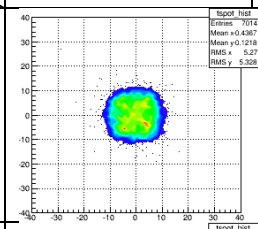
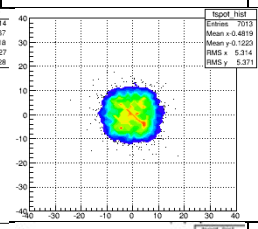
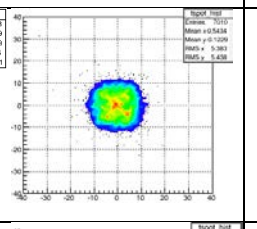
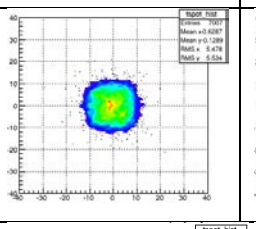
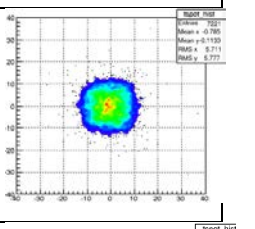
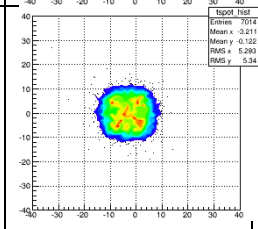
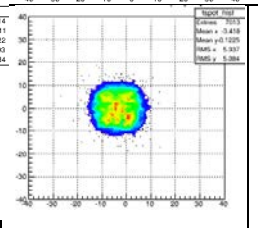
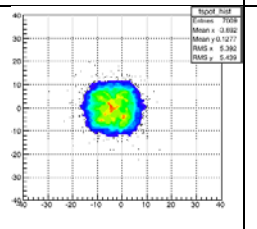
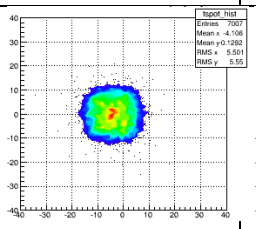
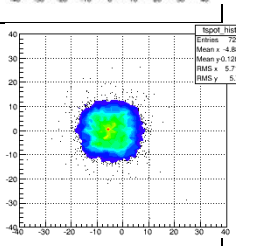
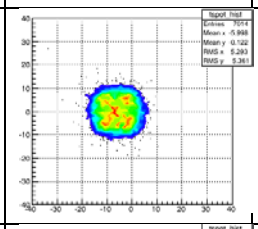
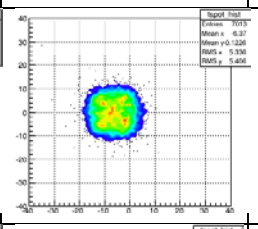
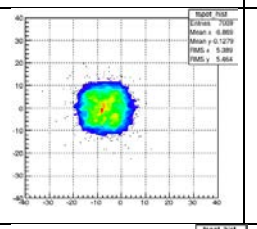
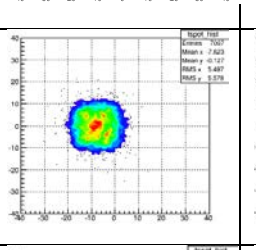
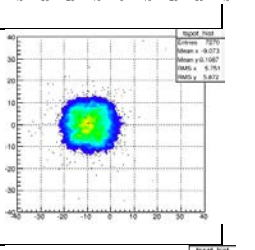
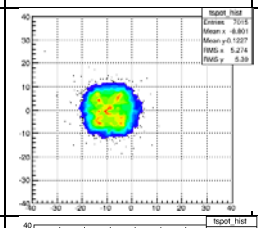
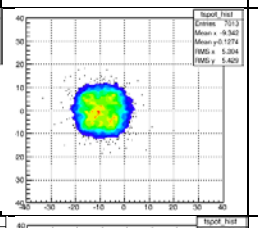
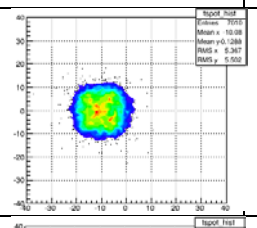
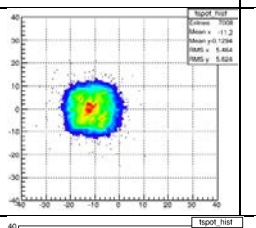
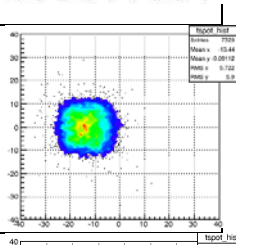
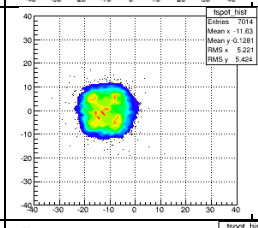
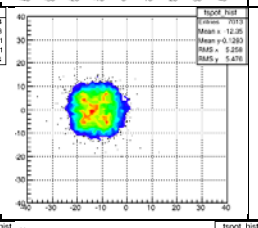
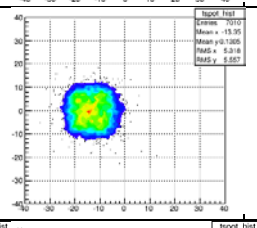
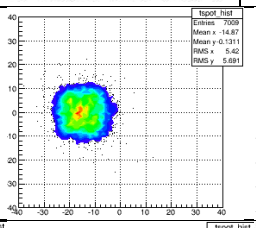
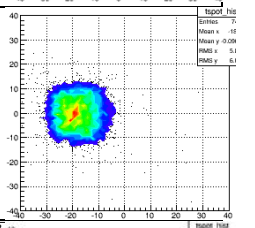
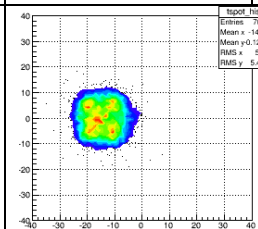
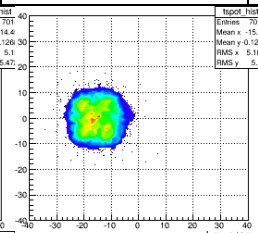
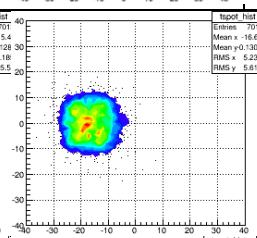
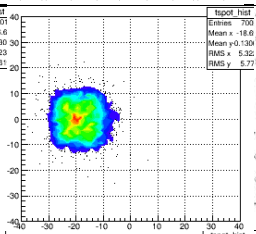
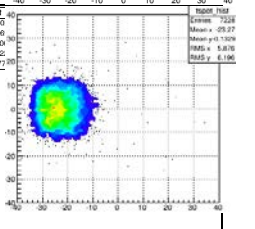
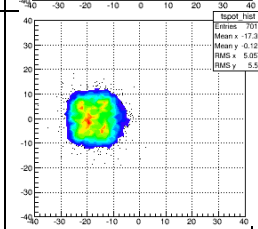
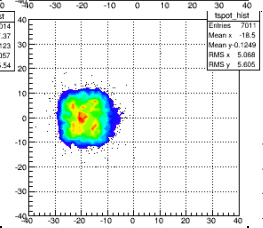
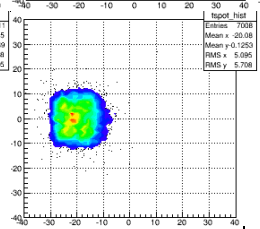
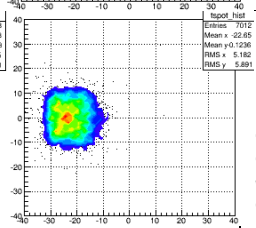
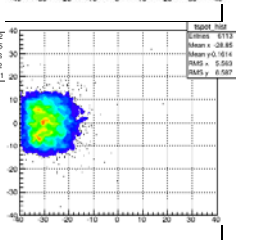
Moderator =15 kV, RA=11.9

