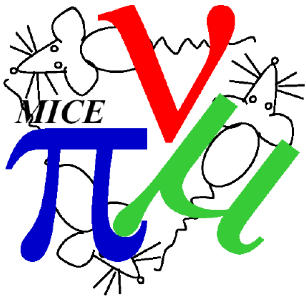
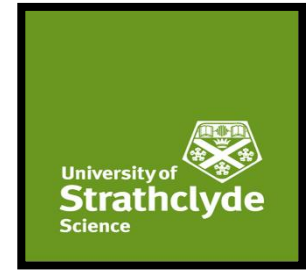


Demo Alignment and Tolerances

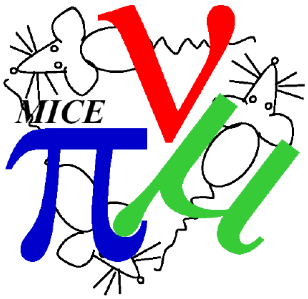
Alan Young
CM 44



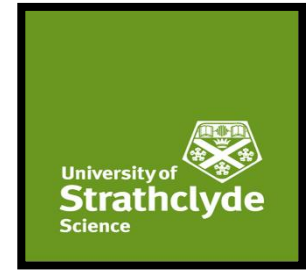
Objective



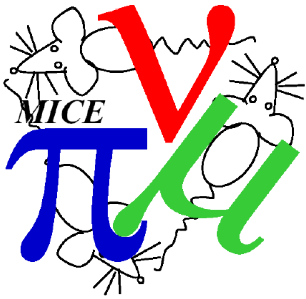
- Determine what the tolerances are for the MICE Demonstration of Ionisation Cooling lattice
- Interested in
 - Magnets
 - Absorbers and Windows
 - RF Cavities
- For Step IV the tolerances were 1mm/1mrad.



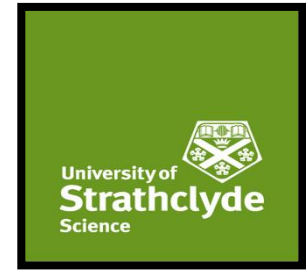
Beam



- 200MeV/c beam
- 10000 particles
- Transverse Distribution – Penn
 - ε_{\perp} : 6mm
 - β_{\perp} : 339.0mm
 - α_{\perp} : 0
- Longitudinal Distribution – Twiss
 - ε_l : 20mm
 - β_l : 11mm
 - α_l : 0.7



Model and Cuts

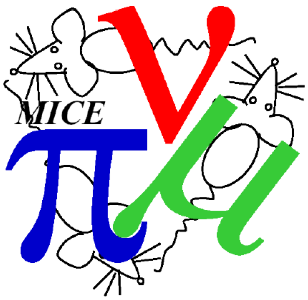


Model

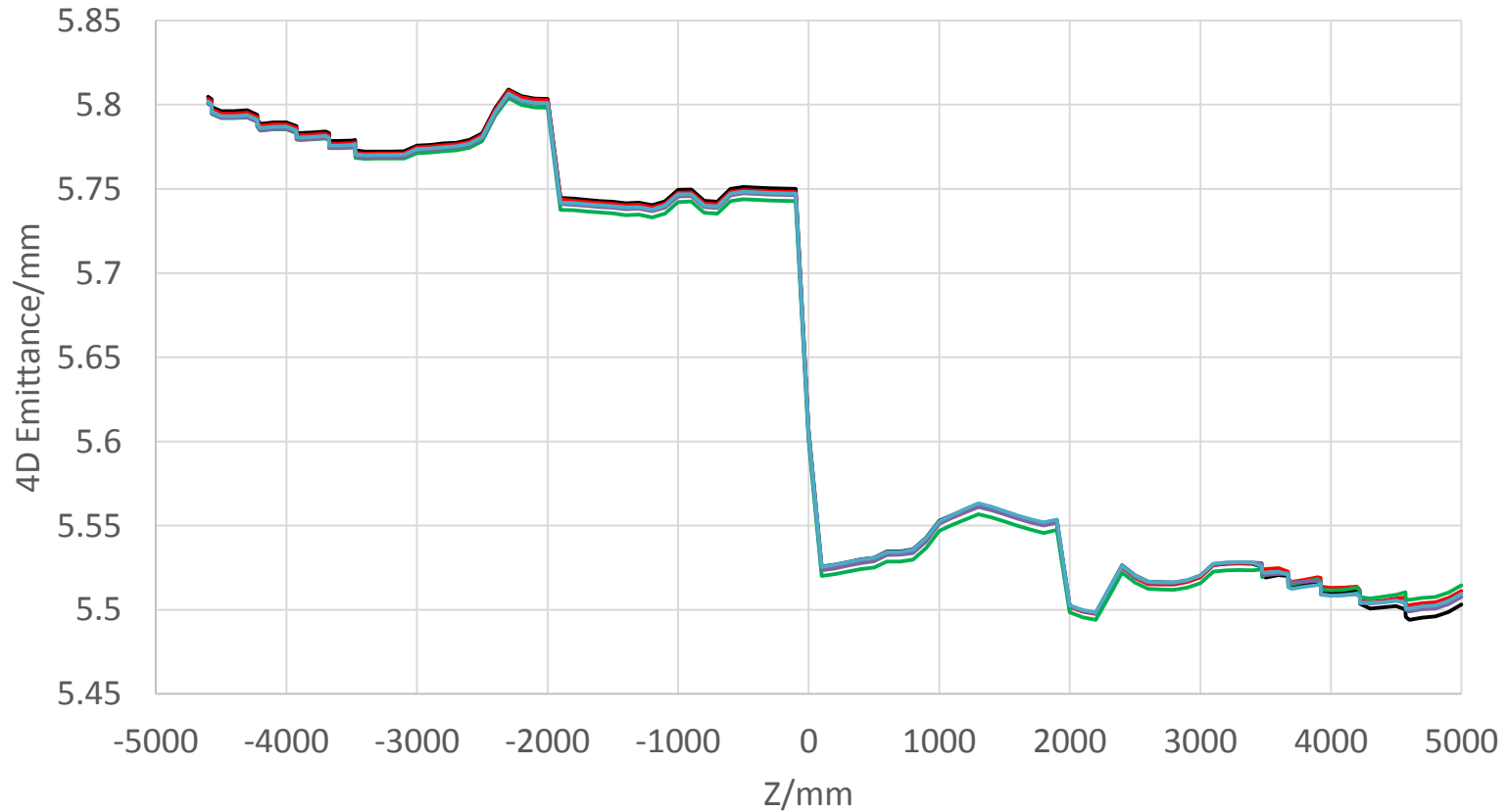
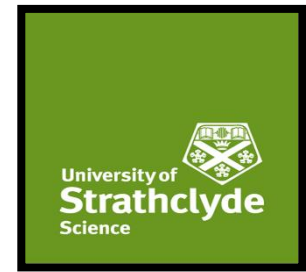
- Demonstration of Ionisation cooling model
`Conf_cd_step_frozen_53_1_em_6.py`

Hits removed from Simulation if

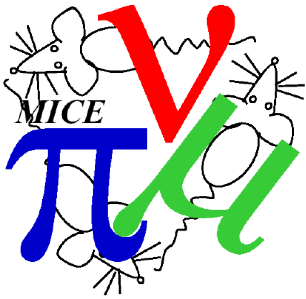
- Bunch Weight less than 10^{-9}
- Pid not equal to -13 (Muon)
- Radius in Upstream Spectrometer greater than 150mm
- Radius in Downstream Spectrometer greater than 150mm



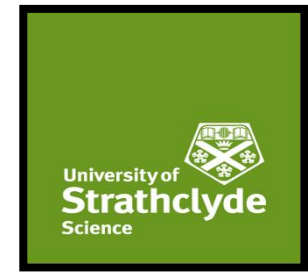
Downstream Spectrometer End Coil 2



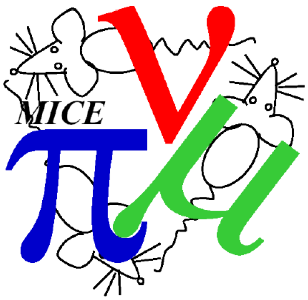
— 32_Base — Radial 1mm — Axial -1mm — Axial 1mm — Rotation 1mrad



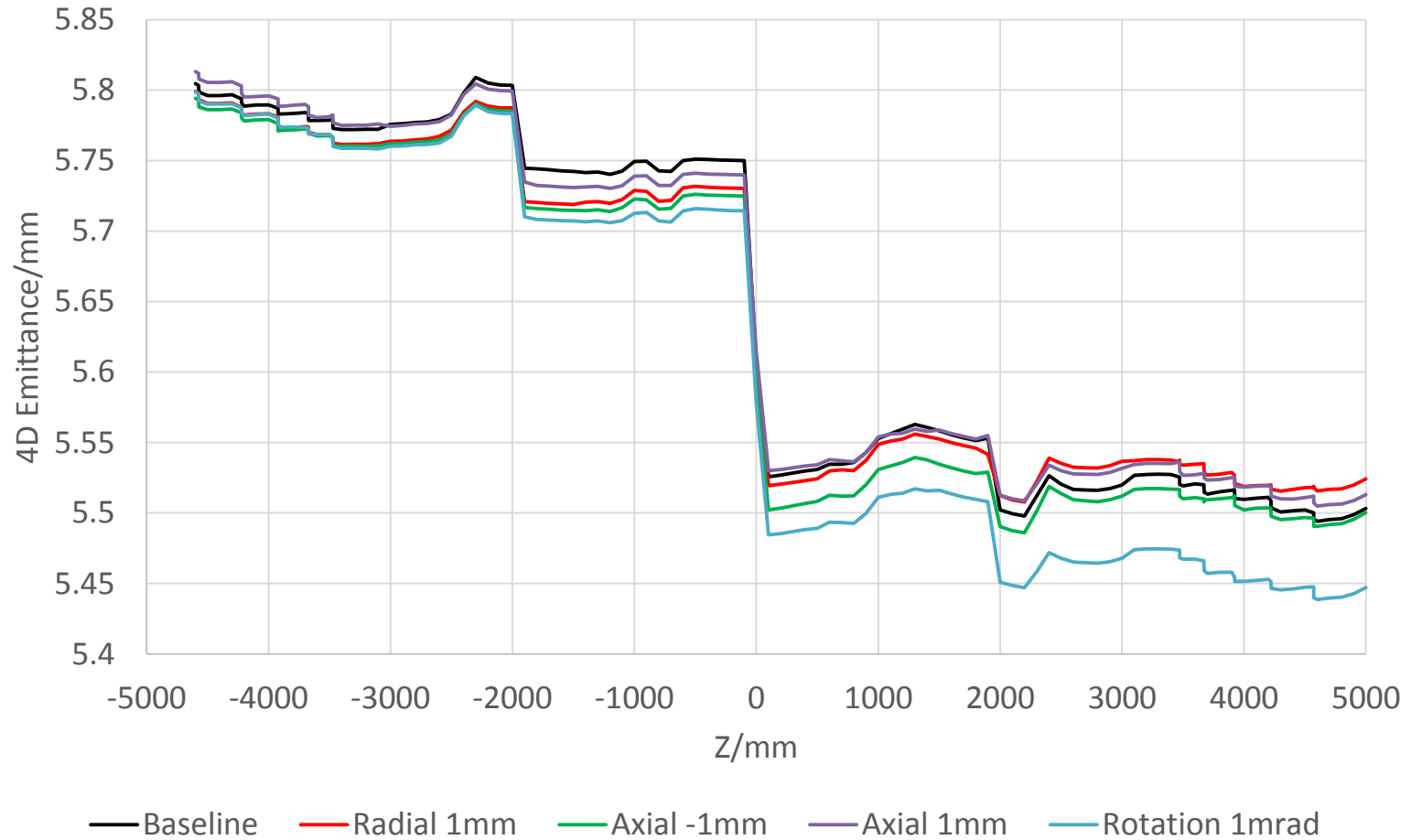
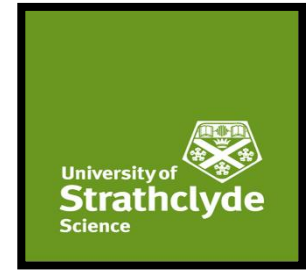
Downstream Spectrometer End Coil 2

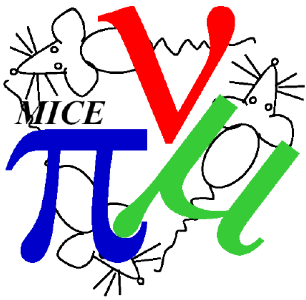


	Base	Radial 1mm	Axial -1mm	Axial 1mm	Rotation 1mrad
Emittance at start of cooling channel/mm	5.772	5.765	5.767	5.768	5.769
Emittance at end of cooling channel/mm	5.527	5.518	5.521	5.524	5.524
Emittance Change/mm	-0.245	-0.247	-0.246	-0.244	-0.244
Percentage emittance change/%	-4.240	-4.289	-4.265	-4.235	-4.238
Optical Beta Function at Absorber/mm	520.8	521.1	520.9	520.7	520.7
Optical Beta Function at Downstream Spectrometer/mm	329.9	329.8	329.8	330.1	329.8
Mean X at Downstream Spectrometer/mm	0.512	0.526	0.486	0.500	0.515
Mean Y at Downstream Spectrometer/mm	-0.346	-0.359	-0.341	-0.388	-0.322
Mean R at Downstream Spectrometer/mm	0.618	0.637	0.593	0.633	0.607
Energy at Upstream spectrometer/MeV	228.9	228.9	228.9	228.9	228.9
Energy at Downstream Spectrometer/MeV	212.8	212.8	212.8	212.8	212.8
Energy change/MeV	-16.099	-16.097	-16.098	-16.098	-16.099
Percentage Energy change/%	-7.033	-7.032	-7.032	-7.032	-7.033

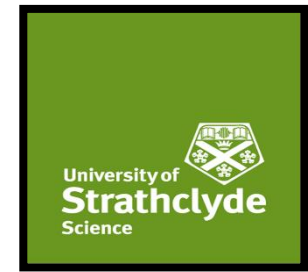


Upstream Spectrometer Match coil 2

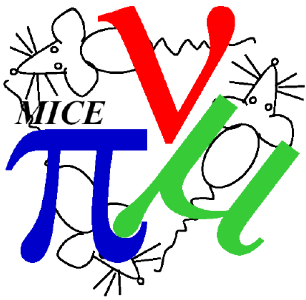




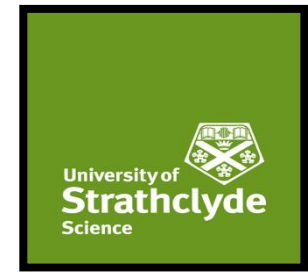
Upstream Spectrometer Match coil 2



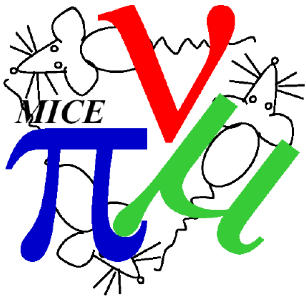
	Base	Radial 1mm	Axial -1mm	Axial 1mm	Rotational 1mrad
Emittance at start of cooling channel/mm	5.772	5.762	5.760	5.775	5.759
Emittance at end of cooling channel/mm	5.527	5.538	5.517	5.535	5.474
Emittance Change/mm	-0.245	-0.224	-0.243	-0.240	-0.284
Percentage emittance change/%	-4.240	-3.888	-4.225	-4.155	-4.939
Optical Beta Function at Absorber/mm	520.8	522.1	518.9	521.5	520.2
Optical Beta Function at Downstream Spectrometer/mm	329.9	328.1	330.0	328.2	328.9
Mean X at Downstream Spectrometer/mm	0.512	0.552	0.408	0.503	0.566
Mean Y at Downstream Spectrometer/mm	-0.346	0.050	-0.021	-0.211	-0.338
Mean R at Downstream Spectrometer/mm	0.618	0.555	0.408	0.545	0.659
Energy at Upstream Spectrometer/MeV	228.9	228.9	228.9	228.9	228.9
Energy at Downstream Spectrometer/MeV	212.8	212.8	212.8	212.8	212.8
Energy change/MeV	-16.099	-16.103	-16.099	-16.108	-16.096
Percentage Energy change/%	-7.033	-7.035	-7.033	-7.036	-7.031



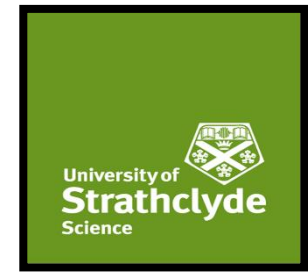
Upstream Spectrometer Match coil 1



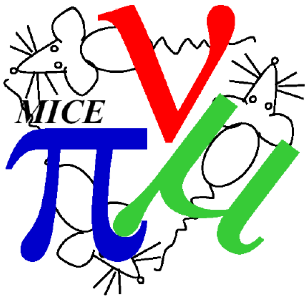
	Base	Radial 1mm	Axial -1mm	Axial 1mm	Rotation 1mrad
Emittance at start of cooling channel/mm	5.772	5.766	5.771	5.766	5.743
Emittance at end of cooling channel/mm	5.527	5.509	5.507	5.525	5.489
Emittance Change/mm	-0.245	-0.257	-0.264	-0.240	-0.254
Percentage emittance change/%	-4.240	-4.451	-4.580	-4.170	-4.415
Optical Beta Function at Absorber/mm	520.8	520.5	522.5	522.6	521.5
Optical Beta Function at Downstream Spectrometer/mm	329.9	330.3	327.9	328.9	328.2
Mean X at Downstream Spectrometer/mm	0.512	-0.085	0.387	0.493	1.075
Mean Y at Downstream Spectrometer/mm	-0.346	0.087	0.002	-0.165	-0.301
Mean R at Downstream Spectrometer/mm	0.618	0.121	0.387	0.519	1.116
Energy at Upstream spectrometer/MeV	228.9	228.9	228.9	228.9	228.9
Energy at Downstream Spectrometer/MeV	212.8	212.8	212.8	212.8	212.8
Energy change/MeV	-16.099	-16.114	-16.118	-16.115	-16.091
Percentage Energy change/%	-7.033	-7.039	-7.042	-7.040	-7.029



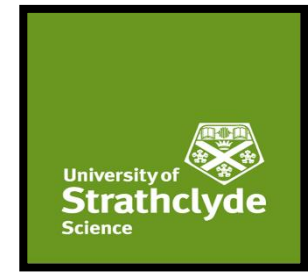
Upstream Spectrometer



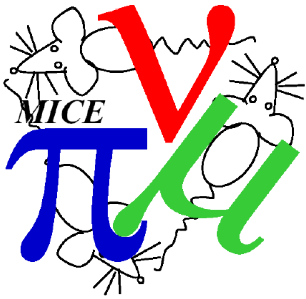
	Base	Radial 1mm	Axial +1mm	Axial -1mm	Rotational 1mrad	Radial 10mm	Axial -10mm	Rotational 10mrad	Axial 10mm
Emittance at start of cooling channel/mm	5.770	5.750	5.761	5.771	5.747	5.737	5.777	5.688	5.761
Emittance at End of cooling channel/mm	5.487	5.490	5.514	5.502	5.465	5.508	5.520	5.480	5.498
Emittance change/mm	-0.283	-0.259	-0.247	-0.269	-0.283	-0.229	-0.257	-0.208	-0.262
Percentage emittance change/%	-4.913	-4.508	-4.294	-4.663	-4.920	-3.988	-4.447	-3.658	-4.552
Optical beta function at absorber/mm	521.3	520.8	520.0	521.2	520.9	522.1	513.3	519.8	525.8
Optical beta function at downstream spectrometer/mm	330.2	330.1	329.8	329.7	329.3	330.0	333.2	319.5	326.7
Mean X at downstream spectrometer/mm	0.476	0.556	0.590	0.392	1.581	0.997	0.644	11.515	0.426
Mean Y at downstream spectrometer/mm	-0.249	0.514	-0.360	-0.124	-1.573	5.531	-0.222	-14.029	-0.228
Mean R at downstream spectrometer/mm	0.537	0.757	0.691	0.411	2.231	5.620	0.681	18.150	0.483
Energy at upstream spectrometer/MeV	228.9	228.9	228.9	228.9	228.9	228.9	228.9	228.9	228.9
Energy at downstream spectrometer/MeV	212.8	212.8	212.8	212.8	212.8	212.8	212.8	212.7	212.8
Energy change/MeV	-16.098	-16.098	-16.116	-16.111	-16.117	-16.121	-16.081	-16.198	-16.111
Percentage energy change/%	-7.032	-7.033	-7.041	-7.038	-7.041	-7.043	-7.025	-7.077	-7.038



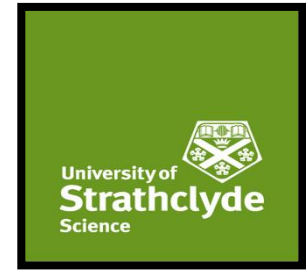
Upstream Secondary Absorber



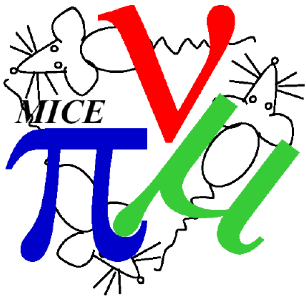
	Base	Radial 1mm	Axial +1mm	Axial -1mm	Rotational 1mrad	Radial 10mm	Axial -10mm	Rotational 10mrad	Axial 10mm
Emittance at start of cooling channel/mm	5.770	5.770	5.770	5.770	5.770	5.770	5.765	5.767	5.770
Emittance at End of cooling channel/mm	5.487	5.487	5.487	5.487	5.487	5.487	5.476	5.477	5.481
Emittance change/mm	-0.283	-0.283	-0.283	-0.283	-0.283	-0.283	-0.289	-0.290	-0.289
Percentage emittance change/%	-4.913	-4.913	-4.913	-4.913	-4.913	-4.913	-5.017	-5.028	-5.017
Optical beta function at absorber/mm	521.3	521.3	521.3	521.3	521.3	521.3	522.4	522.1	521.7
Optical beta function at downstream spectrometer/mm	330.2	330.2	330.2	330.2	330.2	330.2	329.5	329.7	329.7
Mean X at downstream spectrometer/mm	0.476	0.476	0.476	0.476	0.476	0.476	0.482	0.507	0.438
Mean Y at downstream spectrometer/mm	-0.249	-0.249	-0.249	-0.249	-0.249	-0.249	-0.262	-0.243	-0.214
Mean R at downstream spectrometer/mm	0.537	0.537	0.537	0.537	0.537	0.537	0.549	0.563	0.487
Energy at upstream spectrometer/MeV	228.9	228.9	228.9	228.9	228.9	228.9	228.9	228.9	228.9
Energy at downstream spectrometer/MeV	212.8	212.8	212.8	212.8	212.8	212.8	212.8	212.8	212.8
Energy change/MeV	-16.098	-16.098	-16.098	-16.098	-16.098	-16.098	-16.095	-16.090	-16.096
Percentage energy change/%	-7.032	-7.032	-7.032	-7.032	-7.032	-7.032	-7.031	-7.029	-7.031



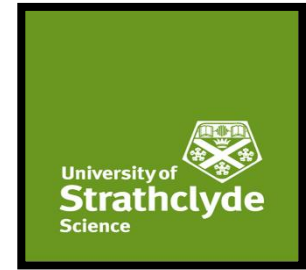
Upstream Cavity



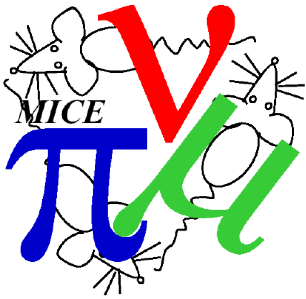
	Base	Radial 1mm	Axial +1mm	Axial -1mm	Rotational 1mrad	Radial 10mm	Axial +10mm	Axial -10mm	Rotational 10mrad
Emittance at start of cooling channel/mm	5.770	5.766	5.768	5.764	5.766	5.766	5.767	5.769	5.766
Emittance at End of cooling channel/mm	5.487	5.481	5.485	5.475	5.480	5.481	5.481	5.484	5.480
Emittance change/mm	-0.283	-0.286	-0.283	-0.289	-0.286	-0.286	-0.286	-0.285	-0.286
Percentage emittance change/%	-4.913	-4.952	-4.908	-5.008	-4.961	-4.952	-4.955	-4.938	-4.954
Optical beta function at absorber/mm	521.3	521.8	521.5	522.1	521.4	521.8	521.6	521.7	521.7
Optical beta function at downstream spectrometer/mm	330.2	329.6	329.8	330.0	329.8	329.6	329.8	329.9	329.8
Mean X at downstream spectrometer/mm	0.476	0.524	0.516	0.497	0.504	0.524	0.498	0.509	0.526
Mean Y at downstream spectrometer/mm	-0.249	-0.258	-0.238	-0.244	-0.261	-0.258	-0.210	-0.238	-0.254
Mean R at downstream spectrometer/mm	0.537	0.584	0.568	0.554	0.568	0.584	0.540	0.562	0.584
Energy at upstream spectrometer/MeV	228.9	228.9	228.9	228.9	228.9	228.9	228.9	228.9	228.9
Energy at downstream spectrometer/MeV	212.8	212.8	212.8	212.8	212.8	212.8	212.8	212.8	212.8
Energy change/MeV	-16.098	-16.099	-16.098	-16.092	-16.096	-16.099	-16.099	-16.102	-16.098
Percentage energy change/%	-7.032	-7.033	-7.032	-7.030	-7.031	-7.033	-7.033	-7.034	-7.032



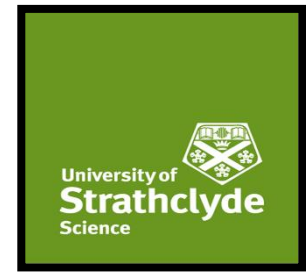
Upstream AFC



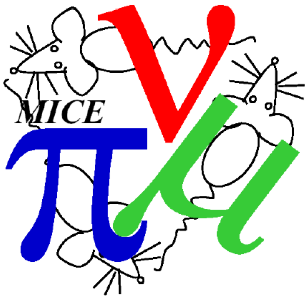
	Base	Radial 1mm	Axial +1mm	Axial -1mm	Rotational 1mrad	Radial 10mm	Axial +10mm	Axial -10mm	Rotational 10mrad
Emittance at start of cooling channel/mm	5.770	5.774	5.763	5.781	5.781	5.758	5.767	5.774	5.767
Emittance at End of cooling channel/mm	5.487	5.494	5.494	5.492	5.517	5.514	5.488	5.493	5.509
Emittance change/mm	-0.283	-0.281	-0.269	-0.289	-0.263	-0.244	-0.279	-0.281	-0.258
Percentage emittance change/%	-4.913	-4.860	-4.670	-4.998	-4.554	-4.239	-4.841	-4.864	-4.468
Optical beta function at absorber/mm	521.3	522.4	521.3	521.5	522.3	519.5	515.6	526.6	522.2
Optical beta function at downstream spectrometer/mm	330.2	329.9	330.8	328.5	329.2	330.0	332.3	323.4	326.8
Mean X at downstream spectrometer/mm	0.476	0.993	0.397	0.422	0.323	5.479	0.440	0.284	-1.485
Mean Y at downstream spectrometer/mm	-0.249	-0.190	-0.299	-0.368	-0.640	0.128	-0.271	-0.323	-3.485
Mean R at downstream spectrometer/mm	0.537	1.011	0.497	0.560	0.717	5.480	0.517	0.430	3.788
Energy at upstream spectrometer/MeV	228.9	228.9	228.9	228.9	228.9	228.9	228.9	228.9	228.9
Energy at downstream spectrometer/MeV	212.8	212.8	212.8	212.8	212.8	212.8	212.8	212.8	212.8
Energy change/MeV	-16.098	-16.076	-16.091	-16.093	-16.111	-16.133	-16.099	-16.142	-16.136
Percentage energy change/%	-7.032	-7.023	-7.029	-7.030	-7.038	-7.048	-7.033	-7.052	-7.048



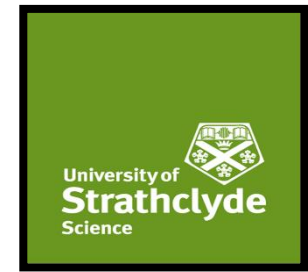
Primary Absorber



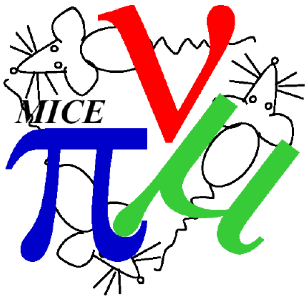
	Base	Radial 1mm	Axial +1mm	Axial -1mm	Rotational 1mrad	Radial 10mm	Axial +10mm	Axial -10mm	Rotational 10mrad
Emittance at start of cooling channel/mm	5.770	5.770	5.766	5.763	5.766	5.770	5.767	5.759	5.768
Emittance at End of cooling channel/mm	5.487	5.487	5.480	5.478	5.474	5.487	5.471	5.479	5.480
Emittance change/mm	-0.283	-0.283	-0.287	-0.285	-0.292	-0.283	-0.296	-0.280	-0.288
Percentage emittance change/%	-4.913	-4.913	-4.969	-4.941	-5.060	-4.913	-5.139	-4.868	-4.993
Optical beta function at absorber/mm	521.3	521.3	522.1	522.0	522.1	521.3	523.9	520.1	521.9
Optical beta function at downstream spectrometer/mm	330.2	330.2	329.7	329.6	329.7	330.2	331.0	330.2	330.0
Mean X at downstream spectrometer/mm	0.476	0.476	0.502	0.492	0.512	0.476	0.495	0.526	0.471
Mean Y at downstream spectrometer/mm	-0.249	-0.249	-0.219	-0.260	-0.251	-0.249	-0.197	-0.219	-0.242
Mean R at downstream spectrometer/mm	0.537	0.537	0.548	0.556	0.570	0.537	0.533	0.570	0.530
Energy at upstream spectrometer/MeV	228.9	228.9	228.9	228.9	228.9	228.9	228.9	228.9	228.9
Energy at downstream spectrometer/MeV	212.8	212.8	212.8	212.8	212.8	212.8	212.8	212.8	212.8
Energy change/MeV	-16.098	-16.098	-16.099	-16.097	-16.096	-16.098	-16.092	-16.099	-16.098
Percentage energy change/%	-7.032	-7.032	-7.033	-7.032	-7.031	-7.032	-7.029	-7.033	-7.032



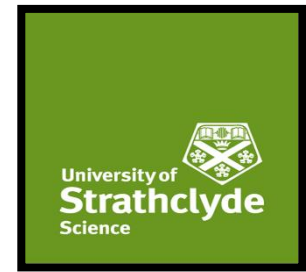
Downstream AFC



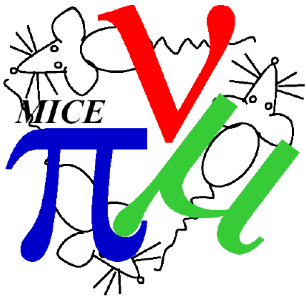
	Base	Radial 1mm	Axial +1mm	Axial -1mm	Rotational 1mrad	Radial 10mm	Axial +10mm	Axial -10mm	Rotational 10mrad
Emittance at start of cooling channel/mm	5.770	5.769	5.764	5.770	5.771	5.755	5.762	5.771	5.752
Emittance at End of cooling channel/mm	5.487	5.479	5.479	5.487	5.486	5.466	5.472	5.491	5.471
Emittance change/mm	-0.283	-0.289	-0.285	-0.283	-0.285	-0.289	-0.291	-0.280	-0.282
Percentage emittance change/%	-4.913	-5.018	-4.947	-4.913	-4.943	-5.027	-5.044	-4.851	-4.901
Optical beta function at absorber/mm	521.3	522.2	521.8	521.3	522.3	522.5	522.1	522.1	521.7
Optical beta function at downstream spectrometer/mm	330.2	329.8	329.9	330.2	330.1	330.7	329.4	331.0	333.1
Mean X at downstream spectrometer/mm	0.476	0.998	0.518	0.476	0.835	5.982	0.481	0.542	3.756
Mean Y at downstream spectrometer/mm	-0.249	0.062	-0.236	-0.249	0.384	2.592	-0.227	-0.184	5.692
Mean R at downstream spectrometer/mm	0.537	0.999	0.569	0.537	0.919	6.519	0.532	0.572	6.820
Energy at upstream spectrometer/MeV	228.9	228.9	228.9	228.9	228.9	228.9	228.9	228.9	228.9
Energy at downstream spectrometer/MeV	212.8	212.8	212.8	212.8	212.8	212.8	212.8	212.8	212.8
Energy change/MeV	-16.098	-16.090	-16.097	-16.098	-16.094	-16.097	-16.097	-16.099	-16.093
Percentage energy change/%	-7.032	-7.029	-7.032	-7.032	-7.031	-7.033	-7.032	-7.033	-7.031



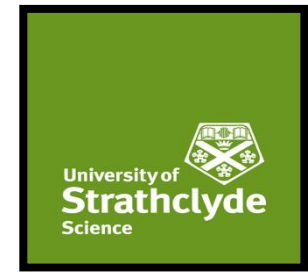
Downstream Cavity



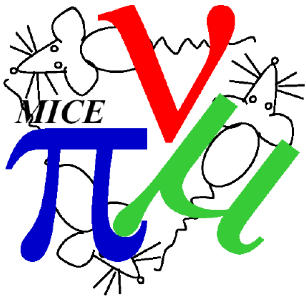
	Base	Radial 1mm	Axial +1mm	Axial -1mm	Rotational 1mrad	Radial 10mm	Axial +10mm	Axial -10mm	Rotational 10mrad
Emittance at start of cooling channel/mm	5.770	5.764	5.768	5.769	5.767	5.768	5.770	5.768	5.768
Emittance at End of cooling channel/mm	5.487	5.479	5.480	5.482	5.481	5.482	5.481	5.487	5.479
Emittance change/mm	-0.283	-0.285	-0.288	-0.286	-0.285	-0.286	-0.289	-0.281	-0.289
Percentage emittance change/%	-4.913	-4.946	-4.985	-4.964	-4.950	-4.960	-5.002	-4.879	-5.009
Optical beta function at absorber/mm	521.3	521.9	521.6	521.6	521.5	521.9	521.5	521.5	521.5
Optical beta function at downstream spectrometer/mm	330.2	329.8	330.0	330.0	330.1	329.6	329.8	330.1	329.9
Mean X at downstream spectrometer/mm	0.476	0.510	0.512	0.504	0.452	0.510	0.470	0.514	0.523
Mean Y at downstream spectrometer/mm	-0.249	-0.243	-0.219	-0.237	-0.251	-0.193	-0.276	-0.227	-0.229
Mean R at downstream spectrometer/mm	0.537	0.565	0.557	0.557	0.517	0.545	0.545	0.562	0.571
Energy at upstream spectrometer/MeV	228.9	228.9	228.9	228.9	228.9	228.9	228.9	228.9	228.9
Energy at downstream spectrometer/MeV	212.8	212.8	212.8	212.8	212.8	212.8	212.8	212.8	212.8
Energy change/MeV	-16.098	-16.096	-16.098	-16.099	-16.099	-16.102	-16.098	-16.100	-16.099
Percentage energy change/%	-7.032	-7.032	-7.032	-7.033	-7.033	-7.034	-7.032	-7.033	-7.033



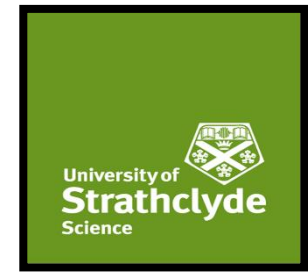
Downstream Secondary Absorber



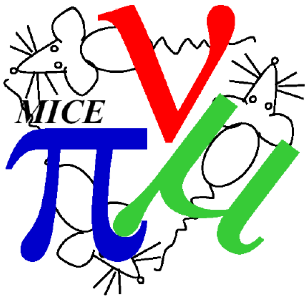
	Base	Radial 1mm	Axial +1mm	Axial -1mm	Rotational 1mrad	Radial 10mm	Axial +10mm	Axial -10mm	Rotational 10mrad
Emittance at start of cooling channel/mm	5.770	5.770	5.767	5.770	5.767	5.770	5.770	5.771	5.769
Emittance at End of cooling channel/mm	5.487	5.487	5.482	5.482	5.481	5.487	5.485	5.485	5.485
Emittance change/mm	-0.283	-0.283	-0.286	-0.288	-0.286	-0.283	-0.285	-0.285	-0.284
Percentage emittance change/%	-4.913	-4.913	-4.956	-4.990	-4.963	-4.913	-4.935	-4.947	-4.921
Optical beta function at absorber/mm	521.3	521.3	521.7	521.8	521.7	521.3	522.2	521.4	521.5
Optical beta function at downstream spectrometer/mm	330.2	330.2	329.5	330.0	329.9	330.2	329.9	330.0	330.1
Mean X at downstream spectrometer/mm	0.476	0.476	0.509	0.513	0.488	0.476	0.507	0.475	0.536
Mean Y at downstream spectrometer/mm	-0.249	-0.249	-0.232	-0.226	-0.233	-0.249	-0.246	-0.218	-0.229
Mean R at downstream spectrometer/mm	0.537	0.537	0.559	0.561	0.541	0.537	0.564	0.523	0.582
Energy at upstream spectrometer/MeV	228.9	228.9	228.9	228.9	228.9	228.9	228.9	228.9	228.9
Energy at downstream spectrometer/MeV	212.8	212.8	212.8	212.8	212.8	212.8	212.8	212.8	212.8
Energy change/MeV	-16.098	-16.098	-16.098	-16.100	-16.102	-16.098	-16.100	-16.098	-16.101
Percentage energy change/%	-7.032	-7.032	-7.032	-7.033	-7.034	-7.032	-7.033	-7.032	-7.034



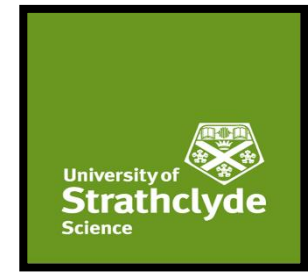
Downstream Spectrometer



	Base	Radial 1mm	Axial +1mm	Axial -1mm	Rotational 1mrad	Radial 10mm	Axial +10mm	Axial -10mm	Rotational 10mrad
Emittance at start of cooling channel/mm	5.770	5.766	5.767	5.771	5.767	5.760	5.757	5.779	5.762
Emittance at End of cooling channel/mm	5.487	5.478	5.482	5.487	5.481	5.472	5.471	5.494	5.471
Emittance change/mm	-0.283	-0.288	-0.286	-0.284	-0.285	-0.288	-0.286	-0.285	-0.291
Percentage emittance change/%	-4.913	-4.999	-4.956	-4.925	-4.951	-4.997	-4.968	-4.930	-5.052
Optical beta function at absorber/mm	521.3	522.3	521.7	522.0	521.6	521.7	521.5	522.9	522.6
Optical beta function at downstream spectrometer/mm	330.2	329.7	329.5	330.0	330.1	330.4	327.7	331.2	330.0
Mean X at downstream spectrometer/mm	0.476	0.916	0.509	0.497	0.124	4.686	0.499	0.471	-3.151
Mean Y at downstream spectrometer/mm	-0.249	-0.432	-0.232	-0.216	0.787	-2.167	-0.193	-0.249	10.056
Mean R at downstream spectrometer/mm	0.537	1.013	0.559	0.542	0.796	5.163	0.535	0.533	10.538
Energy at upstream spectrometer/MeV	228.9	228.9	228.9	228.9	228.9	228.9	228.9	228.9	228.9
Energy at downstream spectrometer/MeV	212.8	212.8	212.8	212.8	212.8	212.8	212.8	212.8	212.8
Energy change/MeV	-16.098	-16.100	-16.098	-16.101	-16.100	-16.095	-16.097	-16.100	-16.092
Percentage energy change/%	-7.032	-7.033	-7.032	-7.033	-7.033	-7.031	-7.032	-7.033	-7.030



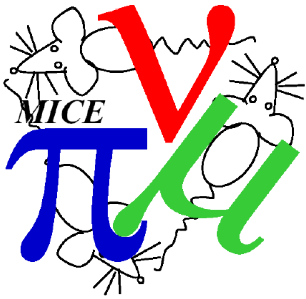
Input Beam Check



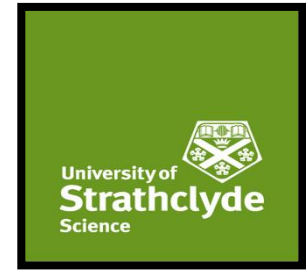
To check input beam is the same for all models the maus root primary was inspected.

X	Y	Z	Px	Py	Pz
-13.8482	-16.2099	-4612.1	-7.66173	-38.6616	202.8549
39.08944	6.686461	-4612.1	12.60449	-26.7	206.6006
-10.3003	38.44315	-4612.1	47.85487	28.14727	195.4725
0.949274	19.15878	-4612.1	-1.04741	1.411665	197.2806
-40.6077	9.358773	-4612.1	-24.4708	33.85289	199.7388
-40.3039	-43.4761	-4612.1	-27.483	21.75072	201.2718
-34.7321	40.37519	-4612.1	-14.2228	29.62515	206.9881
-17.7769	37.40565	-4612.1	5.286802	13.78345	201.5066
24.82732	-70.4519	-4612.1	-27.1487	4.153026	208.6186
-30.8791	-0.66913	-4612.1	-21.3103	8.541139	210.0444
16.37379	-42.3403	-4612.1	-19.3113	-11.3202	197.5624
-26.3133	-32.9561	-4612.1	9.751074	17.30299	206.787
-23.0406	33.4516	-4612.1	36.36711	17.26431	208.1932
46.18679	-55.1276	-4612.1	-73.1542	-36.1418	206.6168
86.68498	14.45942	-4612.1	5.226779	-33.9205	198.9635
-71.4668	-43.5327	-4612.1	-49.6371	41.97487	213.0543
-26.3193	49.14559	-4612.1	39.96107	22.70702	195.3467
-14.6739	10.03781	-4612.1	-37.6417	0.943689	201.7882
-5.13638	-2.43486	-4612.1	-10.365	15.62886	198.191
-49.2541	26.57874	-4612.1	11.45334	29.8719	202.8046

Primary data the same for all models



Conclusions



- Simulations have been carried out with the following displaced by 1mm/1mrad
 - Individual magnets for both spectrometers and focus coils
 - The spectrometer modules
 - The secondary absorber modules
 - The cavity modules
 - The focus coils modules
 - The primary absorber module
- Some doubt regarding the reliability of the results so further investigations being carried out.
 - Have confirmed that the input beam is the same for all simulations.
 - Next plan to check the post processing of the results and in particular the effect the choice of cut is having on the result.