Optics runs during RSS

Optics runs with sieve and carbon target. First optic run was run 43201. Conditions were target field off, electron momentum of 3.6 and scattering angle of 13.15°. The BPMX position was -2.3mm which is beam left. (Note on coordinate systems: In the spectrometer coordinate system +X is downwards and +Y is towards small scattering angles. The "angles" of XP and YP are just dX/dZ and dY/dZ. +XSEM (BPMX) is beam right and +YSEM (BPMY) is vertical.) Second set of optics runs were runs 43355 and 43356. Conditions were target field on and at -90°, electron momentum of 4.095 and scattering angle of 13.15°. The beam position was XSEM = -9.0mm and YSEM = +4.5mm . Third set of optics runs were runs 43357 and 43358. Conditions were target field on and at -90°, electron momentum of 4.095 and scattering angle of 13.15°. The beam position was XSEM = 0.0mm and YSEM = -4.5mm .

For data when the target field was on, data was replayed using *Btheta_lab* = -90 in the *rss.kinematics* file. Other options in ENGINE (set in REPLAY.PARM): *hms_recon_type* and *hms_recon_xychoice* . *hms_recon_type* controls what how the target quantities are reconstructed and can be set to 0 (no target field and no vertical beam offset), 1 (no target field and vertical beam offset), 2 (target field and vertical beam offset). *hms_recon_xychoice* sets whether the SEM or raster adc or a combination is used to calculate the beam position at the target and it can be set to -1,0,1, or 2 . When *hms_recon_xychoice* = 1 then the SEM is used for beam position and when SEM is out-of-range then beam position is set to -25mm. When *hms_recon_xychoice* = 0 then the SEM is used for beam position and when SEM is out-of-range then beam position is set to values *n_force_SEMx* and *n_force_SEMy* which need to be set in the REPLAY.PARAM file (other wise probably set to zero). When *hms_recon_xychoice* = -1 then beam position is set to values *n_force_SEMx* and *n_force_SEMy* (units of mm) which need to be set in the REPLAY.PARAM file. When *hms_recon_xychoice* = 2, then the beam position is set by the raster adc according to a calibration factor determined by comparison to the SEM (note that the scale factor between the raster adc and SEM probably doesn't change run by run , but the centroid of the beam position might change and the centroid is fixed at the time of the calibration). Runs 43355-58 were replayed with *hms_recon_type* = 2 and *hms_recon_xychoice* = -1 with *n_force_SEMx* and *n_force_SEMy* set appropriately.

In Fig. 1,2 and 3 are plots are XP versus YP for runs 43201, runs 43355-6 and runs 43357-8. The sieve is at 166.25cm and the spectrometer is known to be 1mm low. For Run 43201 the beam was BPMX=-2.3 and BPMY=0 so expect XP=0.0006 and YP=0.0014. In Table 1 is a comparison between the expected and measured XP and YP. In the figures, the red line is the measured position.

Runs	Beam X	Beam Y	Expected XP	Measured XP	Expected YP	Measured YP
43201	-2.3mm	0.0	0.0006	0.001	-0.0014	-0.0024
43355-6	-9.0	4.5	-0.053	-0.050	-0.005	-0.0064
43357-8	0.0	-4.5	-0.059	-0.059	0.000	-0.0008