B \ E	-10 kV	-5 kV	0	+5kV	+10kV
0 Gauss					
50					
100					
150					
200					
250					
300					

Results:

1. The magnetic field which is parallel to the sample makes the beamspot shift to the left side (look from the upstream),

2. And the electric field has little influence to the beamspot.

The mean X and mean Y are as following:

	-10kV		-5kV		0		5kV		10kV	
	meanX	meanY	meanX	meanY	meanX	meanY	meanX	meanY	meanX	meanY
0	**-0.437**	**-0.122**	**-0.482**	**-0.122**	**-0.543**	**-0.123**	**-0.629**	**-0.129**	**-0.785**	**-0.113**
50g	**-3.211**	**-0.122**	**-3.418**	**-0.123**	**-3.692**	**-0.128**	**-4.106**	**-0.129**	**-4.894**	**-0.121**
100g	**-5.998**	**-0.122**	**-6.370**	**-0.123**	**-6.869**	**-0.128**	**-7.623**	**-0.127**	**-9.073**	**-0.109**
150g	**-8.801**	**-0.123**	**-9.342**	**-0.127**	**-10.08**	**-0.129**	**-11.20**	**-0.129**	**-13.44**	**-0.091**
200g	**-11.63**	**-0.128**	**-12.35**	**-0.129**	**-13.35**	**-0.131**	**-14.87**	**-0.131**	**-18.17**	**-0.096**
250g	**-14.49**	**-0.127**	**-15.41**	**-0.128**	**-16.68**	**-0.131**	**-18.69**	**-0.131**	**-23.27**	**-0.133**
300g	**-17.37**	**-0.123**	**-18.50**	**-0.125**	**-20.08**	**-0.125**	**-22.65**	**-0.124**	**-28.85**	**-0.161**

Analysis:

So we change the parameters of Ring Anode: RA_L, RA_R: (RAL)-x+(RAL)+x=11.9x2

With the matched parameters of magnetic field and ring anode, we make the good beamspot at the center.

The corresponding parameters are as following:

