Saturday

Sunday

- start a RUN with target holder off (to see if the 3 alpha pics are from the holder) evening
- check kinematic calculations
- heat the Mugast cooling system
- add a TAC T_Agata_hf for beam intensity monitoring
- Straggling into the target (E & Theta)

start run with holder on (under way)

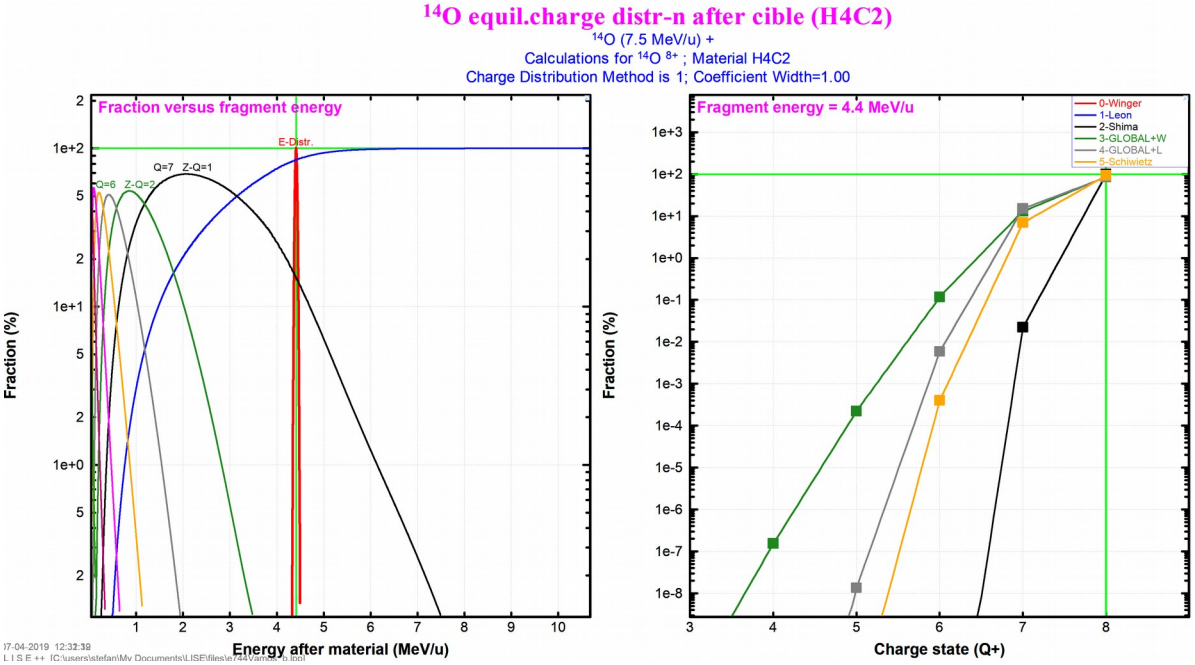
Monday

- change beam energy (E=7.50 MeV/u)
- make a hole target, diameter = 7 mm, foil quite thick
- dismount targets with gloves
- mount targets (list ..… + hole target)

    Target list (Hole Target, 200 um CH2, 100 um CH2, C target, 100 um CH2, 70 um CH2)

- remove the small DCs
- install the VAMOS finger, larger one
- to mount / or not a MCP
- Prepare *Agata Or - HFpropre* and *Agata 52 – HFpropre* for beam intensity monitoring.
- Solve the MM3 EY problems

Charge distribution after the target :



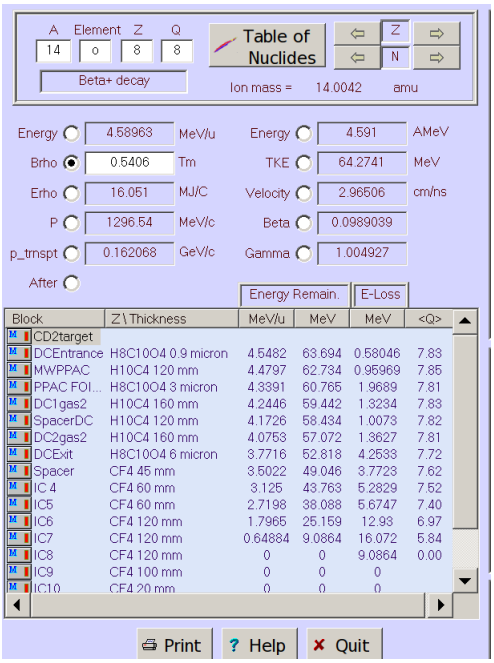
90% 8+
15% 7+

Brho Beam after the target 0.5408 Tm
Beam energy strangling dBrho/Brho=0.44% (FWHM), angular straggling 0.4°