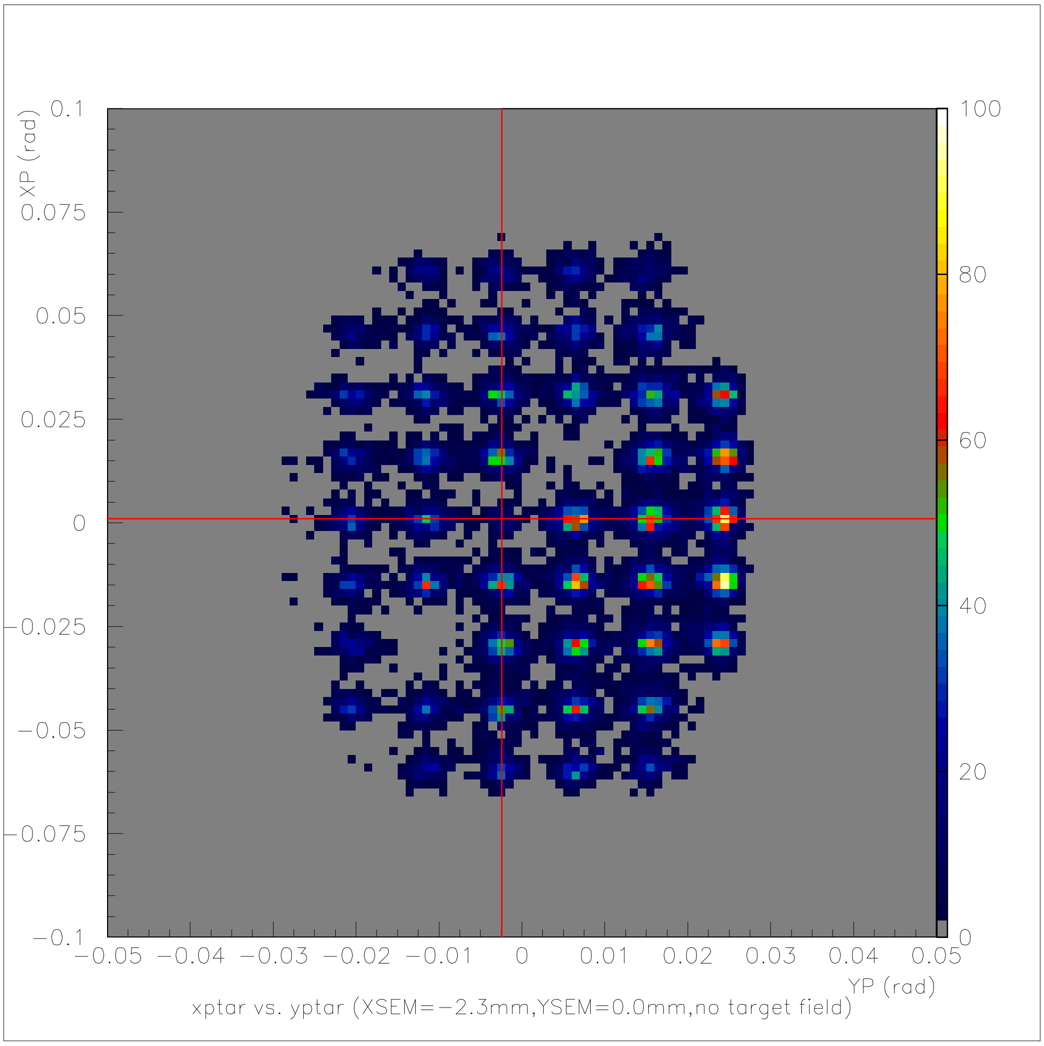

XP (rad)
0.1
0.075
0.05
0.025
0
−0.025
−0.05
−0.075
−0.1
100
80
60
40
20
0
−0.05 −0.04 −0.03 −0.02 −0.01 0 0.01 0.02 0.03 0.04 0.05
YP (rad)
xptar vs. yptar (XSEM=−2.3mm,YSEM=0.0mm,no target field)

Figure 1:

Expected	Col1		Col2		Col3		Col4		Col5		Col6	
XP	XP	Diff	XP	Diff	XP	Diff	XP	Diff	XP	Diff	XP	Diff
-0.06051	0.00000	0.00000	-0.05950	-0.00101	-0.05943	-0.00108	-0.05962	-0.00089	-0.05857	-0.00194	0.00000	0.00000
-0.04523	-0.04434	-0.00090	-0.04500	-0.00023	-0.04517	-0.00007	-0.04476	-0.00047	-0.04449	-0.00075	0.00000	0.00000
-0.02995	-0.02940	-0.00056	-0.03060	0.00064	-0.02962	-0.00033	-0.02943	-0.00053	-0.02905	-0.00091	-0.02866	-0.00129
-0.01468	-0.01475	0.00007	-0.01458	-0.00009	-0.01415	-0.00052	-0.01393	-0.00075	-0.01406	-0.00062	-0.01373	-0.00095
0.00060	0.00062	-0.00002	0.00057	0.00003	0.00073	-0.00013	0.00086	-0.00025	0.00097	-0.00037	0.00119	-0.00059
0.01588	0.01592	-0.00004	0.01578	0.00010	0.01570	0.00017	0.00000	0.00000	0.01609	-0.00021	0.01605	-0.00017
0.03116	0.03054	0.00062	0.03088	0.00028	0.03102	0.00014	0.03117	-0.00001	0.03096	0.00020	0.03060	0.00056
0.04644	0.04602	0.00041	0.04600	0.00044	0.04588	0.00056	0.04604	0.00040	0.04588	0.00056	0.00000	0.00000
0.06171	0.00000	0.00000	0.06093	0.00078	0.06057	0.00114	0.06090	0.00082	0.06047	0.00124	0.00000	0.00000

Table 1: The measured XP centriods for runs 43201 with differences to expected values. Diff is the measured XP minus the expected XP.