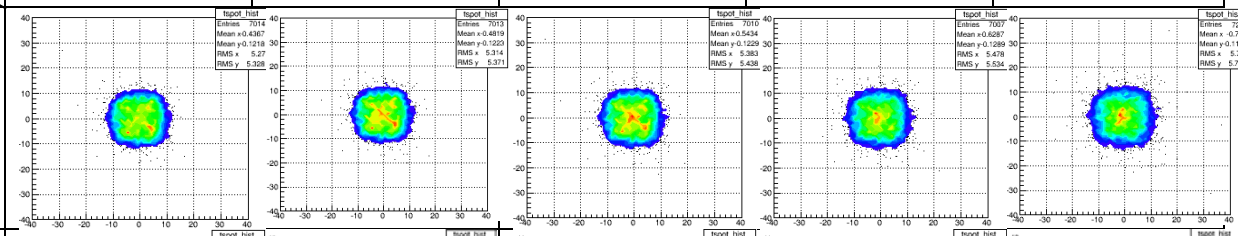
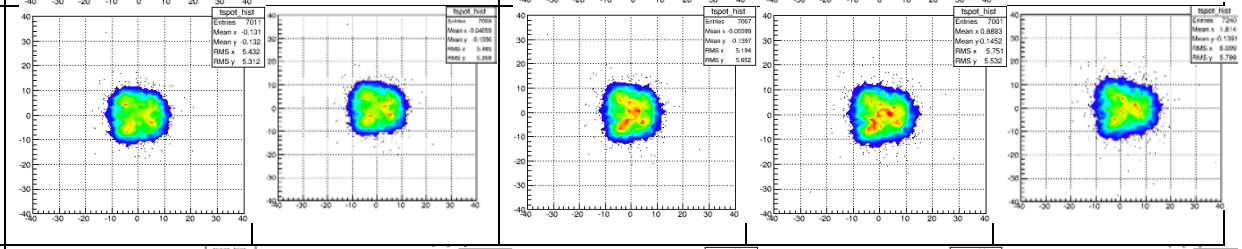
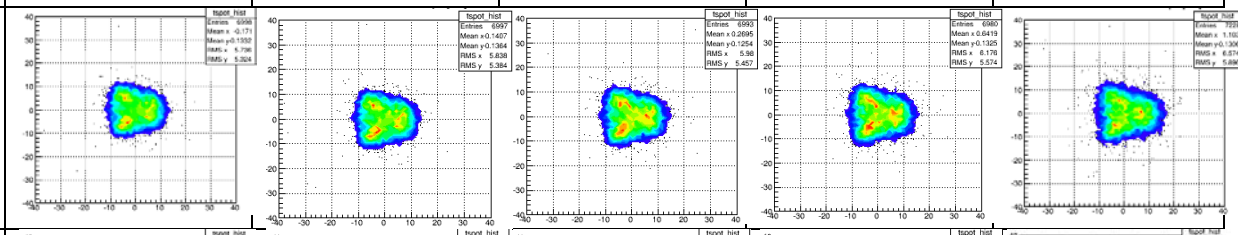
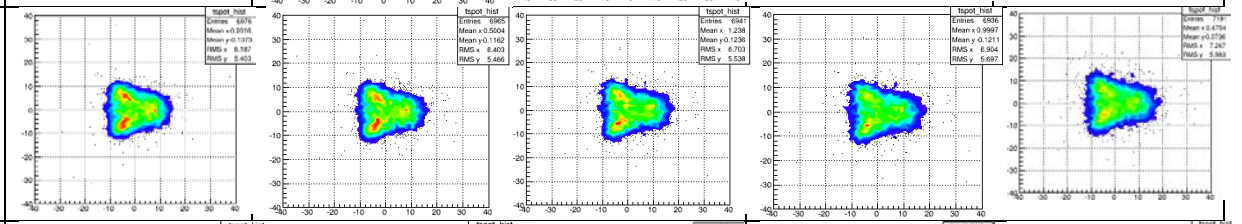
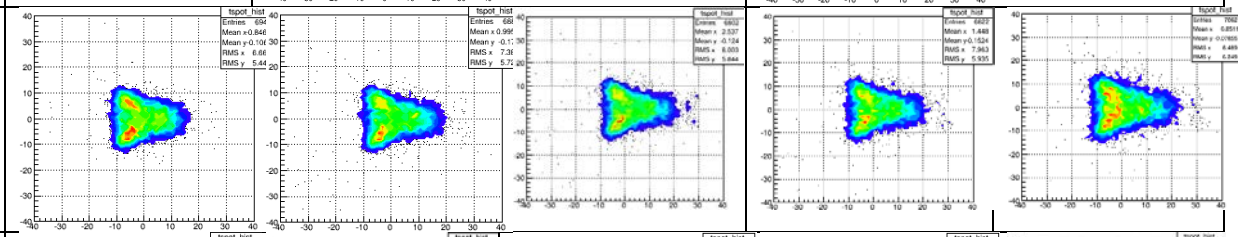
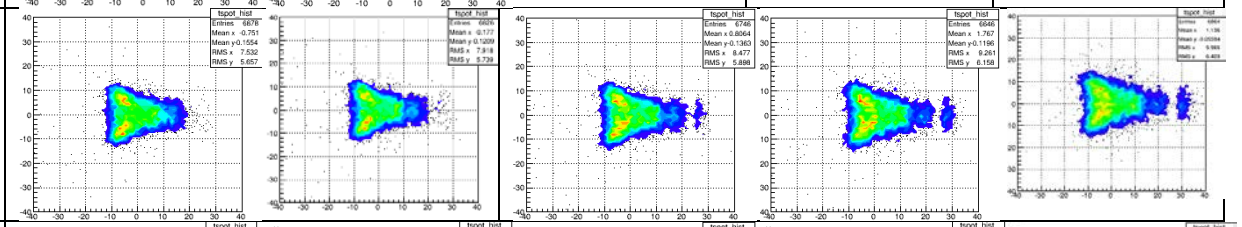
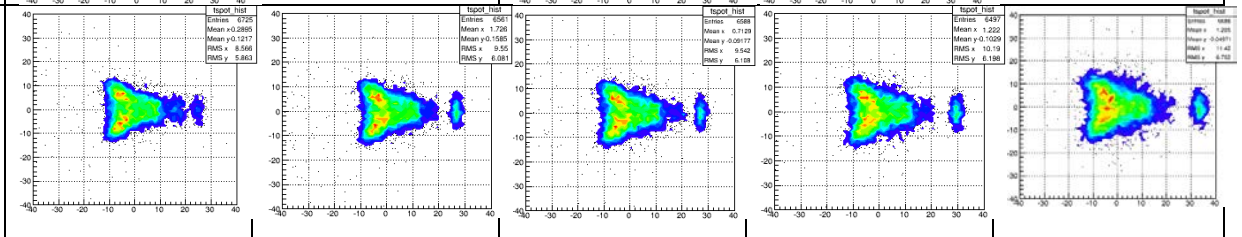
RAL+RAR=11.9*2 , and the table shows the value of RAL minus RAR : RAL-RAR

	-10kV	-5kV	0	5kV	10kV
0	0	0	0	0	0
50 g	-0.36	-0.38	-0.40	-0.50	-0.60
100g	- 0.68	-0.7	-0.76	-0.82	-0.90
150g	-1.0	-1.1	-1.2	-1.2	-1.2
200g	-1.25	-1.5	-1.7	-1.6	-1.6
250g	-1.6	-1.7	-1.85	-2.0	-2.0
300g	-2.0	-2.3	-2.2	-2.3	-2.4

After tuning the parameters of the ring anode, the beamspot at the sample are as followings.

The result shows that when the value of (RAL –RAR) increases, the shape of the beamspot will be deformed to be a triangle, which is effected by the field. The same situation also appears in the experiment.

Moderator =15 kV, RAL+RAR=11.9*2, steered beamspot using RA

B \ E	-10 kV	-5 kV	0	+5kV	+10kV
0 Gauss					
50					
100					
150					
200					
250					
300					

This below table gives the meanX and meanY of the beamspot at the sample after changing the ring anode to the corresponding parameters.