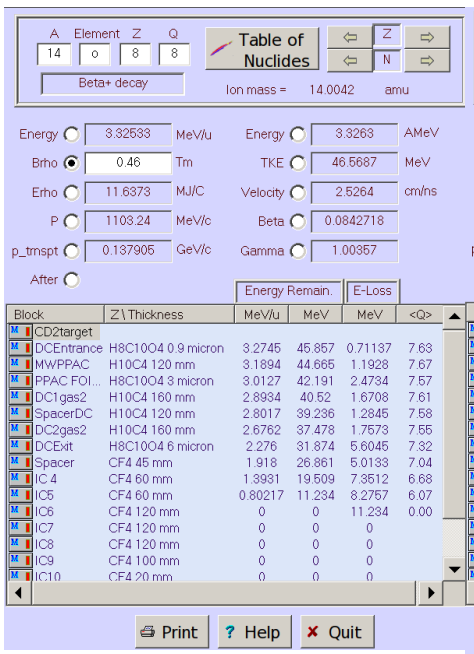
14O relevants Brho 0.45-0.51
14N relevant Brho 0.45-0.59

Fragments inside Vamos:

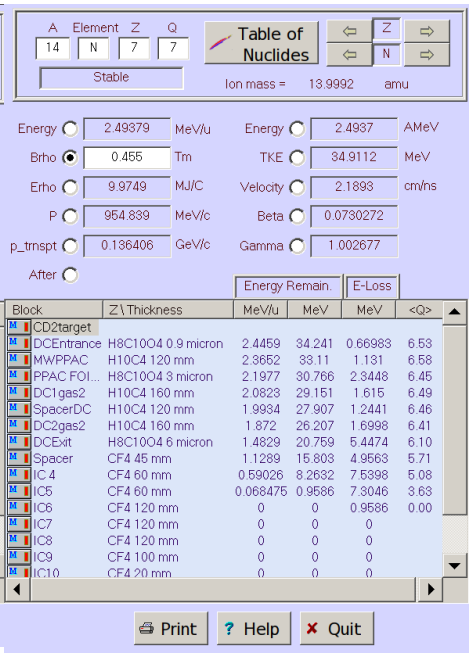
Pressure 50 mb
Beam Brho 0.5406 Tm
Beam stops in 5th IC 49 MeV/64MeV
Lowest 14O stops in 3rd IC 26 MeV/46 mev
Lowest 14N stops in 3rd IC 17 MeV / 35 MeV
Highest 14N stops in 7th IC 47 MeV / 58 MeV



