monitor_nD(filename="NB6_VirtSource_vertical_div
xwidth = 0.2, yheight = 0.2,
options="square wavelength limits=[0,10] bins=101, ydiv limits=[-2.5,2.5] bins=101 ")
AT (0.0, 0.0, 0.0) RELATIVE NB6_VirtualSource_CSYS


COMPONENT NB6_VirtSource_Horizontal_Divergence = Monitor_nD(filename="NB6_VirtSource_horizontal
xwidth = 0.2, yheight = 0.2,
options = "square wavelength limits=[0,10] bins = 101, xdiv limits=[-4,4] bins=161" )
  AT (0.0, 0.0, 0.0) RELATIVE NB6_VirtualSource_CSYS

COMPONENT NB6_VirtSource_Divergence_Map = Divergence_monitor(nh = 160, nv = 80,
                                          filename="NB6_VirtSource_divergence_map", xwidth = 0
                                          maxdiv_h = 4.0, maxdiv_v = 2.0)
  AT (0.0, 0.0, 0.0) RELATIVE NB6_VirtualSource_CSYS
```

```
COMPONENT NB6_VirtSource_Horizontal_Phase_Space_Map = DivPos_monitor(nb = 121, ndiv = 251,
                                filename="NB6_VirtSource_horizontal_phase_space_map",
                                xwidth = 0.06, yheight = 0.25, maxdiv = 4.0)
  AT (0.0, 0.0, 0.0) RELATIVE NB6_VirtualSource_CSYS


COMPONENT NB6_VirtSource_Vertical_Phase_Space_Map = Monitor_nD(
xwidth=0.2, yheight = 0.5, restore_neutron=1, filename="NB6_VirtSource_vertical_phase_space_map
options="square, y limits=[-0.2,0.2] bins=201, ydiv limits =[-2,2] bins=251"
)
AT (0.0, 0.0, 0.0) RELATIVE NB6_VirtualSource_CSYS


END
```

A.6 NB6_VIRTUALSOURCE2MONO

```
/********************************************************************************
* Instrument: NB6_VirtualSource2Mono
*
* %I
* Written by: G. E. Granroth (granrothge@ornl.gov)
* Date: March 4, 2025
* Origin: ORNL
* %INSTRUMENT_SITE: Templates
*
* Components between the Velocity Selector and the Monochromator
*
* %D
* instrument description
*
* Example: parameters=values
*
* %P
* Par1: [unit] Parameter1 description
*
* %L
* <reference/HTML link>
*
* %E
*******************************************************************************/
DEFINE INSTRUMENT NB6_VirtualSource2Mono()

DECLARE
%{
%}
```

```
USERVARS
%{
%}

INITIALIZE
%{
%}

TRACE

COMPONENT origin = Progress_bar()
AT (0, 0, 0) RELATIVE ABSOLUTE
COMPONENT NB6_Incident_SF_CSYS = Arm()
AT(0,0,0.2) RELATIVE NB6_VirtualSource_CSYS
COMPONENT NB6_Incident_SF_Image = PSD_monitor(nx = 200, ny = 400, filename = "NB6_Incident_SF_
xmin = -.05, xmax = .05, ymin = -.1, ymax = .1)
AT (0.0, 0.0, 0.0) RELATIVE NB6_Incident_SF_CSYS




END
```

A.7 NB6_MONOROWLANDSYMMETRICDOUBLEFOCUS

```
/*******************************************************************************
* Instrument: <instrument name>
*
* %I
* Written by: <your name (email)>
* Date: <current date>
* Origin: <your institution>
* %INSTRUMENT_SITE: Templates
*
* <instrument short description>
*
* %D
* <instrument description>
*
* Example: <parameters=values>
*
* %P
* <parameter1>: [<unit>] <parameter1 description>
* ...
*
* %L
* <reference/HTML link>
*
```

```
* %E
*******************************************************************************/
DEFINE INSTRUMENT MonoRowlandSymmetricDoubleFocus(double n_cryst_w=21, mos=27, mono_y=-0.007,
                                                  string refl_file="Refl_files/mos_27_R0vsk.t

DECLARE
%{
double theta;
double thetarad;
double HMon_radius, VMon_radius;
double wl;
double V_radius;
double H_radius;
%}

INITIALIZE
%{
H_radius = 1.6; // Distance from virtual source to monochromator
V_radius = H_radius;
wl = sqrt(81.81/ei);
thetarad =asin(wl*1.8734/4/PI);
theta = RAD2DEG*thetarad;
HMon_radius = V_radius/sin(thetarad);
//HMon_radius = V_radius/sin(theta)/2;
// 6.79 m is the effective source to monocoromator distance for equation
// 3.12 from Shirane, Shapiro and Tranquada
VMon_radius = 2*V_radius*6.79*sin(thetarad)/(V_radius+6.79);
printf("H focusing radius %g\n",HMon_radius);
printf("V focusing radius %g\n",VMon_radius);
printf("Theta at mono %g\n", theta);
%}

TRACE
// Uses arm NeuB6_Coordinate_System_3
// insert components here (e.g. Insert -> Source -> ...)

// Default reflection is PG002 Q=1.8734

// Arm for Monitors in front of Monochromators.

COMPONENT NB6_Monochromator_CSYS=Arm()
AT (0, 0, H_radius) RELATIVE NB6_VirtualSource_CSYS
ROTATED (0.31243,theta,0) RELATIVE NB6_VirtualSource_CSYS

COMPONENT monochromator_curved = Monochromator_curved(
    zwidth = 0.015, yheight = 0.015,
    NH =  n_cryst_w,NV = 11,
    RV = VMon_radius, RH = HMon_radius,
```

```
    mosaich=mos, mosaicv=mos, reflect=refl_file)
AT (0, mono_y, 0) RELATIVE NB6_Monochromator_CSYS
ROTATED (0.00,0,0) RELATIVE NB6_Monochromator_CSYS

COMPONENT NeuB6_Coordinate_System_4= Arm()
AT (0, 0, H_radius) RELATIVE NB6_VirtualSource_CSYS
ROTATED (0.31243,2*theta,0) RELATIVE NB6_VirtualSource_CSYS


END
```

A.8 NB6_SAMPLEMONITORS

```
/*******************************************************************************
* Instrument: <instrument name>
*
* %I
* Written by: <your name (email)>
* Date: <current date>
* Origin: <your institution>
* %INSTRUMENT_SITE: Templates
*
* <instrument short description>
*
* %D
* <instrument description>
*
* Example: <parameters=values>
*
* %P
* <parameter1>: [<unit>] <parameter1 description>
* ...
*
* %L
* <reference/HTML link>
*
* %E
*******************************************************************************/

DEFINE INSTRUMENT NB6_SampleMonitors()
DECLARE
%{
char *f_s_prefix;
char *f_name_s_Image;
char *f_name_s_Spectrum;
char *f_name_s_VDiv;
char *f_name_s_HDiv;
char *f_name_s_Divmon;
char *f_name_s_H_acc;
```

```
char *f_name_s_V_acc;
char *f_name_s_H_lambda;
%}

INITIALIZE
%{
f_s_prefix = malloc(50*sizeof(char));
f_name_s_Image = malloc(100*sizeof(char));
f_name_s_Spectrum = malloc(100*sizeof(char));
f_name_s_VDiv = malloc(100*sizeof(char));
f_name_s_HDiv = malloc(100*sizeof(char));
f_name_s_Divmon = malloc(100*sizeof(char));
f_name_s_H_acc = malloc(100*sizeof(char));
f_name_s_V_acc = malloc(100*sizeof(char));
f_name_s_H_lambda = malloc(100*sizeof(char));

f_s_prefix = "Sample";
sprintf(f_name_s_Image,"NB6_%s_image.dat",f_s_prefix);
sprintf(f_name_s_Spectrum,"NB6_%s_spectrum.dat",f_s_prefix);
sprintf(f_name_s_VDiv,"NB6_%s_vertical_divergence.dat",f_s_prefix);
sprintf(f_name_s_HDiv,"NB6_%s_horizontal_divergence.dat",f_s_prefix);
sprintf(f_name_s_Divmon,"NB6_%s_divergence_map.dat",f_s_prefix);
sprintf(f_name_s_H_acc,"NB6_%s_horizontal_phase_space_map.dat",f_s_prefix);
sprintf(f_name_s_V_acc,"NB6_%s_vertical_phase_space_map.dat",f_s_prefix);
sprintf(f_name_s_H_lambda,"NB6_%s_H_lambda_map.dat",f_s_prefix);
%}

TRACE

//********************************************************************************************

/* Put in some monitors to see if the beam exiting the CG4 guide makes sense */

COMPONENT NeuB6_Sample_Flux = Monitor(xwidth = 0.25, yheight = 0.25)
  AT (0.0, 0.0, V_radius) RELATIVE NeuB6_Coordinate_System_4

COMPONENT NeuB6_Sample_Image = PSD_monitor(nx = 250, ny = 250,
filename = f_name_s_Image,
xmin = -.125, xmax = .125, ymin = -.125, ymax = .125)
  AT (0.0, 0.0, V_radius) RELATIVE NeuB6_Coordinate_System_4

COMPONENT NeuB6_Sample_Spectrum = E_monitor(
/*COMPONENT NeuB6_Sample_Spectrum = L_monitor(
Lmin = Wavelength_Min, Lmax = Wavelength_Max, nL = 200,*/
Emin=1.0, Emax=210, nE=4180,
filename = f_name_s_Spectrum,
xmin = -0.125, xmax = 0.125, ymin = -0.125, ymax = 0.125)
AT (0.0, 0.0, V_radius) RELATIVE NeuB6_Coordinate_System_4
```

```
/* COMPONENT NeuB6_Sample_Vertical_Divergence = Hdiv_monitor(nh = 41,
filename=f_name_s_VDiv,
xwidth = 0.25, yheight = 0.25, h_maxdiv=4.0)
  AT (0.0, 0.0, V_radius) RELATIVE NeuB6_Coordinate_System_4
  ROTATED (0.0, 0.0, 90.0) RELATIVE NeuB6_Coordinate_System_4

COMPONENT NeuB6_Sample_Horizontal_Divergence = Hdiv_monitor(nh = 41,
filename=f_name_s_HDiv,
xwidth = 0.25, yheight = 0.25, h_maxdiv=4.0)
  AT (0.0, 0.0, V_radius) RELATIVE NeuB6_Coordinate_System_4 */

COMPONENT NeuB6_Sample_Divergence_Map = Divergence_monitor(nh = 40, nv = 40,
filename=f_name_s_Divmon,
xwidth = 0.25, yheight = 0.25, maxdiv_h = 4.0, maxdiv_v = 4.0)
  AT (0.0, 0.0, V_radius) RELATIVE NeuB6_Coordinate_System_4

COMPONENT NeuB6_Sample_Horizontal_Phase_Space_Map = DivPos_monitor(nb = 251, ndiv = 251,
filename=f_name_s_H_acc,
xwidth = 0.25, yheight = 0.25, maxdiv = 4.0)
AT (0.0, 0.0, V_radius) RELATIVE NeuB6_Coordinate_System_4

COMPONENT NeuB6_Sample_Vertical_Phase_Space_Map = Monitor_nD(
xwidth=0.2, yheight = 0.5, restore_neutron=1, filename=f_name_s_V_acc,
options="square, y limits=[-0.1,0.1] bins=251, ydiv limits =[-8,8] bins=251"
)
/*COMPONENT NeuB6_Sample_Vertical_Phase_Space_Map = DivPos_monitor(nb = 251, ndiv = 251,
filename=f_name_s_V_acc,
xwidth = 0.25, yheight = 0.25, maxdiv = 4.0)*/
  AT (0.0, 0.0, V_radius) RELATIVE NeuB6_Coordinate_System_4
  /*ROTATED (0.0, 0.0, 90) RELATIVE NeuB6_Coordinate_System_4*/

COMPONENT NeuB6_Sample_Horizontal_wl = Monitor_nD(
xwidth=0.5,yheight=0.5,
restore_neutron=1,filename=f_name_s_H_lambda,
options="square, x limits=[-0.1 0.1] bins=201, lambda limits=[0.5,6.5] bins=601"

)
AT (0.0, 0.0, V_radius) RELATIVE NeuB6_Coordinate_System_4
END
```

APPENDIX B. NB6_MONO_DRUM_MONITORS

APPENDIX B. NB6_MONO_DRUM_MONITORS

```
/*******************************************************************************
*         McStas instrument definition URL=http://www.mcstas.org
*
* Instrument: Baseline NB6 curved guide and short straight section
*
* %Identification
* Written by: Lee Robertson (robertsonjl@ornl.gov) mod by B Winn
* Date Created: 28may2018
* Date Modified: 12aug2019
* Origin: ORNL
* %INSTRUMENT_SITE: ORNL
*
* %Description
* Model of the new guide for the NB6 beamline, formerly CG-1 beamline
* %Parameters
*
* %Link
*
* %End
*******************************************************************************/

DEFINE INSTRUMENT NB6_MonochormatorDrumMonitors()
DECLARE
%{
char *cyl_y;
%}
INITIALIZE
%{
cyl_y = malloc(200*sizeof(char));
sprintf(cyl_y,"banana theta limits=[%g %g] bins=120 y limits=[%g %g] bins=200",-20.0,20.0,-0.2
%}

TRACE

//*****************************************************************************************

/* Monitors just before Monochromator */

COMPONENT NeuB6_Coordinate_System_3a= Arm()
AT (0, 0, 1.6) RELATIVE NeuB6_Coordinate_System_3
ROTATED (0.31243,0,0) RELATIVE NeuB6_Coordinate_System_3




COMPONENT NeuB6_Monochromator_Drum = Monitor_nD(
```

```
filename="NB6_drum_theta_y",
radius =.53975 ,yheight=1.0,
restore_neutron=1,
options=cyl_y)
  AT (0.0, 0.0, 0.0000) RELATIVE NeuB6_Coordinate_System_3a


END
```