	-10kV		-5kV		0		5kV		10kV	
	meanX	meanY	meanX	meanY	meanX	meanY	meanX	meanY	meanX	meanY
0	-0.437	-0.122	-0.482	-0.122	-0.543	-0.123	-0.629	-0.129	-0.785	-0.113
50g	-0.131	-0.132	-0.041	-0.134	-0.056	-0.140	0.888	-0.145	1.814	-0.139
100g	-0.171	-0.133	-0.141	-0.136	0.267	-0.125	0.642	-0.133	1.103	-0.131
150g	-0.202	-0.137	0.050	-0.116	1.239	-0.124	0.999	-0.121	0.475	-0.074
200g	-0.846	-0.107	0.995	-0.172	2.537	-0.124	1.448	-0.152	0.851	-0.079
250g	-0.751	-0.155	-0.177	-0.121	0.806	-0.136	1.767	-0.119	1.136	-0.056
300g	-0.299	-0.122	1.726	-0.159	0.713	-0.092	1.222	-0.103	1.205	-0.050

From the 15kV the electric field at the sample has almost no effect at the beamspot, but it influences the energy of the muons, the following table give the mean energy (keV) of the muons of different magnetic and electric field at the sample, “before” means the beam is original without tuning the RA parameters, “after ” means the steered beam with the RA.

Although the electric field at the sample has almost no effect to the beamspot position, the energy of the muons at the sample shows in the following table that the electric field can moderate or accelerate muons.

	-10 kV		-5 kV		0		5 kV		10 kV	
	before	after	before	after	before	after	before	after	before	after
0	24.18	24.18	19.21	19.21	14.21	14.21	9.227	9.227	4.184	4.184
50 g	24.18	24.18	19.20	19.21	14.21	14.21	9.229	9.229	4.173	4.167
100 g	24.18	24.18	19.20	19.20	14.21	14.21	9.234	9.229	4.183	4.166
150 g	24.17	24.18	19.19	19.20	14.21	14.21	9.242	9.230	4.185	4.161
200 g	24.16	24.17	19.18	19.18	14.22	14.20	9.255	9.235	4.215	4.171
250 g	24.14	24.14	19.17	19.18	14.22	14.20	9.275	9.234	4.327	4.194
300 g	24.12	24.12	19.16	19.14	14.22	14.19	9.310	9.245	5.060	4.224

These following two tables show the fraction of the muons before tuning the RA and after tuning the RA parameter. Fraction defined as the muons at sample position between [-10,10] divided by the total muons at the sample position, which means muon fraction that 20X20 mm^2 sample can get.

20X20 mm^2 unit: %

	-10kV		-5kV		0		5kV		10kV	
	before	after	before	After	before	after	before	after	before	after
0	93.70	93.70	93.24	93.24	91.85	91.85	90.37	90.37	87.56	87.56
50g	86.04	93.33	84.34	92.67	82.39	91.65	79.55	89.00	86.18	82.86
100g	71.04	91.71	68.34	91.28	65.17	88.79	60.41	86.19	52.46	81.10
150g	54.97	88.56	51.44	85.42	46.99	81.43	40.28	73.23	28.10	64.31
200g	38.49	84.00	34.03	85.03	27.96	74.09	1.956	69.37	7.99	63.20
250g	20.86	80.53	15.61	79.63	10.44	76.92	0.474	66.38	1.03	56.46
300g	6.92	79.40	4.022	75.23	2.012	68.85	0.066	62.40	0.107	62.11

Fraction defined as the muons at sample position between [-5,5] divided by the total muons at the sample. 10X10 mm^2

	-10kV		-5kV		0		5kV		10kV	
	before	after	before	after	before	after	before	after	before	after
0	33.43	33.43	33.87	33.87	34.11	34.11	33.91	33.91	33.56	33.56
50g	31.25	32.88	31.19	32.93	30.86	32.97	29.68	31.44	26.38	29.17
100g	24.48	31.58	23.21	31.49	21.61	34.74	18.84	29.13	14.16	27.22
150g	15.43	29.73	14.02	29.27	11.52	32.41	8.404	26.08	4.41	22.94
200g	6.914	28.71	5.30	28.61	3.53	27.03	2.097	24.05	0.702	23.12
250g	1.939	27.84	1.154	27.18	0.699	26.83	0.328	25.01	0.028	20.38
300g	0.342	27.31	0.171	27.85	0.057	27.64	0.014	23.88	0	22.49