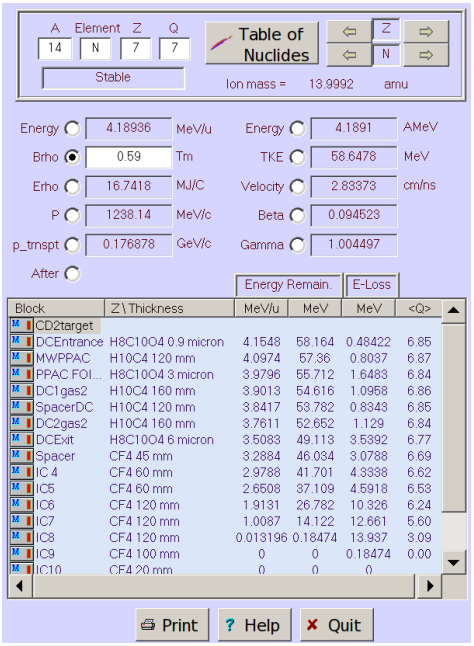
Beam 14O



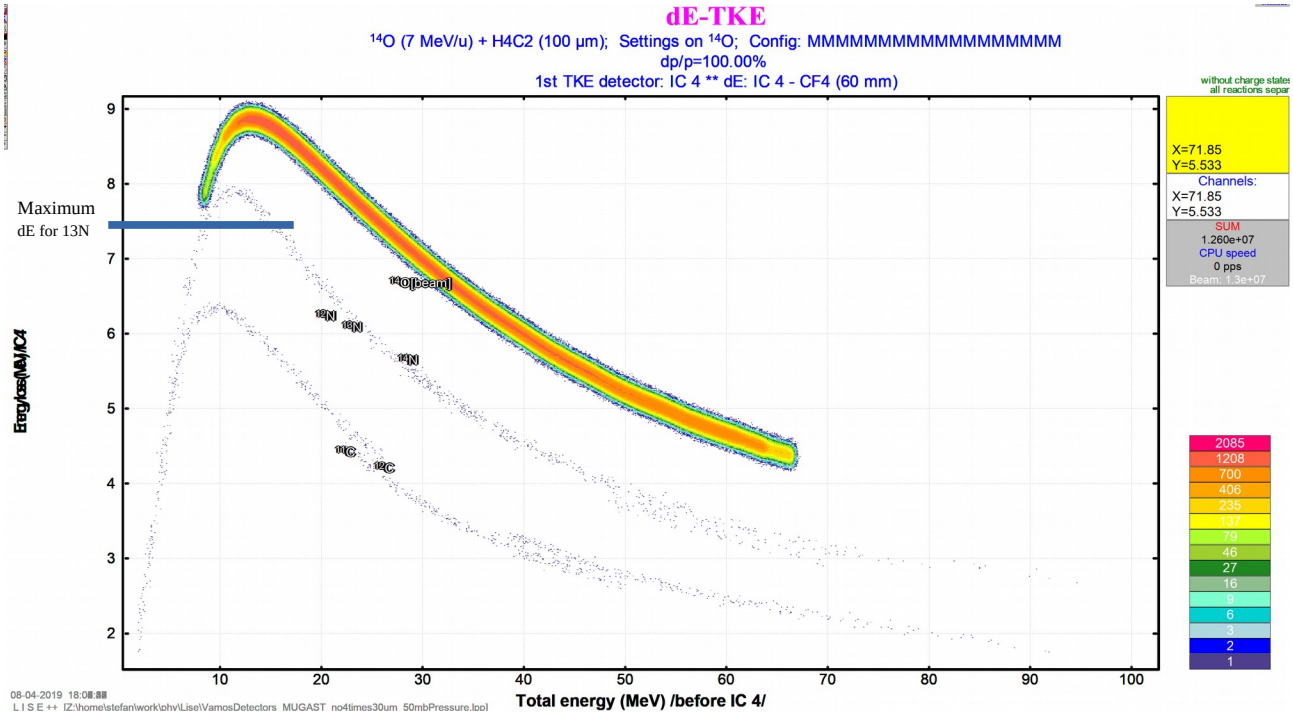
14O Low Brho



14N lowest Brho



14N highest Brho



Identification with Vamos (dE vs total energy). Blue line shows the maximum dE possible for E744 experiment.

Vamos simulation (this changed a bit with final beam energy but in relativ is ok)