Row	Col1		Col2		Col3		Col4		Col5		Col6	
1	0.00000	0.00000	-0.01112	0.00057	-0.00247	0.00108	0.00663	0.00116	0.01534	0.00161	0.00000	0.00000
2	-0.02062	0.00090	-0.01157	0.00102	-0.00250	0.00112	0.00650	0.00128	0.01556	0.00139	0.00000	0.00000
3	-0.02040	0.00068	0.00000	0.00000	-0.00238	0.00099	0.00646	0.00132	0.01563	0.00132	0.02386	0.00226
4	-0.02061	0.00089	-0.01156	0.00101	-0.00248	0.00109	0.00653	0.00125	0.01554	0.00141	0.02413	0.00198
5	-0.02059	0.00087	-0.01132	0.00077	-0.00227	0.00088	0.00635	0.00144	0.01560	0.00135	0.02415	0.00196
6	-0.02057	0.00086	-0.01149	0.00094	-0.00256	0.00118	0.00000	0.00000	0.01578	0.00117	0.02437	0.00175
7	-0.02041	0.00069	-0.01145	0.00090	-0.00251	0.00113	0.00657	0.00121	0.01582	0.00113	0.02407	0.00205
8	-0.02029	0.00057	-0.01132	0.00077	-0.00257	0.00119	0.00652	0.00126	0.01544	0.00151	0.00000	0.00000
9	0.00000	0.00000	-0.01156	0.00101	-0.00257	0.00118	0.00645	0.00133	0.01477	0.00219	0.00000	0.00000
Exp	-0.01972		-0.01055		-0.00138		0.00778		0.01695		0.02612	

Table 2: The measured YP centriods for runs 43201 with differences to expected values.

row	col1	2	3	4	5	6
1	0.00000	-0.11062	-0.10713	0.00000	0.00000	0.00000
2	-0.09533	-0.09712	-0.09581	-0.09449	-0.09322	-0.08744
3	-0.08044	0.00000	-0.08078	-0.07907	-0.07849	-0.07634
4	-0.06585	-0.06543	-0.06646	-0.06480	-0.06307	-0.06385
5	-0.05079	-0.05098	-0.05106	-0.05036	-0.04991	-0.05057
6	-0.03773	-0.03675	-0.03581	0.00000	-0.03565	-0.03634
7	-0.02153	-0.02205	-0.02217	-0.02062	-0.02139	-0.02256
8	-0.00966	-0.00851	-0.00746	-0.00559	-0.00536	0.00000
9	0.00000	0.00731	0.00812	0.00755	0.00732	0.00000

Table 3: The measured XP centriods for runs 43355-6 .

row	col1	2	3	4	5	6
1	0.00000	-0.01649	-0.00708	0.00221	0.01127	0.00000
2	-0.02508	-0.01660	-0.00681	0.00222	0.01158	0.02011
3	-0.02540	0.00000	-0.00681	0.00207	0.01148	0.02040
4	-0.02501	-0.01581	-0.00685	0.00214	0.01174	0.02060
5	-0.02474	-0.01552	-0.00594	0.00216	0.01170	0.02096
6	-0.02471	-0.01561	-0.00661	0.00361	0.01196	0.02096
7	-0.02416	-0.01544	-0.00616	0.00281	0.01228	0.02115
8	-0.02417	-0.01496	-0.00599	0.00306	0.01236	0.00000
9	0.00000	-0.01499	-0.00588	0.00303	0.01185	0.00000

