JIOSS 2018

BAM GROUP

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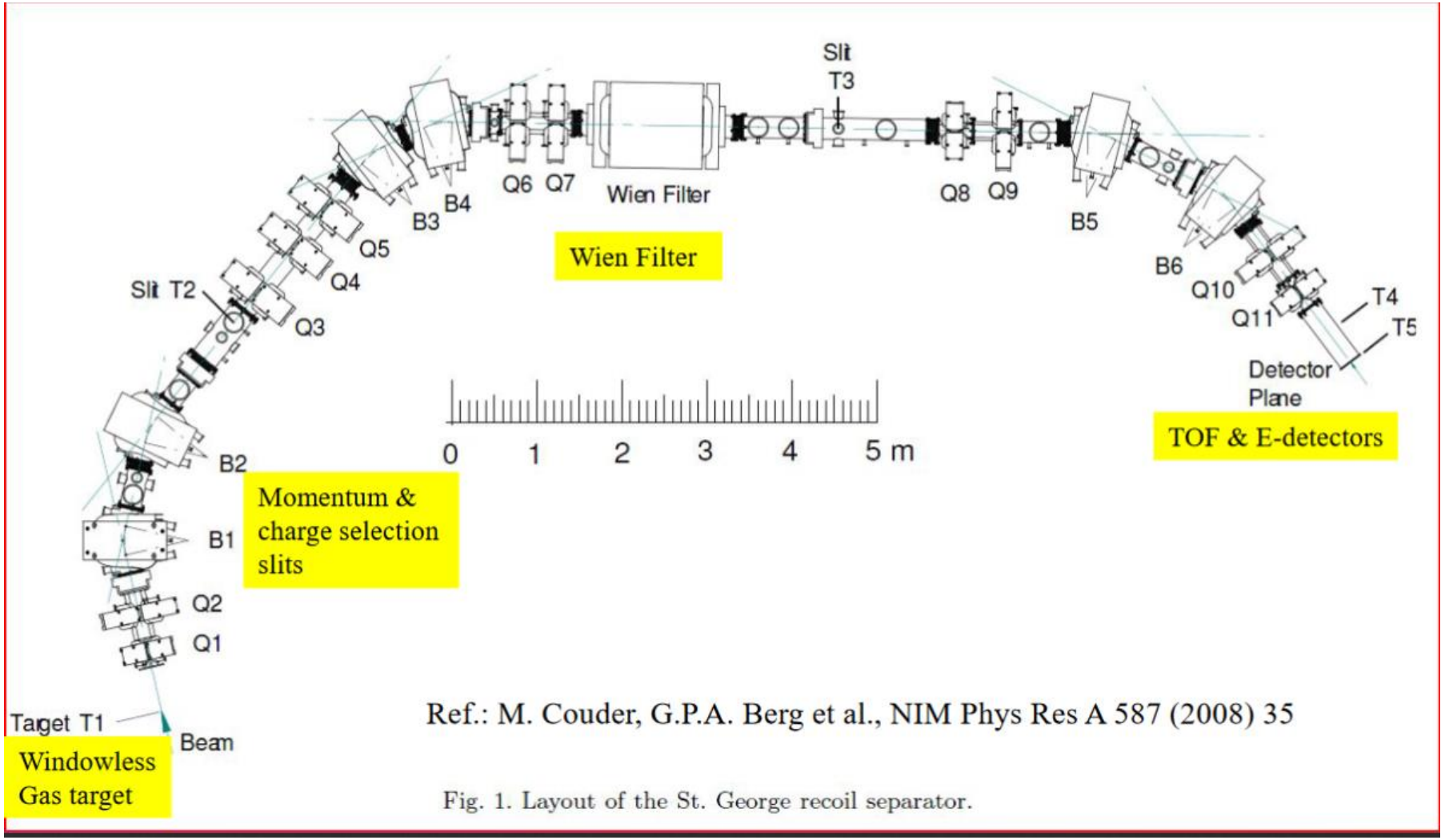
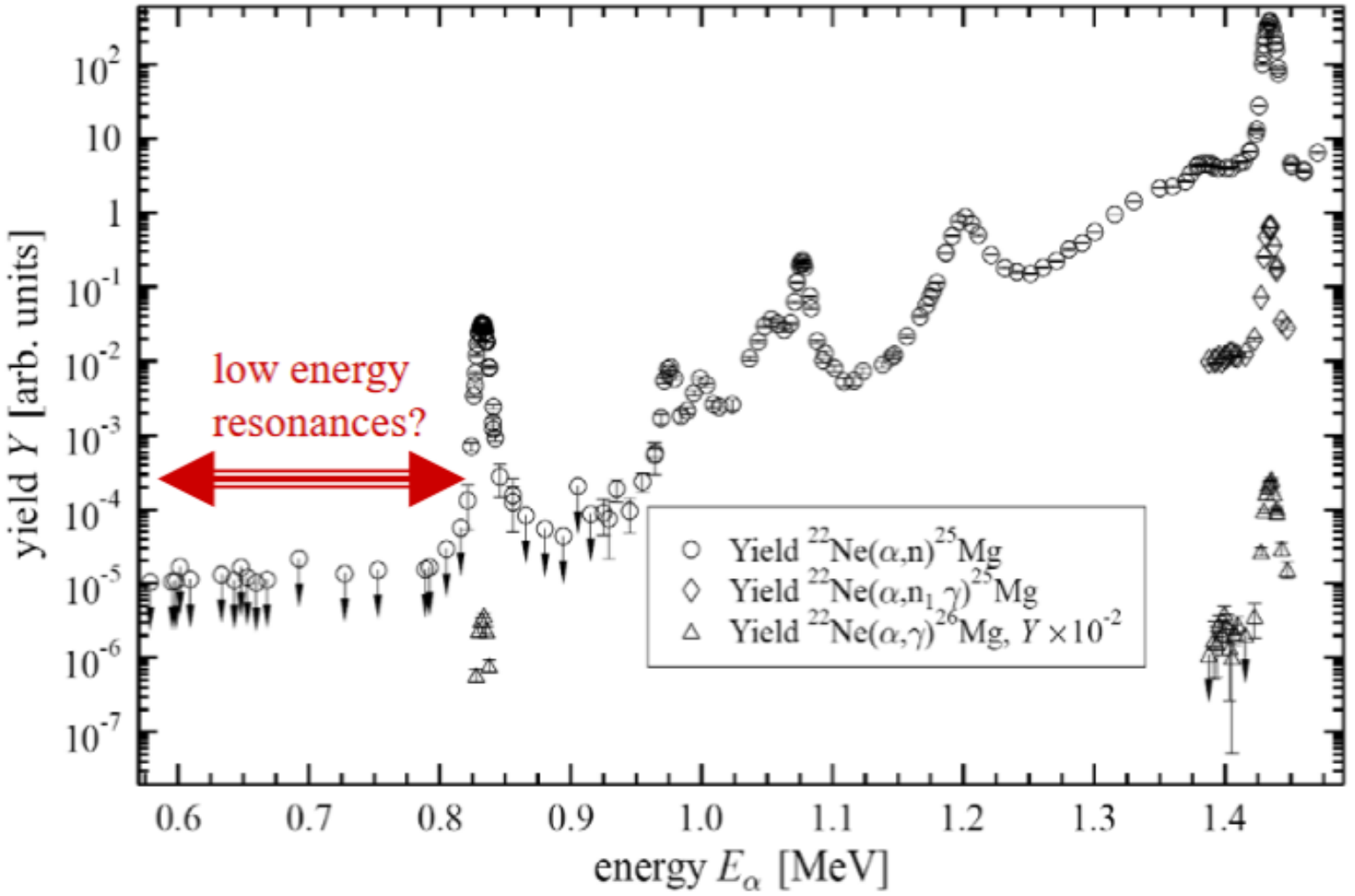


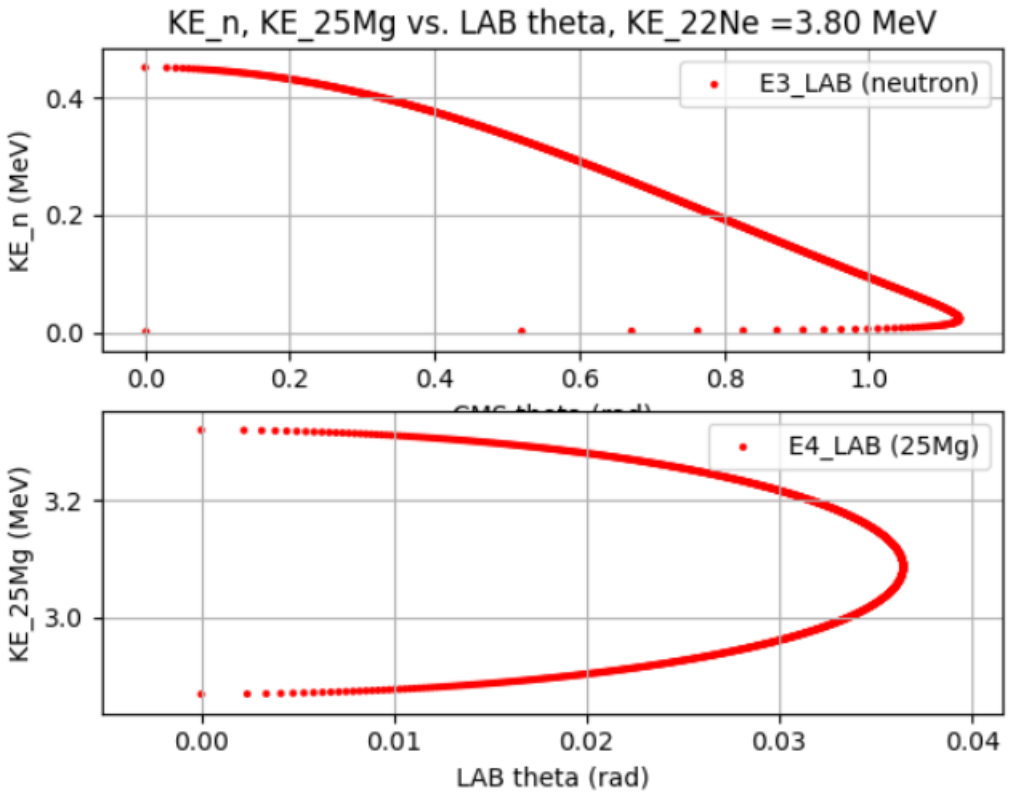
From G. Berg lecture 3

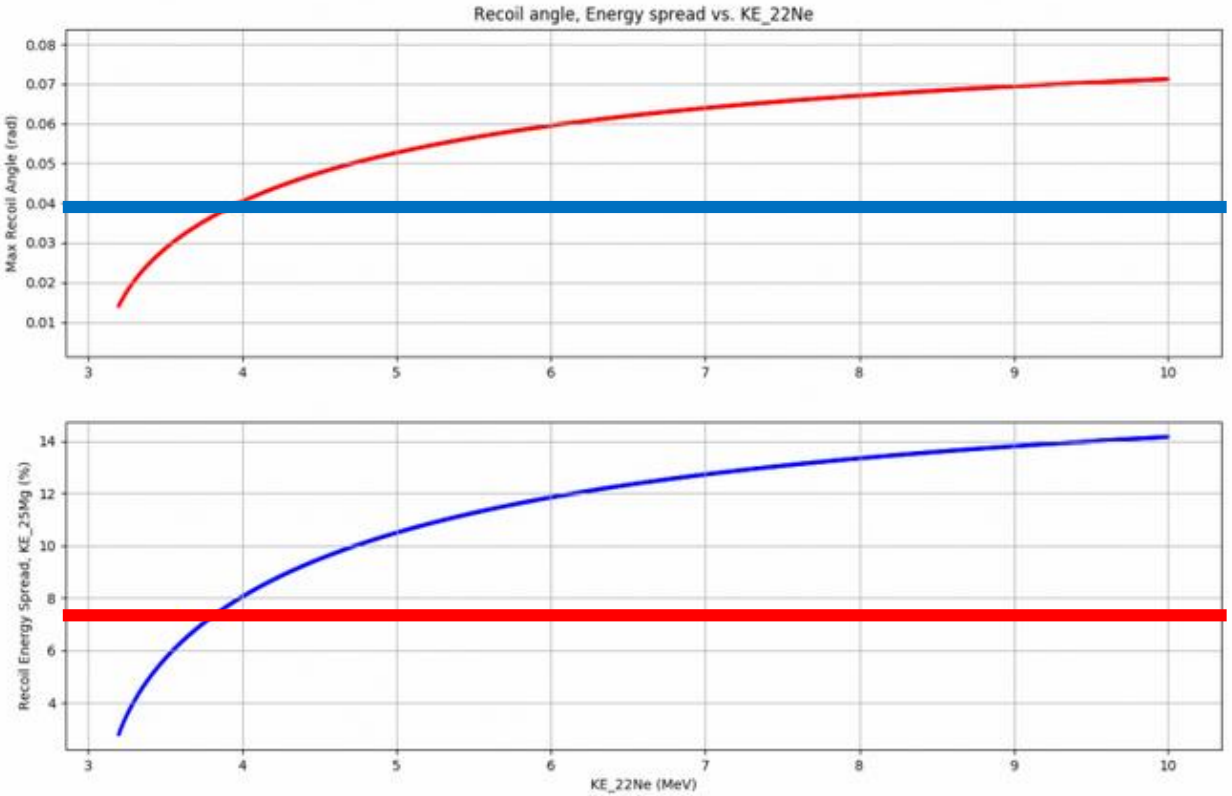
$^{22}Ne(\alpha,n)^{25}Mg$

- Key neutron source in astrophysical s-process
- Low energy resonances are difficult to measure due to low cross sections



Kinematics Calculations



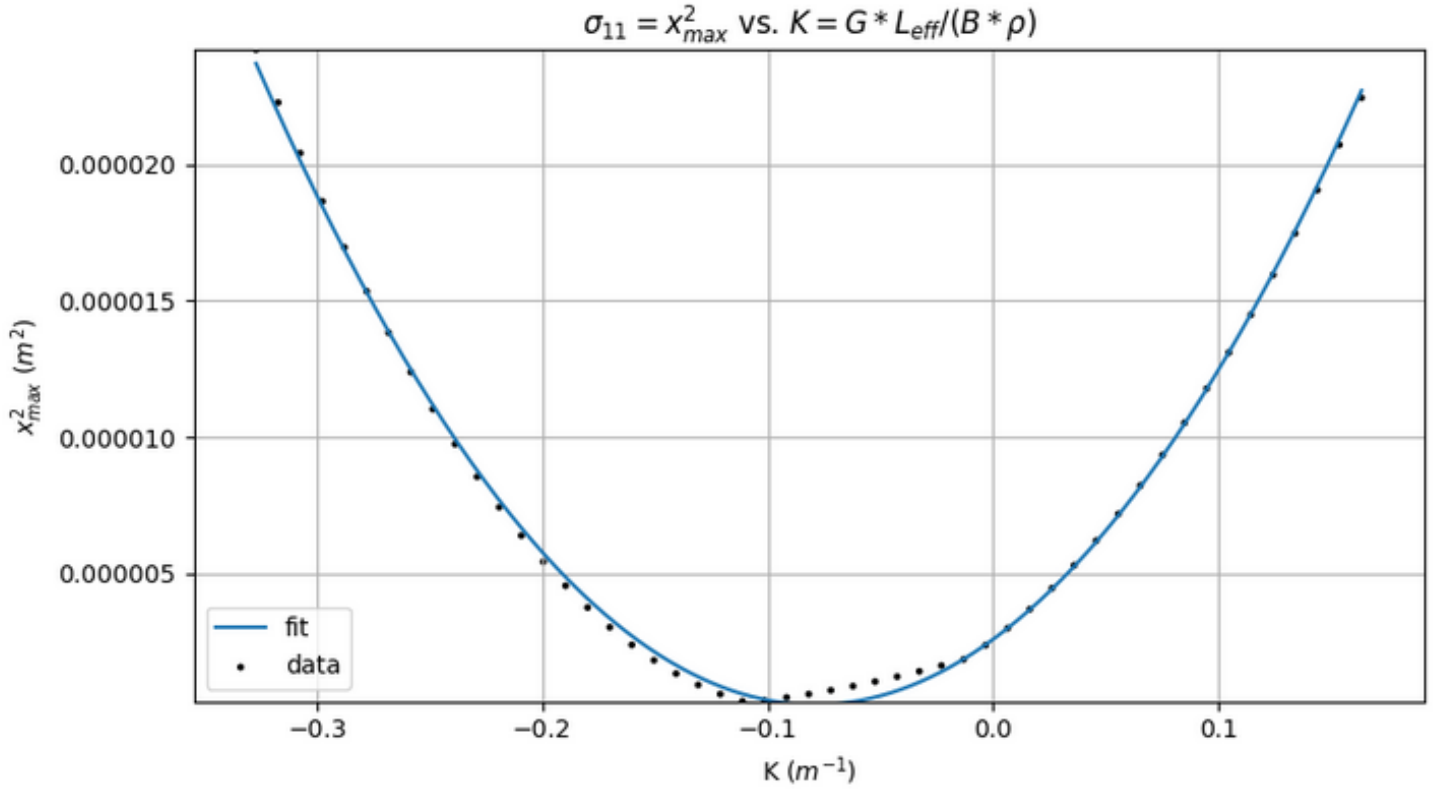


Emittance Calculation

$$\sigma_{11} = \frac{P_1}{L^2}$$

$$\sigma_{12} = \frac{1}{L^2}\left(\frac{P_2}{2} - L\sigma_{11}\right)$$

$$\sigma_{22} = \frac{1}{L^2}(P_3 - \sigma_{11} - 2L\sigma_{12})$$



Model: P1*x^2 + P2*x + P3
P1 = 3.82e-04+/-2.03e-06 m^2
P2 = 6.05e-05+/-4.22e-07 m^3
P3 = 2.59e-06+/-5.20e-08 m^2

ε - RAYS = 0.2 mm*mrad

ε - FIT = 0.23 mm*mrad

Problem 8

Value Changed	Amount of change to decrease mass resolution by 5%
Beam position	Change x-position by 0.5 mm
Beam size	Increase X variable by .1 mm
Q3 length	Increase length by 2 mm
Shift in Q3 position	Shift by .5 mm in x Shift by 5 mm in y
Shift in Q3 pitch	.05˚
Shift in Q3 roll	.15˚
Shift in Q3 yaw	2.3˚

```
{##########################################################################}
{############################## RECOIL_LINE PROCE ###########################}
{##########################################################################}
{ACTUAL RECOIL SEPARATOR DESCRIPTION}

PROCEDURE RECOIL_LINE;

FR FRINGEFIELD;


{ shift the beam alignment axis - parameterize! }

SA X_CEN*PARA(3) Y_CEN;
```

You can use the one remaining variable to parameterize the ‘knob’ you want to turn

COSY beam manual SECTION 5.2 – MAPS WITH KNOBS

1ST ORDER TERMS OF MAP – WITH NEW PARAMETER

map(1)

I	COEFFICIENT	ORDER	EXPONENTS											
1	-.1872347881706920E-02	0	0	0	0	0	0	0	0	0	0	0	0	0
2	1.877757398983927	1	1	0	0	0	0	0	0	0	0	0	0	0
3	-.1049505486834457E-01	1	0	1	0	0	0	0	0	0	0	0	0	0
4	0.1046086373218358E-01	1	0	0	0	0	0	1	0	0	0	0	0	0
5	-.5230380743704411	1	0	0	0	0	0	0	1	0	0	0	0	0
6	0.5125771435662508	1	0	0	0	0	0	0	0	1	0	0	0	0
7	-.1877757398983249E-02	1	0	0	0	0	0	0	0	0	1	0	0	0

THIS IS THE FIRST ‘ROW’ OF THE MAP, IE. X|X, X|A, ETC

Command: ME(1,7) – first order

MEP(1,7) – full expansion

map(1)

I	COEFFICIENT	ORDER	EXPONENTS							
1	-.1872347881706920E-02	0	0	0	0	0	0	0	0	0
2	1.877757398983927	1	1	0	0	0	0	0	0	0
3	-.1049505486834457E-01	1	0	1	0	0	0	0	0	0
4	0.1046086373218358E-01	1	0	0	0	0	1	0	0	0
5	-.5230380743704411	1	0	0	0	0	0	1	0	0
6	0.5125771435662508	1	0	0	0	0	0	0	1	0
7	-.1877757398983249E-02	1	0	0	0	0	0	0	0	1
8	-5.440224228536041	2	2	0	0	0	0	0	0	0
9	-8.874645534563387	2	1	1	0	0	0	0	0	0
10	-.2383286469240236	2	0	2	0	0	0	0	0	0
11	124.4047842257572	2	0	0	2	0	0	0	0	0
12	24.79329351984255	2	0	0	1	1	0	0	0	0
13	-1.266711749515370	2	0	0	0	2	0	0	0	0
14	-.6987342554204905	2	1	0	0	0	0	1	0	0
15	0.8438301298813808	2	0	1	0	0	0	1	0	0
16	-.7791601746220626	2	1	0	0	0	0	0	1	0
17	1.152561721565428	2	0	1	0	0	0	0	1	0
18	1.478095759886789	2	1	0	0	0	0	0	0	1
19	-1.985677746371350	2	0	1	0	0	0	0	0	1
20	0.1088044845707253E-01	2	1	0	0	0	0	0	0	1
21	0.8874645534564152E-02	2	0	1	0	0	0	0	0	1
22	0.1503652527231618	2	0	0	0	0	0	2	0	0
23	0.8396625410881839	2	0	0	0	0	0	1	1	0
24	0.6844836856998975	2	0	0	0	0	0	0	2	0
25	-1.150852121113378	2	0	0	0	0	0	1	0	1
26	-1.685590036797115	2	0	0	0	0	0	0	1	1
27	1.161930745467778	2	0	0	0	0	0	0	0	2
28	0.6987342554196995E-03	2	0	0	0	0	0	1	0	0	1
29	0.7791601746212066E-03	2	0	0	0	0	0	0	1	0	1
30	-.1478095759886545E-02	2	0	0	0	0	0	0	0	1	1
31	-.5440224227482955E-05	2	0	0	0	0	0	0	0	0	2
32	30.59401653958650	3	3	0	0	0	0	0	0	0	0
33	24.28682190775137	3	2	1	0	0	0	0	0	0	0
34	-46.77028046149081	3	1	2	0	0	0	0	0	0	0
35	-39.83294305274318	3	0	3	0	0	0	0	0	0	0
36	1748.008703550093	3	1	0	2	0	0	0	0	0	0
37	4453.384644558641	3	0	1	2	0	0	0	0	0	0
38	-171.6457483203178	3	1	0	1	1	0	0	0	0	0
39	-556.2198123352076	3	0	1	1	1	0	0	0	0	0
40	38.83790854169925	3	1	0	0	2	0	0	0	0	0
41	29.26498897666480	3	0	1	0	2	0	0	0	0	0
42	-13.14485505834837	3	2	0	0	0	0	1	0	0	0
43	-5.459391301259312	3	1	1	0	0	0	1	0	0	0
44	8.324578281800699	3	0	2	0	0	0	1	0	0	0
45	1278.417272325712	3	0	0	2	0	0	1	0	0	0
46	-325.9666872822384	3	0	0	1	1	0	1	0	0	0
47	-17.42768212456246	3	0	0	0	2	0	1	0	0	0
48	-12.40686679428707	3	2	0	0	0	0	0	1	0	0
49	-4.053217856664109	3	1	1	0	0	0	0	1	0	0
50	8.426378157181880	3	0	2	0	0	0	0	1	0	0
51	1247.019558761220	3	0	0	2	0	0	0	1	0	0
52	-327.9633565636537	3	0	0	1	1	0	0	1	0	0
53	-17.33301956786568	3	0	0	0	2	0	0	1	0	0
54	25.35016688804086	3	2	0	0	0	0	0	0	1	0

700+ TERMS IN FIRST ROW ONLY TO 5TH ORDER!

• • •

BEAM AXIS OFFSET PARAMETER IS THE 9TH VARIABLE – MAP CONTAINS EXACT BEHAVIOR OF THIS PARAMETER TO 5TH ORDER

697	178.1693550600182	5	0	0	0	0	0	2	3	0	0
698	85.59486752995038	5	0	0	0	0	0	1	4	0	0
699	14.96912811180452	5	0	0	0	0	0	0	5	0	0
700	-194.0432194696581	5	0	0	0	0	0	4	0	1	0
701	-745.9363619216208	5	0	0	0	0	0	3	1	1	0
702	-1087.147718344976	5	0	0	0	0	0	2	2	1	0
703	-709.1004097012213	5	0	0	0	0	0	1	3	1	0
704	-168.7689917748073	5	0	0	0	0	0	0	4	1	0
705	759.9464440344781	5	0	0	0	0	0	3	0	2	0
706	2194.871618106822	5	0	0	0	0	0	2	1	2	0
707	2150.516835128320	5	0	0	0	0	0	1	2	2	0
708	704.2876125448227	5	0	0	0	0	0	0	3	2	0
709	-1475.773523554040	5	0	0	0	0	0	2	0	3	0
710	-2867.328518886878	5	0	0	0	0	0	1	1	3	0
711	-1419.834744927795	5	0	0	0	0	0	0	2	3	0
712	1429.598420243209	5	0	0	0	0	0	1	0	4	0
713	1408.198807414961	5	0	0	0	0	0	0	1	4	0
714	-555.2218535031629	5	0	0	0	0	0	0	0	5	0
715	0.1667744191985188E-01	5	0	0	0	0	0	4	0	0	1
716	0.1638888938109926	5	0	0	0	0	0	3	1	0	1
717	0.2682288132242548	5	0	0	0	0	0	2	2	0	1
718	0.1300006292871064	5	0	0	0	0	0	1	3	0	1
719	-.5804144566087702E-02	5	0	0	0	0	0	0	4	0	1
720	-.3518812229738481	5	0	0	0	0	0	3	0	1	1
721	-1.317982225410263	5	0	0	0	0	0	2	1	1	1
722	-1.231167514985418	5	0	0	0	0	0	1	2	1	1
723	-.2445781074175534	5	0	0	0	0	0	0	3	1	1
724	1.466836823209949	5	0	0	0	0	0	2	0	2	1
725	3.050505802578581	5	0	0	0	0	0	1	1	2	1
726	1.292755663842724	5	0	0	0	0	0	0	2	2	1
727	-2.286924688874939	5	0	0	0	0	0	1	0	3	1
728	-2.189865887694161	5	0	0	0	0	0	0	1	3	1
729	1.239307631713371	5	0	0	0	0	0	0	0	4	1
730	-.1280076450856367E-03	5	0	0	0	0	0	3	0	0	2
731	-.1785078379126259E-03	5	0	0	0	0	0	2	1	0	2
732	-.2068407645037738E-03	5	0	0	0	0	0	1	2	0	2
733	-.1593451268945805E-03	5	0	0	0	0	0	0	3	0	2
734	0.3293411528871123E-03	5	0	0	0	0	0	2	0	1	2
735	0.3262849389575504E-03	5	0	0	0	0	0	1	1	1	2
736	0.4441375491376023E-03	5	0	0	0	0	0	0	2	1	2
737	-.5411510321690852E-04	5	0	0	0	0	0	1	0	2	2
738	-.1607018406507461E-03	5	0	0	0	0	0	0	1	2	2
739	-.2123825277161838E-03	5	0	0	0	0	0	0	0	3	2
740	-.4426225477296242E-06	5	0	0	0	0	0	2	0	0	3
741	-.5883773554047693E-06	5	0	0	0	0	0	1	1	0	3
742	-.5300418746908254E-06	5	0	0	0	0	0	0	2	0	3
743	0.1154291721619793E-05	5	0	0	0	0	0	1	0	1	3
744	0.1331577979793430E-05	5	0	0	0	0	0	0	1	1	3
745	-.8574398483214640E-06	5	0	0	0	0	0	0	0	2	3
746	-.3381367532481148E-09	5	0	0	0	0	0	1	0	0	4
747	-.3570654956550669E-09	5	0	0	0	0	0	0	1	0	4
748	0.5890361081546728E-09	5	0	0	0	0	0	0	0	1	4
749	-.5931103736982083E-11	5	0	0	0	0	0	0	0	0	5