Kinematics of 1H(14O,gamma p)14O (left) and vamos selection

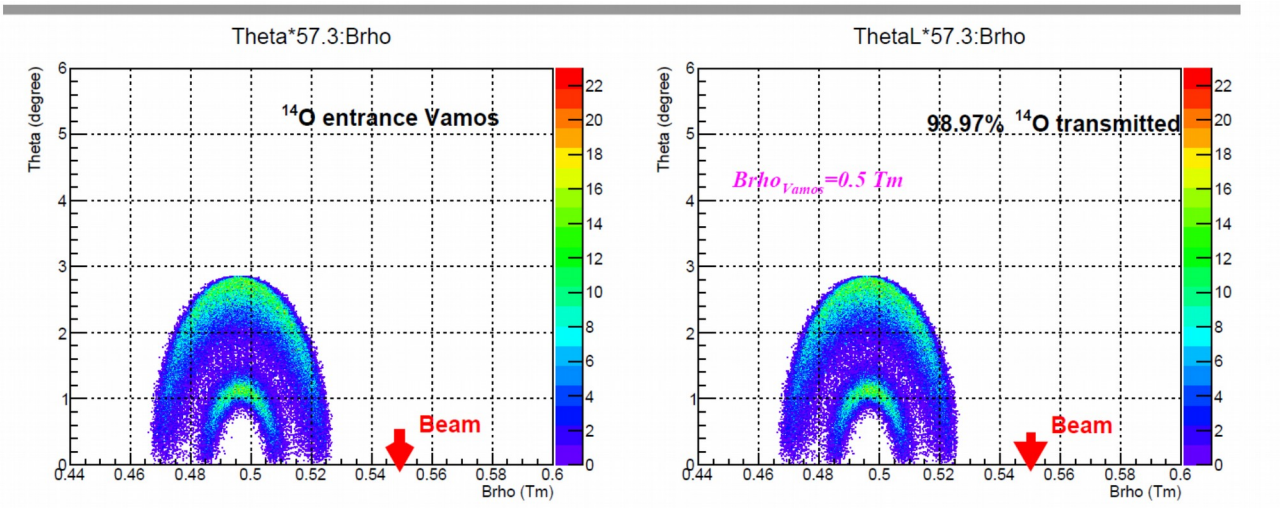


Figure 2 Transmission of the ^{14}O trough Vamos. Brho for the ^{14}O beam is 0.55 Tm and the ^{14}O of interest is found between (0.46 to 0.53 Tm). Brho of reference for Vamos used in the simulation ~ 0.5 Tm

Kinematics of 1H(14O,p p)13N (left) and vamos selection

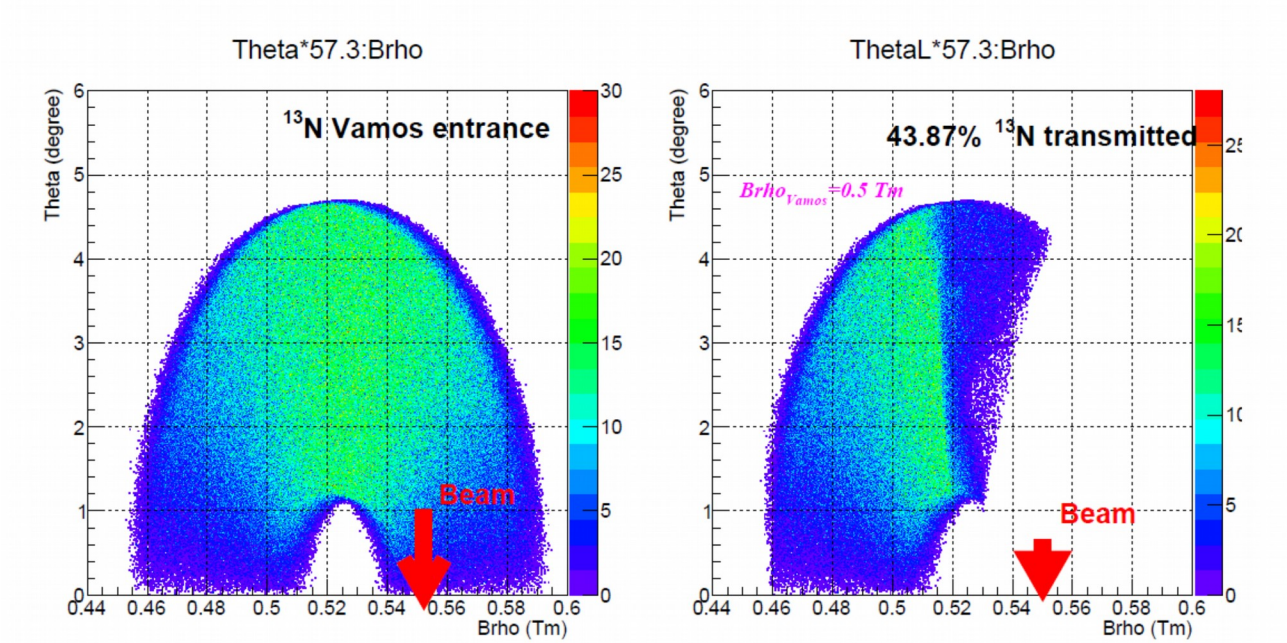


Figure 3 Transmission of ^{13}N trough Vamos. Brho for the ^{13}N of interest if between 0.45 to 0.58 Tm. Brho of reference for Vamos ~ 0.5 Tm

Peace 4 simulation of fusion evaporation for 14O beam on 12C :