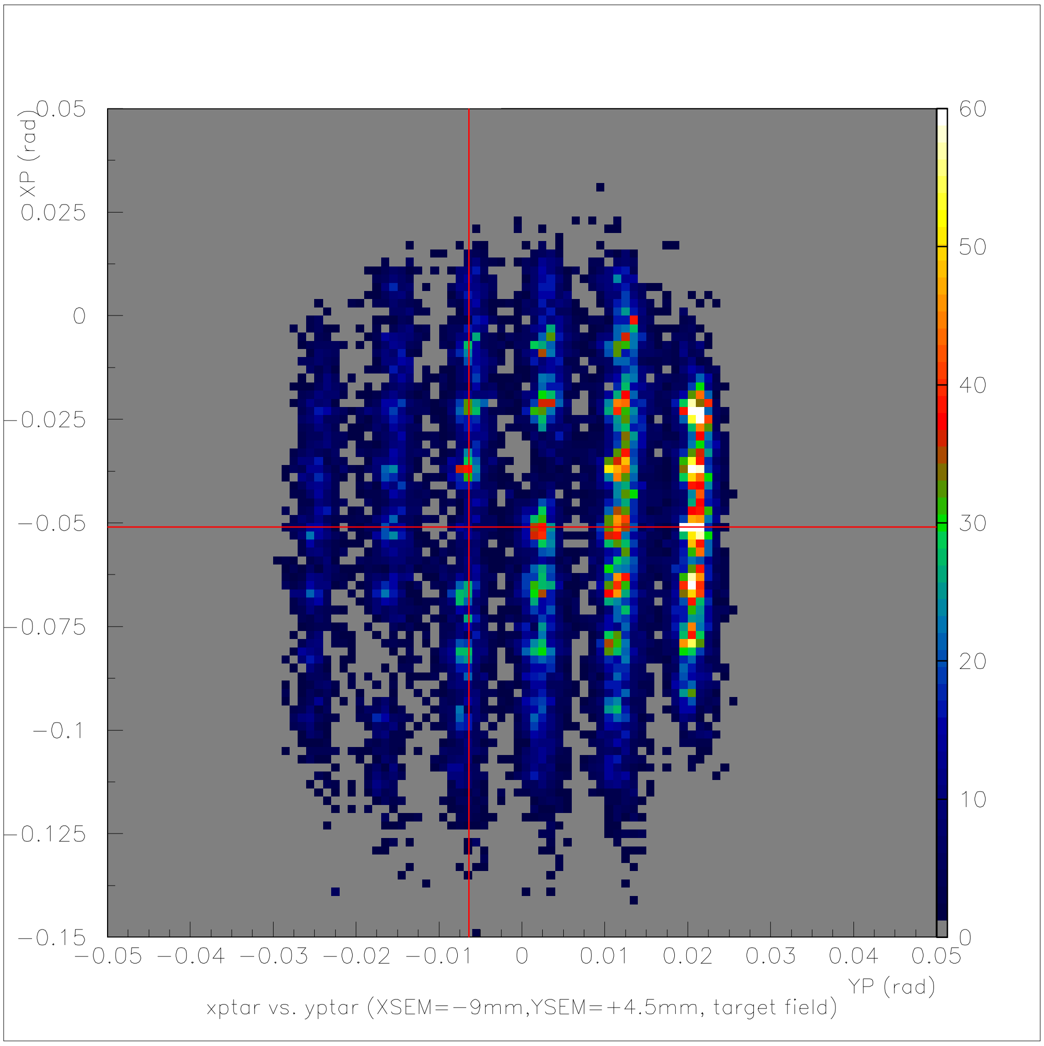
Table 4: The measured YP centriods for runs 43355-6 .

row	col1	2	3	4	5	6
1	0.00000	-0.12044	-0.12018	0.00000	0.00000	0.00000
2	-0.10314	-0.10556	-0.10664	-0.10811	-0.10846	0.00000
3	-0.08858	0.00000	-0.08866	-0.09004	-0.09283	0.00000
4	-0.07309	-0.07374	-0.07596	-0.07345	-0.07531	-0.07698
5	-0.05777	-0.05868	-0.05772	-0.05942	-0.05940	-0.06208
6	-0.04234	-0.04452	-0.04305	0.00000	-0.04310	-0.04508
7	-0.02909	-0.02950	-0.02864	-0.02762	-0.02787	-0.02744
8	-0.01410	-0.01317	-0.01344	-0.01300	-0.01302	0.00000
9	0.00002	0.00172	0.00107	0.00029	0.00020	0.00000

Table 5: The measured XP centriods for runs 43357-8 .

