PSI-CAMEA - MAGNET OPTICS

MAGNET OPTICS

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MARCH 20, 2018
MAGNET OPTICS
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1 Plan

1.1 Notes from meeting 13/03/18

Focusig, in principle for eliptical → simulated by straight for MA15 (test case for MA9)

- 2.3 degrees opening angle 4AA
- m=6
- sample size: 5x5mm
- 30cm at the magnet. Compare with only sample position (should be 5x5mm)
- Inner dimention is 7mm (focus for 5 mm on sample position)
- limits for outer diameter
- Reference sample to look at resolution

? Maybe Union

- Build up a 'complete' back-end

1.2 Magnet limitations

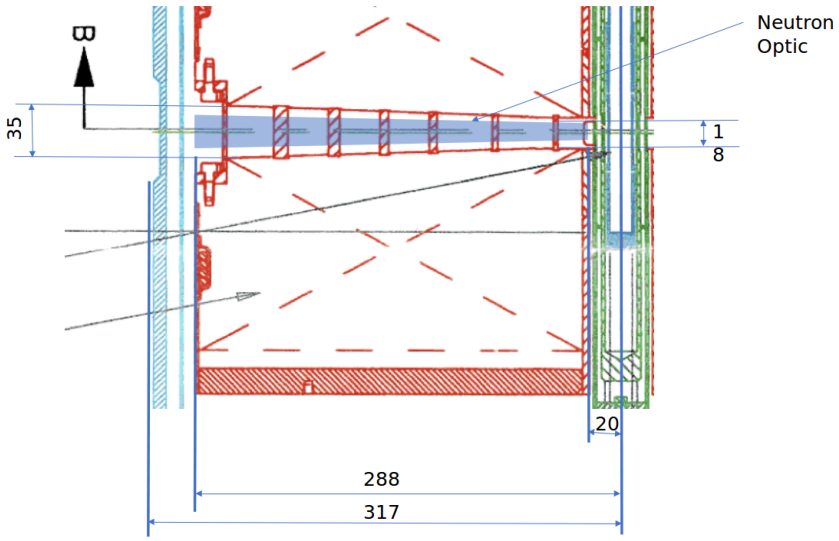


Figure 1: *Sketch of optic dimensions due to magnet limitations.*

- MagnetOpticsOpening = 0.030,
- MagnetOpticsEnd = 0.007,
- MagnetOpticsLenght=0.268,
- MagnetOpticsM = 6,
- MagnetOpticsWidth = 0.2,

1.3 Original setup

Setup consists of:

```
COMPONENT MonoFLat = Monochromator_curved(
     zwidth = 0.05, yheight = 0.025, gap = 0.0005, NH =3,
     NV = 5, DM=3.355, mosaich = 37, mosaicv = 37, r0 = 1,
      RV = RV_mono, RH = RH_mono)
  AT (0, 0, 1.6) RELATIVE SlitGuideEnd
  ROTATED (0, thetaA1 ,0) RELATIVE SlitGuideEnd

COMPONENT A2 = Arm()
  AT (0, 0, 1.6) RELATIVE SlitGuideEnd
  ROTATED (0, thetaA2 , 0) RELATIVE SlitGuideEnd

COMPONENT SlitMagnetStart = Slit(
     xwidth = MagnetSlitWidth , yheight = MagnetSlitHeight)
  AT (0, 0, 1.3) RELATIVE A2

COMPONENT PsdMagnet = PSD_monitor(
     nx = 100, ny = 100, filename = "PSD_Magnet_opening.dat", xwidth = 0.2,
     yheight = 0.2)
  AT (0, 0, 1.3) RELATIVE A2

COMPONENT DivMon_Magnet = Divergence_monitor(
     nh = 100, nv = 100, filename = "Div_Magnet_opening.dat",
     xwidth = 0.2, yheight = 0.2, maxdiv_h = 6, maxdiv_v = 6.5)
   AT (0, 0, 0 ) RELATIVE PREVIOUS


COMPONENT PsdSampleBeamProfile = PSD_monitor(
     nx = 100, ny = 100, filename = "PsdSampleBeamProfile.dat", xwidth = 0.2,
     yheight = 0.2)
  AT (0, 0, 1.6) RELATIVE A2


COMPONENT DivMonSampleBeamProfile = Divergence_monitor(
     nh = 100, nv = 100, filename = "DivMonSampleBeamProfile.dat",
     xwidth = 0.2, yheight = 0.2, maxdiv_h = 6, maxdiv_v = 6.5)
   AT (0, 0, 0 ) RELATIVE PREVIOUS

COMPONENT PsdSampleSimulator = PSD_monitor(
     nx = 100, ny = 100, filename = "PsdSampleSimulator.dat", xwidth = 0.005,
     yheight = 0.005)
  AT (0, 0, 0) RELATIVE PREVIOUS

COMPONENT DivMonSampleSimulator = Divergence_monitor(
     nh = 100, nv = 100, filename = "DivMonSampleSimulator.dat",
```

```
    xwidth = 0.005, yheight = 0.005, maxdiv_h = 6, maxdiv_v = 6.5)
AT (0, 0, 0) RELATIVE PREVIOUS
```

Figure 2: *Flat monochromator with slits and without optics.*

Figure 3: *Flat monochromator with slits and with optics.*

1.4 Comparison

	Flat Mono WO	VCurved Mono WO	Flat Mono W	VCurved Mono W
Intensities	177282	432272	204688	591671
Flat Mono WO	1	2.44	1.15	3.34
VCurved Mono WO	–	1	0.47	1.37
Flat Mono W	–	–	1	2.89
VCurved Mono W	–	–	–	1

Table 1: *Comparison between vertically focused/unfocused and with/without optics*

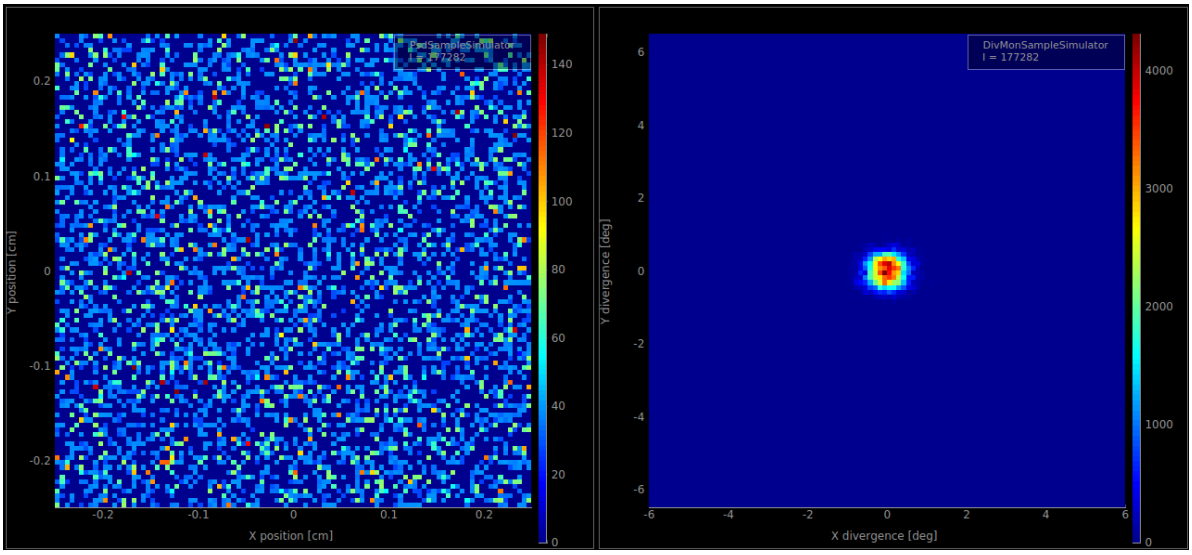


Figure 4: *No optics flat.*

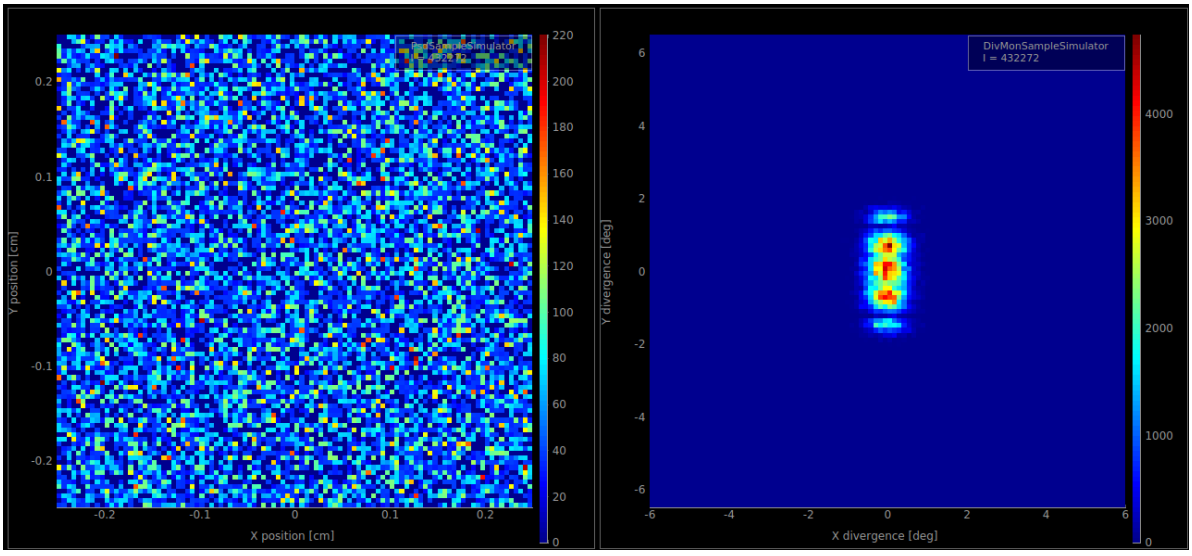


Figure 5: *No optics curved vertically.*

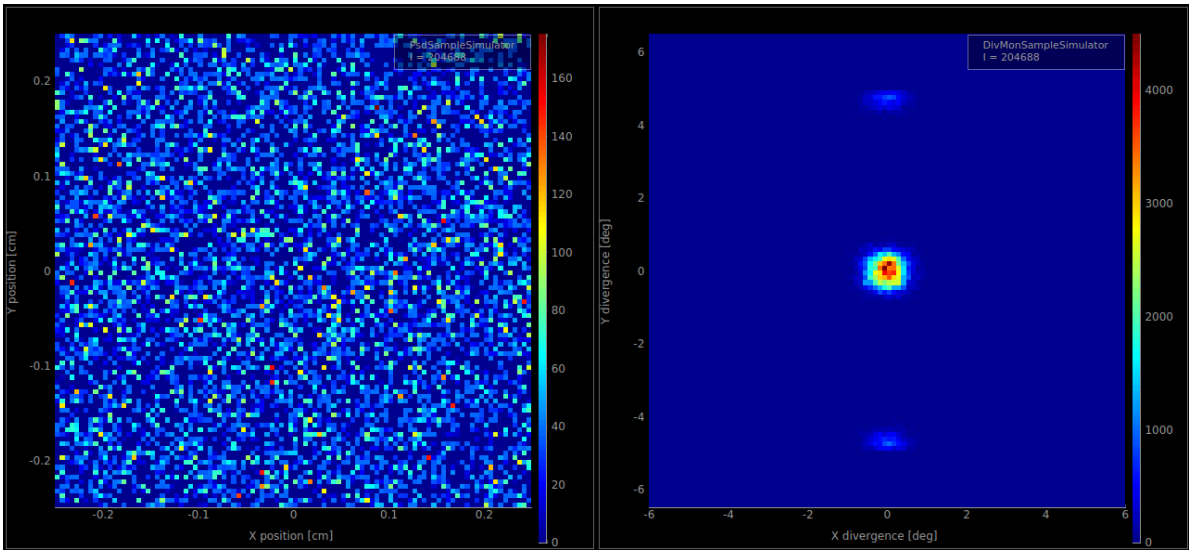


Figure 6: *Flat optics flat.*

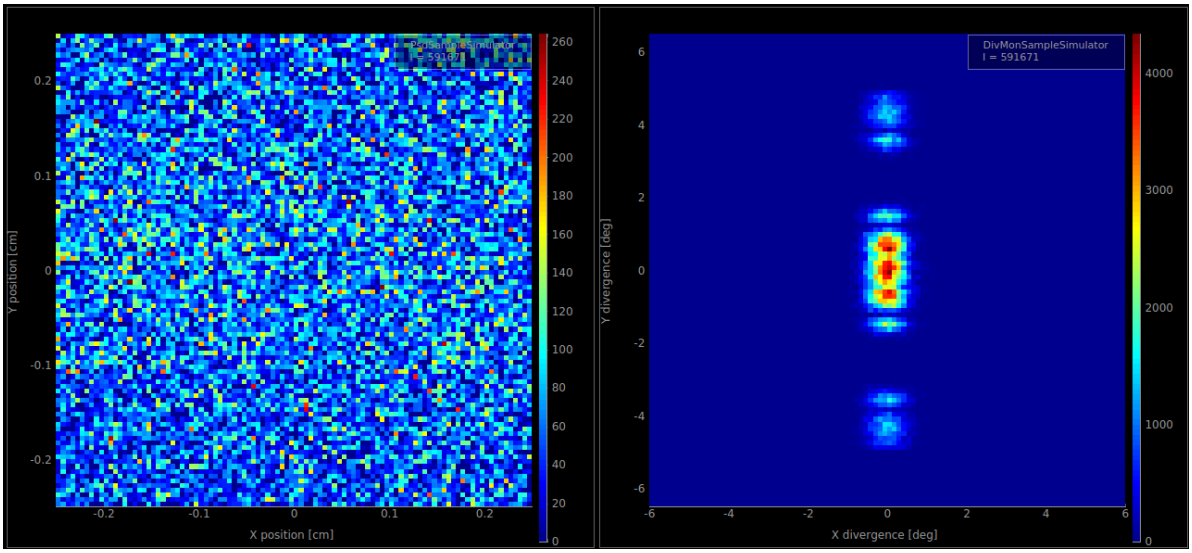


Figure 7: *Flat optics curved vertically.*

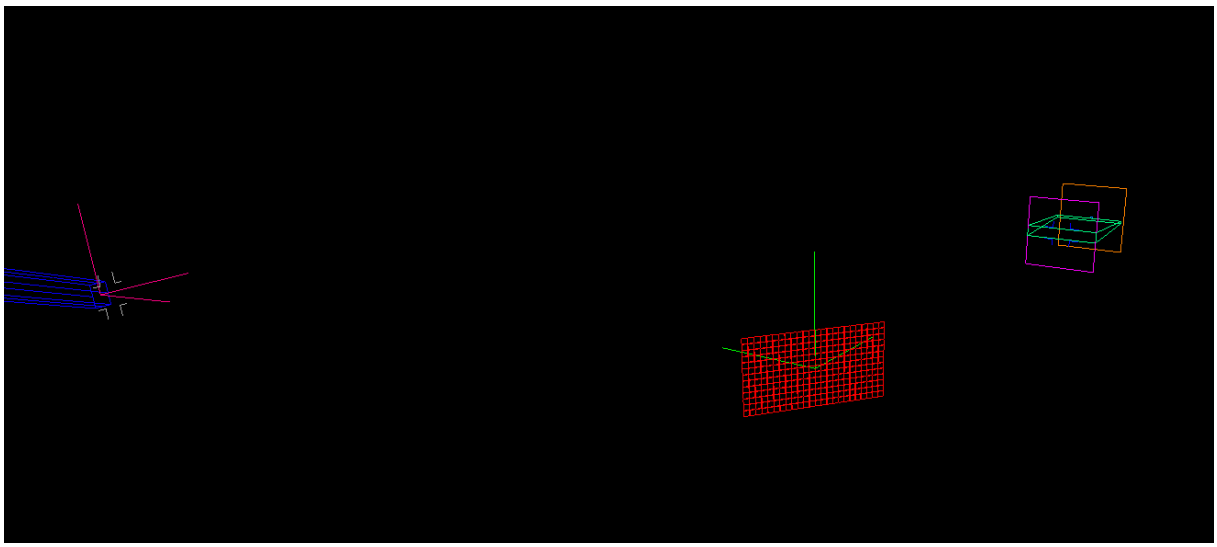
1.5 Future Monochromator

The future monochromator might change the efficiency of adding the optics. The monochromator is given as

```
COMPONENT Mono = Monochromator_curved(
     zwidth = 0.01, yheight = 0.01, gap = 0.0005, NH =24,
     NV = 13, DM=3.355,mosaich = 37, mosaicv = 37, r0 = 1,
      RV = RV_mono, RH = RH_mono)
  AT (0, 0, 1.6) RELATIVE SlitGuideEnd
  ROTATED (0, thetaA1,0) RELATIVE SlitGuideEnd
```

	Flat Mono WO	Curved Mono WO	Flat Mono W	VCurved Mono W
Intensities	160212	598328	197003	833920
Flat Mono WO	1	3.73	1.23	5.21
VCurved Mono WO	–	1	0.33	1.39
Flat Mono W	–	–	1	4.23
VCurved Mono W	–	–	–	1

Table 2: *Comparison between double focused/unfocused and with/without optics with the future monochromator.*



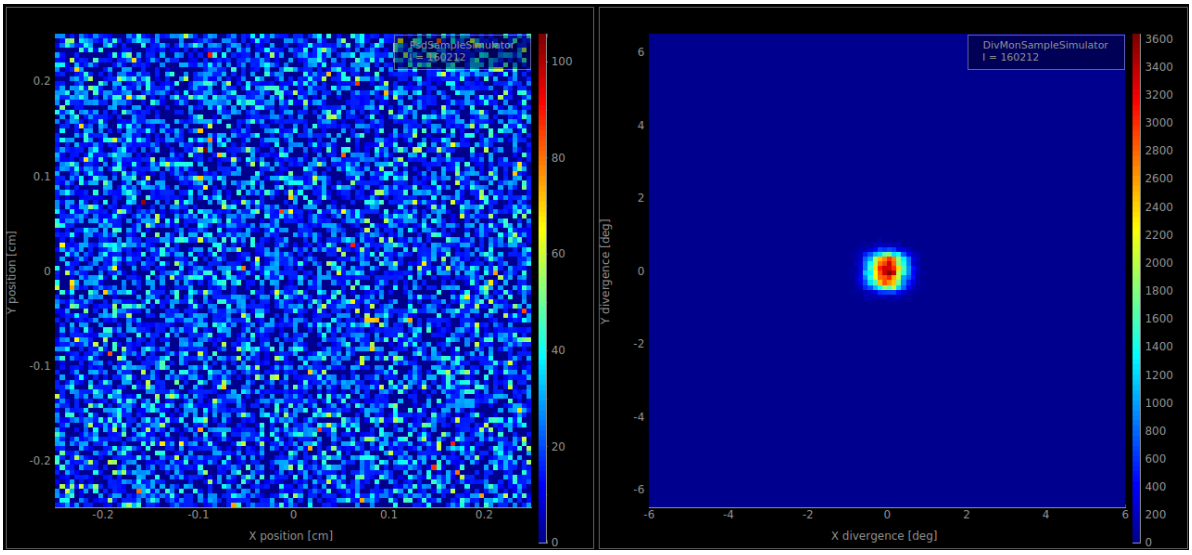


Figure 8: *No optics flat with new monochromator.*

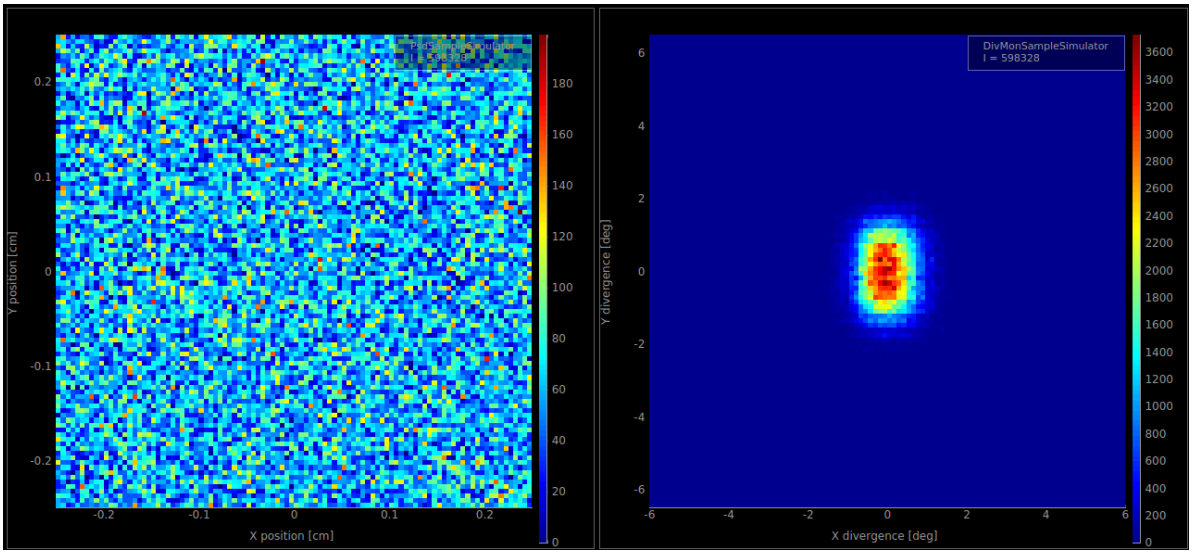


Figure 9: *No optics double focusing with new monochromator.*

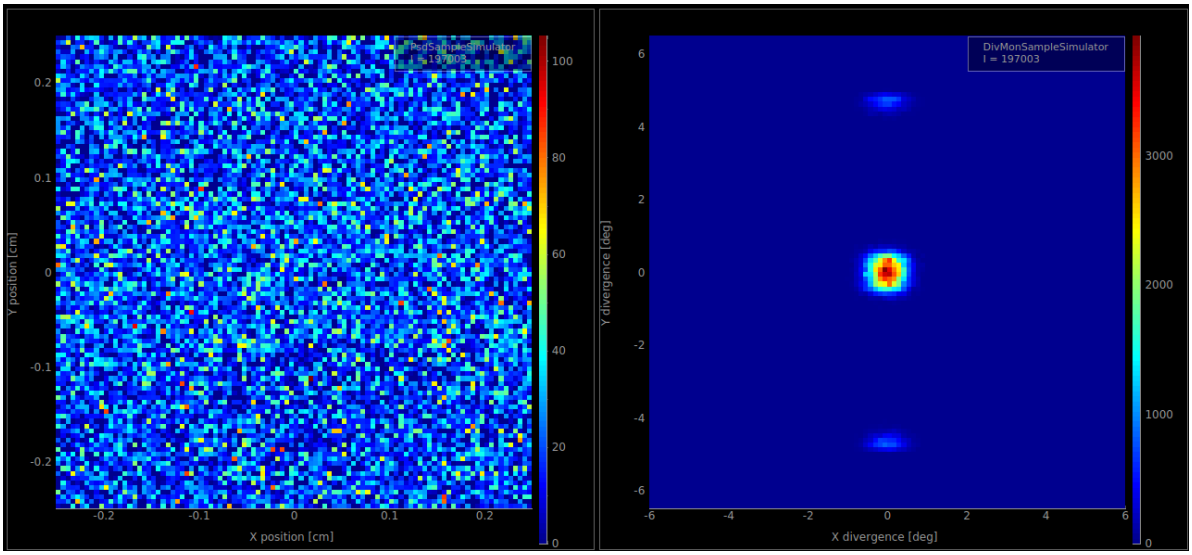


Figure 10: *Flat optics flat with the future monochromator.*

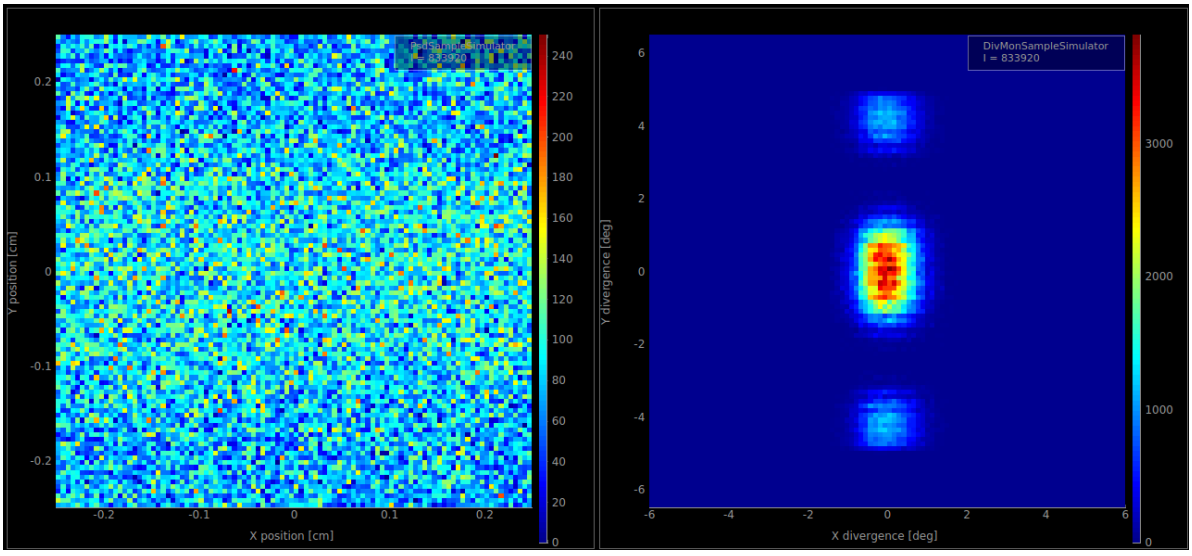


Figure 11: *Flat optics double focusing with the future monochromator.*

1.6 Next steps

Possible next steps

- Eliptical optics
- Optimzation of optic opening
- Full simulation

Figure 12: *Energy scan, flat monochromator, without optics, VanSample with radius=0.005m and yheight=0.01m*

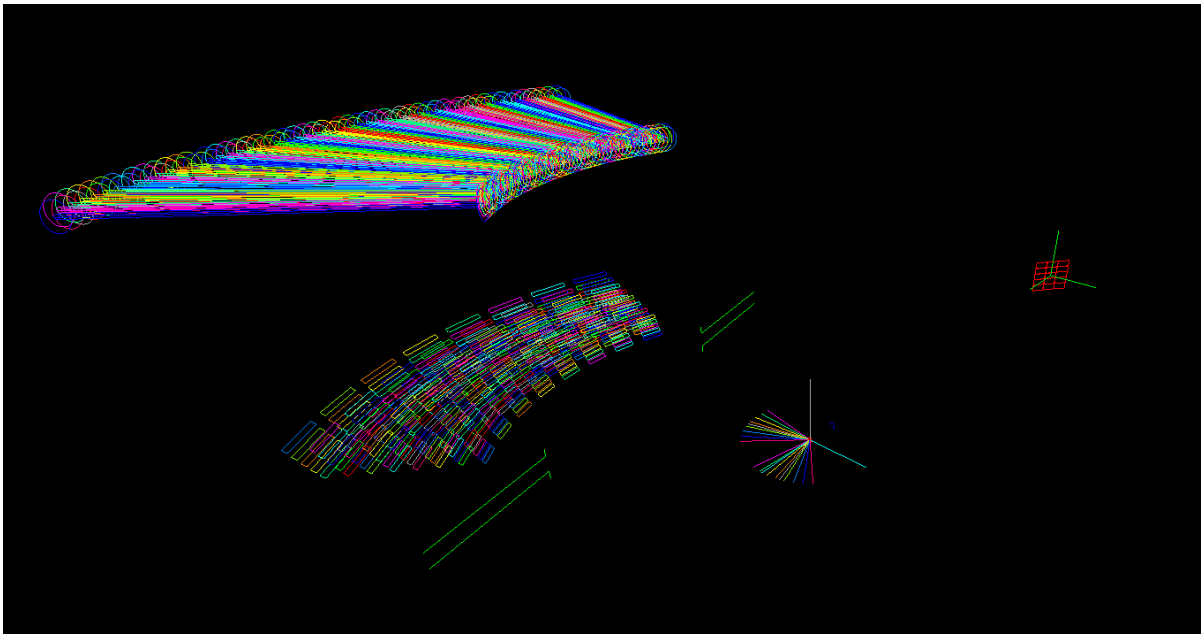


Figure 13: *Instrument view of energy scan simulation with two slits.*

1.7 Folder overview

1.7.1 Old Monochromator

Flat monochromator without optics:

- OriginalFlat

Vertically curved monochromator without optics:

- OriginalCurved

Flat monochromator with flat optics:

- FlatOpticsFlat

Vertically curved monochromator with flat optics:

- FlatOpticsCurved

1.7.2 New Monochromator

Flat monochromator without optics:

- FutureMonochromator/Flat

Double focusing monochromator without optics:

- FutureMonochromator/DoubleCurved

Flat monochromator with flat optics:

- FutureMonochromator/FlatWithOptics

Doble focusing monochromator with flat optics:

- FutureMonochromator/CurvedWithOptics