All heavy fragments have low energy
Protons are produced with 1.5 barn cross-section
Alfa with 1 barn
gammas with 4.5 barns

Target will contain 1.2 e+21 nucleons (1/3 carbon)
for 1e+5 pps 14O
at forward angles (10-40 degrees) :
protons have 158+195+228 mb cross-sec → 32 counts/s (mainly between 1-9 MeV)
alfas have 214+267+293 mb cross-section → 43 counts/s (mainly between 1-12 MeV)

1.Yields of residual nuclei

Z	N	A	events	percent	x-section(mb)
14	12	**26 Si**	1	0.1%	0.783
12	12	**24 Mg**	4	0.4%	3.13
13	10	**23 Al**	4	0.4%	3.13
12	11	**23 Mg**	62	6.2%	48.5
11	12	**23 Na**	33	3.3%	25.8
11	11	**22 Na**	36	3.6%	28.2
10	12	**22 Ne**	3	0.3%	2.35
11	10	**21 Na**	35	3.5%	27.4
10	11	**21 Ne**	4	0.4%	3.13
11	9	**20 Na**	2	0.2%	1.57
10	10	**20 Ne**	270	27%	211
10	9	**19 Ne**	14	1.4%	11
9	10	**19 F**	30	3%	23.5

10	8	**18 Ne**	5	0.5%	3.91
10	7	**17 Ne**	1	0.1%	0.783
9	8	**17 F**	47	4.7%	36.8
8	8	**16 O**	377	37.7%	295
8	7	**15 O**	2	0.2%	1.57
7	8	**15 N**	32	3.2%	25
8	6	**14 O**	1	0.1%	0.783
7	6	**13 N**	19	1.9%	14.9
6	6	**12 C**	13	1.3%	10.2
5	4	**9 B**	5	0.5%	3.91
TOTAL			1000	100%	783

Proton spectra in laboratory coordinates 2017 events

Energy range (MeV)	Angular range (deg) 0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90	90 - 100	100 - 110	110 - 120	120 - 130	130 - 140	140 - 150	150 - 160	160 - 170	170 - 180
0.0-1.0		1		2	3	1	3	2	4	7	6	7	8	7	5	2	1	1
1.0-2.0			1	1	3	4	10	14	19	13	15	5	11	3	4	2		1
2.0-3.0				1	9	10	14	16	18	11	14	11	5	6	5	7	3	1
3.0-4.0					9	8	11	15	25	14	12	12	9	5	7	3	3	1	
4.0-5.0			2		7	8	14	22	16	16	12	8	11	6	8	5	1	2	
5.0-6.0		3		1	11	13	19	16	13	7	8	7	9	7	5		1	2	1
6.0-7.0		4		9	17	15	15	12	14	8	10	5	4	3	3	1	3		
7.0-8.0	1	6		13	11	23	25	21	13	6	5	7	3	3	2		2	3	1
8.0-9.0	4	15		14	21	15	22	16	15	4	5	4	1	1	1	4		1	
9.0-10.0		8		19	16	15	14	8	8	7	6	6		3		2			
10.0-11.0	5	8		17	16	11	13	7	9	5	9	4		1					
11.0-12.0	5	7		14	19	10	7	14	14	4	5	1	2						
12.0-13.0	1	11		9	18	19	9	9	4	3	3	2	1	1		1			
13.0-14.0	3	14		9	3	15	6	10	8	2	1	1			1				
14.0-15.0	6	4		10	6	11	9	5	1	4									
15.0-16.0	4	8		14	6	10	4	5	4	2	1		1						
16.0-17.0		12		7	9	8	5	4	3	1	2								
17.0-18.0	1	8		8	9	4	5	2		2									
18.0-19.0	3	10		9	10	4	2	3	1	2	3								
19.0-20.0		2		10	7	3	5	2	1	1									
20.0-21.0	2	7		3	5	7	2		1										
21.0-22.0		4		6	3	2	2	3											
22.0-23.0		3		4	2		5			1									
23.0-24.0	2	3		3	3	1	3	1											
24.0-25.0	2	4		4	5	1	1		1										
25.0-26.0	2	7		1	2	1	1												
26.0-27.0	1	2		3	1	2	1												
27.0-28.0	2	1		1	3	1													
28.0-29.0		1		1	1	1													
29.0-30.0	1	2		1	1														
Above 30.0	1	3		3	3	1	1												
Total	46	158		195	228	224	216	202	183	130	113	92	64	54	43	30	21	13	5
dSig/dOmega	4e+02	4e+02		3e+02	3e+02	2e+02	2e+02	2e+02	1e+02	9e+01	8e+01	7e+01	5e+01	5e+01	4e+01	4e+01	4e+01	4e+01	4e+01
0.0 - 5.0		1		3	20	31	40	64	73	71	55	55	43	35	31	22	15	7	3
5.0 - 10.0	5	36		56	76	81	95	73	63	32	34	29	17	17	11	7	6	6	2
10.0 - 20.0	28	84		107	103	95	65	61	45	26	24	8	4	2	1	1			
Above 20.0	13	37		29	29	17	16	4	2	1									

Alpha spectra in laboratory coordinates 1398 events

Energy range (MeV)	Angular range (deg) 0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90	90 - 100	100 - 110	110 - 120	120 - 130	130 - 140	140 - 150	150 - 160	160 - 170	170 - 180
0.0-1.0		1		3	5	5	5	3	1		3	1			1	1		
1.0-2.0		4	8	3	5	7	8	2	4	1	3	3	2		1			
2.0-3.0		4	4	9	9	10	9	4	6	1	6	4	1	2	1			
3.0-4.0	1	3	4	10	7	8	8	3	5	2	1	1			1			
4.0-5.0		2	7	10	12	9	6	6	2	4	2	1						
5.0-6.0		3	9	13	15	6	8	4	5	2	1	1			1			
6.0-7.0			5	13	16	13	5	4	1	1	1							
7.0-8.0		1	10	19	11	9	4	5	2	1		1						
8.0-9.0		1	9	8	14	11	4	3	1									
9.0-10.0	1	4	7	23	11	6	4		2									
10.0-11.0	2	3	5	19	12	5	4	1	1	3								
11.0-12.0		1	11	17	6	4	2		2		2							
12.0-13.0	2	4	18	15	3	6	2	2										
13.0-14.0	1	5	8	10	5	3	2	1	1	1								
14.0-15.0	2	7	14	12	6	3	2	2	1									
15.0-16.0		11	12	8	1	6	2	1										
16.0-17.0	2	7	16	12		5												
17.0-18.0	4	7	11	13	5	1	5											
18.0-19.0	3	11	9	6	1	4	1											
19.0-20.0	4	12	10	7	3	2												
20.0-21.0	5	6	7	8	4	4												
21.0-22.0	7	7	3	5	1	3	1	1										
22.0-23.0	2	9	13	4	3	1												
23.0-24.0	4	13	6	5	2	3		1										
24.0-25.0	4	8	8	8		1												
25.0-26.0	3	8	3	2	1													
26.0-27.0	2	9	3	6	3	3												
27.0-28.0	6	6	2	4	2	1	1											
28.0-29.0	2	5	4	7	2		2											
29.0-30.0	3	8	4		1													
Above 30.0	29	44	37	14	9	1												
Total	89	214	267	293	175	140	85	43	34	16	19	12	3	2	5	1		
dSig/dOmega	7e+02	6e+02	5e+02	4e+02	2e+02	1e+02	7e+01	3e+01	2e+01	1e+01	1e+01	9	3	2	6	2	0	0
0.0 - 5.0	1	14	23	35	38	39	36	18	18	8	15	10	3	2	4	1		
5.0 - 10.0	1	9	40	76	67	45	25	16	11	4	2	2			1			
10.0 - 20.0	20	68	114	119	42	39	20	7	5	4	2							
Above 20.0	67	123	90	63	28	17	4	2										

Gamma ray spectrum 7425 events

Emission from unbound and bound states(*), and total gamma ray spectrum
(*) note that emission of a particle from an unbound state is not allowed in the code if Ecm is less than Emin

Energy range (MeV)	Unbound	Bound	TOTAL
0.0 - 1.0	4	422	426
1.0 - 2.0	2535	4457	6992
3.0 - 4.0	1	0	1
5.0 - 6.0	1	0	1
6.0 - 7.0	1	0	1
8.0 - 9.0	1	0	1
9.0 - 10.0	1	0	1
11.0 - 12.0	1	0	1
12.0 - 13.0	1	0	1
Total	2546	4879	7425