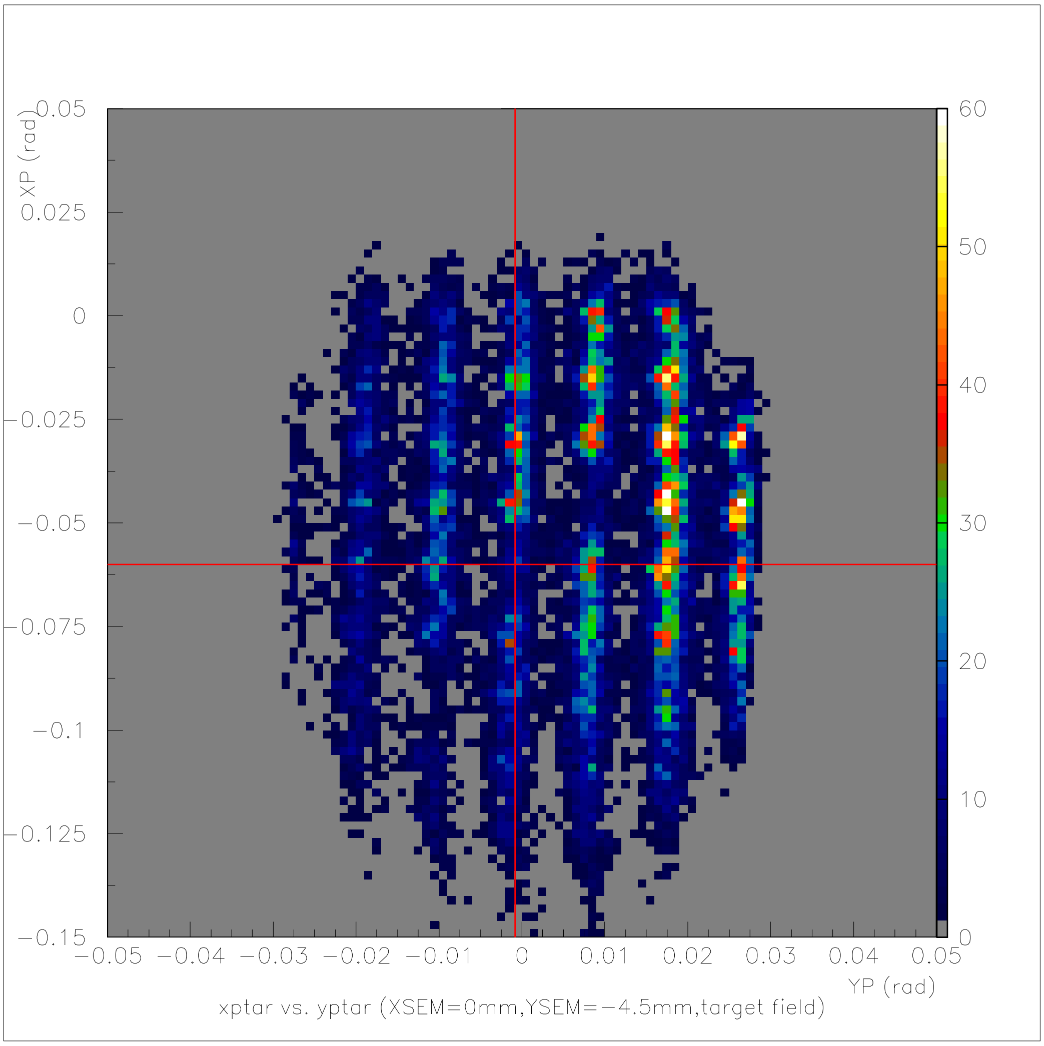
row	col1	2	3	4	5	6
1	0.00000	-0.01042	-0.00155	0.00816	0.01741	0.00000
2	-0.01995	-0.01103	-0.00143	0.00786	0.01751	0.00000
3	-0.01987	0.00000	-0.00110	0.00787	0.01757	0.02559
4	-0.01950	-0.01015	-0.00118	0.00814	0.01756	0.02601
5	-0.01944	-0.01006	-0.00066	0.00807	0.01776	0.02634
6	-0.01911	-0.00970	-0.00069	0.00000	0.01795	0.02631
7	-0.01899	-0.00959	-0.00053	0.00857	0.01789	0.02605
8	-0.01872	-0.00955	-0.00024	0.00880	0.01799	0.00000
9	-0.01820	-0.00940	-0.00020	0.00914	0.01760	0.00000

Table 6: The measured YP centriods for runs 43357-8 .



XP (rad)
0.05
0.025
0
−0.025
−0.05
−0.075
−0.1
−0.125
−0.15
60
50
40
30
20
10
0
−0.05 −0.04 −0.03 −0.02 −0.01 0 0.01 0.02 0.03 0.04 0.05
YP (rad)
xptar vs. yptar (XSEM=−9mm,YSEM=+4.5mm, target field)

Figure 2:



XP (rad)
0.05
0.025
0
−0.025
−0.05
−0.075
−0.1
−0.125
−0.15
−0.05 −0.04 −0.03 −0.02 −0.01 0 0.01 0.02 0.03 0.04 0.05
YP (rad)
60
50
40
30
20
10
0
xptar vs. yptar (XSEM=0mm,YSEM=−4.5mm,target field)

Figure 3: