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Version 4.34.14 ** 11:55 ** 21-08-2024

P A C E 4

modified JULIAN

projection angular-momentum coupled evaporation Monte Carlo code

angular distributions obtained using M-states of angular momentum

********** *Fusion xsection taken from Bass model*

Bass fusion xsection for E = 362 *MeV is* 984.74 *mb*

Fusion radius = 9.6 *fm. Barrier height is* 60.3074 *MeV*

Transmission probability for a one-dimens. barrier: **Classical**

Starting conditions

	Z	N	A	Spin
Projectile	36	48	84	0
Target	13	14	27	0
Compound nucleus	49	62	111	

Bombarding energy (MeV)	362.00
Center of mass energy (MeV)	88.05
Compound nucleus excitation energy (MeV)	76.810
Q-value of reaction (MeV)	-11.244
Compound nucleus recoil energy (MeV)	273.946
Compound nucleus recoil velocity (cm/ns)	2.184e+00
Compound nucleus velocity/c	7.279e-02
Beam velocity (cm/ns)	2.886e+00
Beam velocity/c	9.619e-02

*** Input transmission coefficients determined by input value of TL diffuseness.

*** diffuseness = 2.00

*** Optical model input calculation bypasses. *********

Experimental fusion cross section (mb)	9.85e+02
Fusion L-grazing	51.32
Fusion L-diffuseness	2.00
Yrast spin at maximum excitation energy	76
Compound nucleus formation cross section (mb)	9.85e+02

Partial cross sections (mb)									
J	**SIG(J)**	**J**	**SIG(J)**	**J**	**SIG(J)**	**J**	**SIG(J)**	**J**	**SIG(J)**
0	0.36	14	11	28	21	42	31	56	3.6
1	1.1	15	11	29	22	43	31	57	2.3
2	1.8	16	12	30	22	44	32	58	1.5
3	2.6	17	13	31	23	45	32	59	0.91
4	3.3	18	14	32	24	46	32	60	0.57
5	4	19	14	33	24	47	31	61	0.35
6	4.7	20	15	34	25	48	30	62	0.22
7	5.5	21	16	35	26	49	28	63	0.13
8	6.2	22	16	36	27	50	24	64	0.083
9	6.9	23	17	37	27	51	20	65	0.051
10	7.7	24	18	38	28	52	16		
11	8.4	25	19	39	29	53	12		
12	9.1	26	19	40	29	54	8.2		
13	9.9	27	20	41	30	55	5.5		

***Spherical nucleus level density

*** Input fission barrier = 48.72 MeV at L=0 taken from Sierk

*** G.S. little A multiplied by factor 1 to obtain saddle level density

*** No fission calculation for barrier above 30 MeV

*** Little-A = MASS / 10

Energy range for	**neutron**	**proton**	**alpha**	**gamma**
minimal	0.01	1.10	2.19	0.00

minimal	40.00	30.74	55.84	20.00

*** Internal probability discriminator of program set to 0.002

Number of cascades is 1000

Optical model parameters for light emitted particles

V	*E	*E**2	R0R	ARD	R0C	W0	*E	*E**2	R01	AID	RMCHD	NPD	IMAG	IRAD
47.010	-0.267	-0.002	1.276	0.660	0.000	9.520	-0.053	0.000	1. 26874	0.48	0.000	250.000	SURF	1.000
55.299	-0.550	0.000	1.250	0.650	1.250	13.500	0.000	0.000	1.25	0.47	0.000	250.000	SURF	1.000
50.000	0.000	0.000	7.392	0.576	5.622	14.655	0.000	0.000	7. 39202	0.576	0.000	250.000	VOL	0.000

E.M.Transition strengths in Weisskopf units

E1 = 0.000014 M1 = 0.010000 E2 = 5.900000 M2 = 0.000880

*** Gilbert - Cameron spin cutoff parameter used

Output results for compound nucleus decay

1. Yields of residual nuclei

Z	N	A	events	percent	x-section(mb)
49	58	**107 In**	38	3.8%	37.4
48	59	**107 Cd**	22	2.2%	21.7
47	60	**107 Ag**	2	0.2%	1.97
49	57	**106 In**	182	18.2%	179
48	58	**106 Cd**	308	30.8%	303
47	59	**106 Ag**	34	3.4%	33.5
49	56	**105 In**	16	1.6%	15.8
48	57	**105 Cd**	39	3.9%	38.4
47	58	**105 Ag**	10	1%	9.85

47	57	**104**	**Ag**	51	5.1%	50.2
46	58	**104**	**Pd**	16	1.6%	15.8
47	56	**103**	**Ag**	166	16.6%	163
46	57	**103**	**Pd**	58	5.8%	57.1
45	58	**103**	**Rh**	2	0.2%	1.97
47	55	**102**	**Ag**	11	1.1%	10.8
46	56	**102**	**Pd**	6	0.6%	5.91
45	57	**102**	**Rh**	2	0.2%	1.97
45	56	**101**	**Rh**	11	1.1%	10.8
44	57	**101**	**Ru**	2	0.2%	1.97
45	55	**100**	**Rh**	21	2.1%	20.7
44	56	**100**	**Ru**	2	0.2%	1.97
45	54	**99**	**Rh**	1	0.1%	0.985
TOTAL				1000	100	984.693

2. Angular distribution results

*** Spin alignment perpendicular to recoil axis - standard compound nucleus angular distribution

2.1 Energy and angular distribution of residual nucleus Z = 49 and N = 58 (107In)

Residual velocity/c Vz = 7.32e-02(sig = 1.32e-03) rms Vxy = 1.60e-03

Energy Range	**Angular range (deg)**																	
(MeV)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Below 195																		
240 - 245		1																
245 - 250	1	1																
250 - 255	1	3																
255 - 260		4																
260 -	2	3	1															

265																		
265 - 270	3	4																
270 - 275	7	3																
275 - 280	1	2																
280 - 285		1																
Above 340																		
Total	15	22	1															
dSig/dOmeg	1.5e+04	7.5e+03	2.1e+02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0 - 195																		
195 - 270	7	16	1															
270 - 345	8	6																
Above 345																		

2.2 Energy and angular distribution of residual nucleus Z = 48 and N = 59 (107Cd)

Residual velocity/c Vz = 7.53e-02(sig = 1.19e-03) rms Vxy = 2.11e-03

Energy Range	**Angular range (deg)**																	
(MeV)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Below 195																		
250 - 255		3																
255 - 260			3															
260 - 265	1	2	1															
265 - 270	3		1															

270 - 275	2		1															
275 - 280	3	1	1															
Above 340																		
Total	9	6	7															
dSig/dOmeg	9.3e+03	2.1e+03	1.4e+03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0 - 195																		
195 - 270	4	5	5															
270 - 345	5	1	2															
Above 345																		

2.3 Energy and angular distribution of residual nucleus Z = 49 and N = 57 (106In)

Residual velocity/c Vz = 7.56e-02(sig = 1.14e-03) rms Vxy = 1.72e-03

Energy Range	**Angular range (deg)**																	
(MeV)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Below 195																		
235 - 240	1																	
240 - 245		1																
245 - 250	1	2																
250 - 255	9	5	3															
255 - 260	14	17	2															
260 - 265	12	23	5															
265 -	21	18	6															

270																		
270 - 275	8	12	2															
275 - 280	10	4																
280 - 285	2	3	1															
Above 340																		
Total	78	85	19															
dSig/dOmeg	8e+04	2.9e+04	3.9e+03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0 - 195																		
195 - 270	58	66	16															
270 - 345	20	19	3															
Above 345																		

2.4 Energy and angular distribution of residual nucleus Z = 48 and N = 58 (106Cd)

Residual velocity/c Vz = 7.49e-02(sig = 1.24e-03) rms Vxy = 1.67e-03

Energy Range	**Angular range (deg)**																	
(MeV)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Below 195																		
235 - 240	1																	
240 - 245		3																
245 - 250	3	12																
250 - 255	19	13																
255 - 260	21	23	7															

260 - 265	29	42	6															
265 - 270	33	25	5															
270 - 275	13	17	4															
275 - 280	6	9	3															
280 - 285	7	4																
285 - 290	1	2																
Above 340																		
Total	133	150	25															
dSig/dOmeg	1.4e+05	5.1e+04	5.1e+03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0 - 195																		
195 - 270	106	118	18															
270 - 345	27	32	7															
Above 345																		

2.5 Energy and angular distribution of residual nucleus Z = 47 and N = 59 (106Ag)

Residual velocity/c Vz = 7.49e-02(sig = 1.07e-03) rms Vxy = 1.78e-03

Energy Range	**Angular range (deg)**																	
(MeV)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Below 195																		
245 - 250	1	1																
250 - 255	2	1																
255 -	1	2	1															

260																		
260 - 265	5	5	1															
265 - 270	3	3																
270 - 275	2	2	2															
275 - 280		2																
Above 340																		
Total	14	16	4															
dSig/dOmeg	1.4e+04	5.5e+03	8.2e+02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0 - 195																		
195 - 270	12	12	2															
270 - 345	2	4	2															
Above 345																		

2.6 Energy and angular distribution of residual nucleus Z = 48 and N = 57 (105Cd)

Residual velocity/c Vz = 7.57e-02(sig = 1.38e-03) rms Vxy = 1.69e-03

Energy Range	**Angular range (deg)**																	
(MeV)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Below 195																		
235 - 240	1																	
240 - 245	1	1																
245 - 250	1	1	1															
250 - 255	2	4																

255 - 260	1	3																
260 - 265	6	6	1															
265 - 270	2	2	1															
270 - 275	1	2																
275 - 280	1																	
280 - 285	1																	
Above 340																		
Total	17	19	3															
dSig/dOmeg	1.7e+04	6.5e+03	6.2e+02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0 - 195																		
195 - 270	14	17	3															
270 - 345	3	2																
Above 345																		

2.7 Energy and angular distribution of residual nucleus Z = 47 and N = 57 (104Ag)

Residual velocity/c Vz = 7.34e-02(sig = 2.27e-03) rms Vxy = 3.44e-03

Energy Range	**Angular range (deg)**																	
(MeV)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Below 195																		
230 - 235		2	1															
235 - 240	3	2	3															
240 -		1	1	1														

245																		
245 - 250			1	1	1													
250 - 255			3	1	1													
255 - 260			3	1	3													
260 - 265	1																	
265 - 270		3	1		1													
270 - 275			4	2														
275 - 280		1	1	3														
280 - 285	1	2	1															
285 - 290		1																
Above 340																		
Total	5	12	19	9	6													
dSig/dOmeg	5.1e+03	4.1e+03	3.9e+03	1.3e+03	6.9e+02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0 - 195																		
195 - 270	4	8	13	4	6													
270 - 345	1	4	6	5														
Above 345																		

2.8 Energy and angular distribution of residual nucleus Z = 47 and N = 56 (103Ag)

Residual velocity/c Vz = 6.99e-02(sig = 2.28e-03) rms Vxy = 2.68e-03

Energy Range	**Angular range (deg)**																	
(MeV)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Below 195																		
220 - 225		1																
225 - 230	1		1															
230 - 235	3	4	2															
235 - 240	3	3	2	2														
240 - 245	2	8	5	1	1													
245 - 250	2	3	8	3														
250 - 255		6	9	1														
255 - 260	2	3	5	2														
260 - 265	1	5	9	5														
265 - 270		4	7	1														
270 - 275	3	6	7															
275 - 280	6	8	2	2														
280 - 285	3	4	1	1														
285 - 290	2	3	1															
290 - 295	1	1																
Above 340																		
Total	29	59	59	18	1													
dSig/dOmeg	3e+04	2e+04	1.2e+04	2.6e+03	1.1e+02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0 - 195																		
195 - 270	14	37	48	15	1													
270 - 345	15	22	11	3														
Above 345																		

2.9 Energy and angular distribution of residual nucleus Z = 46 and N = 57 (103Pd)

Residual velocity/c Vz = 7.13e-02(sig = 2.42e-03) rms Vxy = 2.89e-03

Energy Range	Angular range (deg)																	
(MeV)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Below 195																		
220 - 225		1																
225 - 230		1																
230 - 235		1																
235 - 240	1	3		1														
240 - 245		3	2	1	1													
245 - 250		4	2															
250 - 255		1	3	1	1													
255 - 260		1	1															
260 - 265		1	3	1														
265 - 270		2	1	1														
270 - 275		2	5															
275 - 280	2	1	1															
280 - 285		4	2															
285 - 290			1	1														
290 - 295		1																
Above 340																		

Total	3	26	21	6	2													
dSig/dOmeg	3.1e+03	8.9e+03	4.3e+03	8.8e+02	2.3e+02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0 - 195																		
195 - 270	1	18	12	5	2													
270 - 345	2	8	9	1														
Above 345																		

2.10 Energy and angular distribution of residual nucleus Z = 45 and N = 55 (100Rh)

Residual velocity/c Vz = 6.93e-02(sig = 2.34e-03) rms Vxy = 3.72e-03

Energy Range	**Angular range (deg)**																	
(MeV)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Below 195																		
220 - 225			1															
225 - 230			1															
235 - 240		2																
240 - 245		1	1				1											
245 - 250		1																
250 - 255	1																	
255 - 260		1	2															
260 - 265		2				1												
265 - 270		1				1												
270 - 275			1	1														

280 - 285				1														
285 - 290		1																
Above 340																		
Total	1	9	6	2		2	1											
dSig/dOmeg	1e+03	3.1e+03	1.2e+03	2.9e+02	0.00	1.9e+02	79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0 - 195																		
195 - 270	1	8	5			2	1											
270 - 345		1	1	2														
Above 345																		

2.11 Energy and angular distribution of ALL residual nuclei

Energy Range	**Angular range (deg)**																	
(MeV)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Below 195																		
215 - 220		1																
220 - 225	1	2	1															
225 - 230	1	2	2		1													
230 - 235	3	8	3															
235 - 240	11	11	8	5	2													
240 - 245	3	22	10	4	3		1											
245 - 250	11	31	12	4	1													
250 - 255	38	38	20	5	2													
255 - 260	42	55	29	4	3													

260 - 265	64	92	29	6	2	1												
265 - 270	67	67	23	2	1	1												
270 - 275	37	47	26	3														
275 - 280	29	28	8	5														
280 - 285	15	19	6	2														
285 - 290	4	7	4	1														
290 - 295	1	2	1															
Above 340																		
Total	327	432	182	41	15	2	1											
dSig/dOmeg	3.4e+05	1.5e+05	3.7e+04	6e+03	1.7e+03	1.9e+02	79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0 - 195																		
195 - 270	241	329	137	30	15	2	1											
270 - 345	86	103	45	11														
Above 345																		

Neutron spectra in laboratory coordinates 4002 events

Energy range	**Angular range (deg)**																	
(MeV)	**0**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**120**	**130**	**140**	**150**	**160**	**170**
	10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**120**	**130**	**140**	**150**	**160**	**170**	**180**
0-1		3	7	10	16	45	59	35	33	25	20	23	13	12	15	5	2	2
1 - 2	2	1	5	12	33	73	72	53	27	28	13	17	9	1	8	3	3	
2 - 3	4	3	7	18	51	78	52	48	33	28	18	6	6	3	4	2	1	
3 - 4	2	2	11	28	94	72	54	34	27	17	9	7	2	1	1	2		
4 - 5	3	5	14	59	87	60	49	30	25	8	6	1	4	2		1		
5 - 6	4	11	34	101	74	48	30	19	8	6	2	2	2	3				
6 - 7	5	24	69	72	63	39	27	16	6	5	2	1	1		1			
7 - 8	11	50	80	62	52	25	22	12	9		1							
8 - 9	27	60	48	50	37	30	10	10	2	2	3							

9 - 10	12	49	57	46	28	18	6	1	1			1			1			
10 - 11	20	39	34	36	22	15	3	5	4				1		2			
11 - 12	12	23	32	20	19	12	4	2	1									
12 - 13	10	27	23	17	9	12	2		1									
13 - 14	6	13	26	13	15	5	1	1										
14 - 15	8	12	13	15	8	2	1	1		1								
15 - 16	6	11	16	14	6	2	1											
16 - 17	6	7	10	3	3	4	1											
17 - 18	1	6	9	4	3		1											
18 - 19	4	6	2	2	2	1	1											
19 - 20	4	5	5	1	2	1	2											
20 - 21		3	7	2	2	1		1										
21 - 22	1	2	1		1													
22 - 23		1		1	1													
23 - 24		3		1	1													
24 - 25		1		1														
25 - 26		1																
26 - 27			1	1														
27 - 28		1		1														
29 - 30			1	2														
Above 30		1																
Total	148	370	512	592	629	543	398	268	177	120	74	58	38	22	32	13	6	2
dSig/dOmega	1525.36	1284.13	1088.24	927.1	799.014	595.408	394.435	249.198	159.575	108.181	68.7974	57.4646	41.6503	27.9299	50.0711	27.5959	20.7778	20.4742
0 - 5	11	14	44	127	281	328	286	200	145	106	66	54	34	19	28	13	6	2
5 - 10	59	194	288	331	254	160	95	58	26	13	8	4	3	3	2			

10 - 20	77	149	170	125	89	54	17	9	6	1			1		2			
Above 20	1	13	10	9	5	1		1										

Proton spectra in laboratory coordinates 551 events

Energy range	**Angular range (deg)**																	
(MeV)	**0**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**120**	**130**	**140**	**150**	**160**	**170**
	10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**120**	**130**	**140**	**150**	**160**	**170**	**180**
0 - 1													3			1		1
1 - 2										2	1	3	1	2	3	3		1
2 - 3								1		1	7	3	3	2	2	1		1
3 - 4								1	2	4	6	4	3	3		1	1	1
4 - 5							1	2	11	6	3	3	2	3	1			
5 - 6						1	2	6	6	7	6	2	1	2				
6 - 7						3	2	6	7	9	7	2	1	1				
7 - 8							5	8	8	3	3	6		2				
8 - 9				1	4	1	2	2	4	7	1		1			1		
9 - 10				1	3	5	6	7	2	3	1							
10 - 11				1	2	4	8	3	1	3	1							
11 - 12		1	1	3	6	6	5	2	2	1	1	1						
12 - 13			6	3	3	3	6	3										
13 - 14		1	6	5	6	2	3	1	2	1								
14 - 15	1	2	2	7	6	4	3											
15 - 16			9	9	6	5	2	2										
16 - 17		1	5	6	7	1	1	1										
17 - 18	1	6	3	10	2	3												
18 - 19	1	5	4	1	3	1												
19 - 20	2	5	2	5	2		2											
20 - 21	1	3	4	2	1													
21 - 22	4	1	2	4	1		1											

22 - 23		2	3	4	2													
23 - 24	1		2															
24 - 25			2															
25 - 26			1	1														
26 - 27	1		1			1												
27 - 28					1													
28 - 29		1																
29 - 30		1		1														
Above 30	2			1														
Total	14	29	53	65	55	40	49	45	45	47	37	24	15	15	6	7	1	4
dSig/dOmega	144.291	100.648	112.649	101.793	69.8661	43.8606	48.5611	41.8429	40.5699	42.3708	34.3987	23.7784	16.4409	19.0431	9.38833	14.8593	3.46297	40.9485
0 - 5							1	4	13	13	17	13	12	10	6	6	1	4
5 - 10				2	7	10	17	29	27	29	18	10	3	5		1		
10 - 20	5	21	38	50	43	29	30	12	5	5	2	1						
Above 20	9	8	15	13	5	1	1											

Alpha spectra in laboratory coordinates 387 events

Energy range	**Angular range (deg)**																	
(MeV)	**0**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**120**	**130**	**140**	**150**	**160**	**170**
	10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**120**	**130**	**140**	**150**	**160**	**170**	**180**
0 - 1											2		2	1				
1 - 2									1	1	2		1	1	3	1		1
2 - 3									4	2	3	2	1	1				
3 - 4									3	3	3	3						
4 - 5									3	5	2				1			
5 - 6							1	2	2	2	2			1				
6 - 7							2	3	6	1								
7 - 8								3	4	1	1							
8 - 9							2	4	3	2	1							
9 - 10								1		2	1							

10 - 11						1	4	5	2									
11 - 12							5	4	2	1								
12 - 13							2		1									
13 - 14							4	2										
14 - 15						1	4	1	1									
15 - 16						1	3	2	1									
16 - 17						3	1											
17 - 18						2	4											
18 - 19						6	2		1									
19 - 20					1	2	3											
20 - 21					1	3												
21 - 22					2	4	2											
22 - 23					2	3												
23 - 24					2		1											
24 - 25				1	2	8												
25 - 26					8	2	3											
26 - 27				2	4													
27 - 28				2	4	1												
28 - 29				1	3	1												
29 - 30			1	2	2													
Above 30	20	28	42	38	14	6	1											
Total	20	28	43	46	45	44	44	27	34	20	17	5	4	4	4	1		1
dSig/dOmega	206.13	97.1776	91.3948	72.0381	57.1632	48.2467	43.6059	25.1058	30.6528	18.0301	15.8048	4.95384	4.38425	5.07816	6.25889	2.12276	0	10.2371
0 - 5									11	11	12	5	4	3	4	1		1
5 - 10							5	13	15	8	5			1				

10 - 20					1	16	32	14	8	1								
Above 20	20	28	43	46	44	28	7											

Gamma ray spectrum 8992 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 - 1	0	611	611
1 - 2	5671	2708	8379
5 - 6	1	0	1
10 - 11	1	0	1
Total	5673	3319	8992

6.1 percent of cascades trapped before reaching ground state due to spin inhibition

Average energy at which cascades were trapped is ***0.5*** MeV, average spin = ***4.72131*** hbar

**** successive decays through single yrast cascade assumed

-------- C.M. spectra of emitted particles ------

Ex(MeV)	Neut	Prot	Alpha	Gamma
0 - 1	90			611
1 - 2	782			8379
2 - 3	969			
3 - 4	664	4		
4 - 5	481	22		
5 - 6	356	33		1
6 - 7	211	74		
7 - 8	161	91		
8 - 9	104	81	1	
9 - 10	56	78	3	

10 - 11	50	44	7	1
11 - 12	25	48	20	
12 - 13	13	31	40	
13 - 14	14	15	51	
14 - 15	7	9	58	
15 - 16	4	9	45	
16 - 17	5	3	39	
17 - 18	3	4	30	
18 - 19	2	1	23	
19 - 20	2	3	22	
20 - 21	1	1	16	
21 - 22	2		4	
22 - 23			7	
23 - 24			6	
24 - 25			5	
25 - 26			4	
26 - 27			3	
27 - 28			1	
28 - 29			1	
32 - 33			1	
Total	4002	551	387	8992
Average Energy	3.91904	9.03539	16.009	1.4335

Track down of decay modes at **76.7099 , 38.9049 , 10** MeV excitation

Ex = 76.7099 **Gamma = 0.305 MeV** **Lifetime = 2.17e-21 sec** **Average J = 17.760** **Stand.dev. = 6.106**

	Part	**Num**	**DelJ**	**RMS-dJ**
Neut	3291	-0.0297782	2.60017	14.7506
Prot	425	-0.155294	2.40978	15.6423
Alph	283	-3.23322	5.78868	19.5571
Gamm	1	2	2	10.3099

Ex = 38.9049 **Gamma = 0.0525 MeV** **Lifetime = 1.66e-20 sec** **Average J = 14.772** **Stand.dev. = 5.168**

	Part	Num	DelJ	RMS-dJ
Neut	3185	-0.812873	2.26453	13.3432
Prot	456	-0.868421	2.05409	14.8794
Alph	354	-3.27401	5.28643	18.3955

Ex = 10 **Gamma = 0.000202 MeV** **Lifetime = 1.88e-11 sec** **Average J = 9.216** **Stand.dev. = 3.784**

	Part	Num	DelJ	RMS-dJ
Neut	2562	-1.13232	2.02299	11.8257
Prot	176	-1.20455	1.99431	11.8977
Alph	62	-2.5	3.84162	15.0161
Gamm	1191	-1.75735	1.91046	1

---- end of evaporation calculation ----

***** Complete traceback diagnostic of particle and gamma emission *****

Components of gamma spectrum

Energy	E1-spec	E2-spec
0.05 - 0.15		23
0.15 - 0.25		52
0.25 - 0.35		3
0.35 - 0.45		49
0.45 - 0.55		9
0.55 - 0.65	169	306
1.05 - 1.15	554	7825
Above 3.05	0	2

M states at final J vs Ex

0 - 3 0.26 2.12 .. ..

3 - 6	0.23	2.20	2.43	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6 - 9	0.46	2.17	2.26	5.00	..	..	..	..	..	..	..	..	..	..	..	..	..
9 - 12	0.90	2.13	2.34	2.12	..	..	..	..	..	..	..	..	..	..	..	..	..
12 - 15	1.37	2.44	2.54	2.35	1.00	..	..	..	..	..	..	..	..	..	..	..	..
15 - 18	1.63	1.85	2.63	2.63	4.20	..	..	..	..	..	..	..	..	..	..	..	..
18 - 21	0.89	2.05	2.57	2.58	2.86	..	..	..	..	..	..	..	..	..	..	..	..
21 - 24	1.33	2.12	2.57	2.59	3.53	..	..	..	..	..	..	..	..	..	..	..	..
24 - 27	1.00	2.31	2.21	2.39	2.50	..	..	..	..	..	..	..	..	..	..	..	..
27 - 30	0.60	1.74	2.37	2.51	3.20	..	..	..	..	..	..	..	..	..	..	..	..
30 - 33	1.75	1.98	1.99	2.34	3.50	..	..	..	..	..	..	..	..	..	..	..	..
33 - 36	0.80	2.33	2.75	2.37	2.95	1.00	..	..	..	..	..	..	..	..	..	..	..
36 - 39	0.75	2.37	2.52	2.01	2.03	1.00	..	..	..	..	..	..	..	..	..	..	..
39 - 42	1.25	1.50	2.35	1.76	2.00	1.67	..	..	..	..	..	..	..	..	..	..	..
42 - 45	1.20	2.42	2.21	2.48	2.69	3.67	..	..	..	..	..	..	..	..	..	..	..
45 - 48	0.40	1.49	2.33	2.26	2.50	2.50	..	..	..	..	..	..	..	..	..	..	..
48 - 51	1.00	1.94	2.21	1.83	1.93	2.60	..	..	..	..	..	..	..	..	..	..	..
51 - 54	1.00	1.81	1.84	1.77	1.96	2.25	..	..	..	..	..	..	..	..	..	..	..
54 - 57	0.50	1.56	1.76	1.69	2.16	1.40	..	..	..	..	..	..	..	..	..	..	..
57 - 60	0.50	1.56	2.02	1.53	1.08	1.43	2.00	..	..	..	..	..	..	..	..	..	..
60 - 63	1.17	1.47	1.78	1.57	1.40	1.61	3.67	3.00	..	..	..	..	..	..	..	..	..
63 - 66	1.00	1.40	1.16	1.33	1.32	1.08	1.40	..	..	..	..	..	..	..	..	..	..
66 - 69	..	0.50	0.53	0.38	0.58	0.63	..	..	..	..	..	..	..	..	..	..	..
69 - 72	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
72 - 75	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
75 - 78	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

78 - 81	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
81 - 84	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
84 - 87	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
87 - 90	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ex / J	-4.00	-9.00	-14.00	-19.00	-24.00	-29.00	-34.00	-39.00	-44.00	-49.00	-54.00	-59.00	-64.00	-69.00	-74.00	-79.00	

Decay summary. Mode = NEUT Total = 4002 Out of = 1000 events Multiplicity = 4.002

Average Ecm = 3.9 Average spin removed = 1.4

9 - 12	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	2	0
12 - 15	9	31	14	..	..	..	..	..	..	..	..	..	..	..	..	..	54	7.46296	3.23014
15 - 18	6	60	65	..	..	..	..	..	..	..	..	..	..	..	..	..	131	9.25191	2.91179
18 - 21	8	62	103	32	..	..	..	..	..	..	..	..	..	..	..	..	205	10.878	3.75594
21 - 24	3	61	117	48	5	..	..	..	..	..	..	..	..	..	..	..	234	11.8077	3.87648
24 - 27	9	44	89	45	7	..	..	..	..	..	..	..	..	..	..	..	194	11.9227	4.43965
27 - 30	4	30	69	37	6	..	..	..	..	..	..	..	..	..	..	..	146	12.3767	4.2638
30 - 33	4	42	63	53	5	1	..	..	..	..	..	..	..	..	..	..	168	12.4762	4.53945
33 - 36	2	40	83	69	14	1	..	..	..	..	..	..	..	..	..	..	209	13.3397	4.4694
36 - 39	4	42	90	60	25	..	..	..	..	..	..	..	..	..	..	..	221	13.3575	4.77681
39 - 42	1	22	60	47	17	3	..	..	..	..	..	..	..	..	..	..	150	14.2	4.81248
42 - 45	3	18	47	46	11	1	..	..	..	..	..	..	..	..	..	..	126	13.8651	4.70284
45 - 48	5	31	63	56	23	5	..	..	..	..	..	..	..	..	..	..	183	14.0765	5.38716
48 - 51	9	28	76	76	35	9	..	..	..	..	..	..	..	..	..	..	233	14.7253	5.59522
51 - 54	1	22	54	53	39	2	..	..	..	..	..	..	..	..	..	..	171	15.3041	5.106
54 - 57	4	15	26	25	18	4	..	..	..	..	..	..	..	..	..	..	92	14.7174	6.09762
57 - 60	2	14	46	38	20	6	..	..	..	..	..	..	..	..	..	..	126	15.0952	5.37695
60 - 63	5	22	75	73	46	15	2	..	..	..	..	..	..	..	..	..	238	15.9076	5.80349
63 - 66	2	35	74	97	74	16	1	..	..	..	..	..	..	..	..	..	299	16.3144	5.58739
66 - 69	1	1	13	11	8	5	..	..	..	..	..	..	..	..	..	..	39	17	5.88348
75 - 78	10	63	170	240	197	79	20	2	..	..	..	..	..	..	..	..	781	17.621	6.26187
Ex / J	-4	-9	-14	-19	-24	-29	-34	-39	-44	-49	-54	-59	-64	-69	-74	-79	**sum**	**avrg**	**stdv**
Sum	94	683	1397	1106	550	147	23	2	..	..	..	..	..	..	..	..			

Decay summary. Mode = PROT Total = 551 Out of = 1000 events Multiplicity = 0.551

Average Ecm = 9 Average spin removed = 1.2

15 - 18	2	7	3	..	..	..	..	..	..	..	..	..	..	..	..	..	12	7.41667	3.20048
18 - 21	1	13	7	7	..	..	..	..	..	..	..	..	..	..	..	..	28	10.5714	4.40315
21 - 24	..	14	12	6	..	..	..	..	..	..	..	..	..	..	..	..	32	10.75	3.75
24 - 27	1	6	12	9	..	..	..	..	..	..	..	..	..	..	..	..	28	12.1786	4.1149
27 - 30	1	4	12	4	2	..	..	..	..	..	..	..	..	..	..	..	23	12.4348	4.64221
30 - 33	..	2	9	3	1	..	..	..	..	..	..	..	..	..	..	..	15	13	3.74166
33 - 36	2	5	11	8	3	..	..	..	..	..	..	..	..	..	..	..	29	12.8621	5.26356
36 - 39	2	7	8	9	7	..	..	..	..	..	..	..	..	..	..	..	33	13.8182	6.00734
39 - 42	3	3	7	10	3	..	..	..	..	..	..	..	..	..	..	..	26	13.3462	5.81075
42 - 45	1	1	6	5	1	..	..	..	..	..	..	..	..	..	..	..	14	13.4286	4.79157
45 - 48	..	4	10	6	1	1	..	..	..	..	..	..	..	..	..	..	22	13.5909	4.85854
48 - 51	..	3	9	13	2	..	..	..	..	..	..	..	..	..	..	..	27	14.5926	3.93709
51 - 54	..	4	9	10	5	1	..	..	..	..	..	..	..	..	..	..	29	15.2759	5.13203
54 - 57	..	2	7	5	4	1	..	..	..	..	..	..	..	..	..	..	19	15.6842	5.34152
57 - 60	..	2	2	9	1	..	..	..	..	..	..	..	..	..	..	..	14	15.2143	4.05636
60 - 63	1	8	7	8	7	..	..	..	..	..	..	..	..	..	..	..	31	13.9355	5.913
63 - 66	..	2	12	11	9	4	..	..	..	..	..	..	..	..	..	..	38	17.1316	5.43948
66 - 69	..	..	2	1	3	..	..	..	..	..	..	..	..	..	..	..	6	17.8333	4.48764
75 - 78	1	10	40	32	29	10	3	..	..	..	..	..	..	..	..	..	125	16.8	6.07947
Ex / J	-4	-9	-14	-19	-24	-29	-34	-39	-44	-49	-54	-59	-64	-69	-74	-79	**sum**	**avrg**	**stdv**
Sum	15	97	185	156	78	17	3	..	..	..	..	..	..	..	..	..			

Decay summary. Mode = ALPH Total = 387 Out of = 1000 events Multiplicity = 0.387

Average Ecm = 16 Average spin removed = 4.1

18 - 21	..	2	3	..	..	..	..	..	..	..	..	..	..	..	..	..	5	10	2.44949
21 - 24	..	3	2	1	..	..	..	..	..	..	..	..	..	..	..	..	6	10.3333	3.72678
24 - 27	..	5	3	3	..	..	..	..	..	..	..	..	..	..	..	..	11	11.0909	4.16598
27 - 30	..	..	7	2	2	..	..	..	..	..	..	..	..	..	..	..	11	14.7273	3.91015
30 - 33	..	3	4	8	6	..	..	..	..	..	..	..	..	..	..	..	21	16.0476	5.02826
33 - 36	1	1	8	5	2	..	..	..	..	..	..	..	..	..	..	..	17	13.7647	4.83285
36 - 39	2	2	5	9	3	1	..	..	..	..	..	..	..	..	..	..	22	14.7273	6.16575
39 - 42	..	1	5	6	1	..	..	..	..	..	..	..	..	..	..	..	13	14.6923	3.72898
42 - 45	1	..	3	1	1	2	..	..	..	..	..	..	..	..	..	..	8	16.375	8.07678

45 - 48	..	2	5	4	..	..	..	..	..	..	..	..	..	..	..	..	11	12.9091	3.57909
48 - 51	..	4	5	5	4	1	..	..	..	..	..	..	..	..	..	..	19	15.1579	5.89615
51 - 54	..	1	5	7	2	1	..	..	..	..	..	..	..	..	..	..	16	16.0625	4.74959
54 - 57	..	1	5	6	3	..	..	..	..	..	..	..	..	..	..	..	15	15.6667	4.26875
57 - 60	..	..	2	4	5	1	1	..	..	..	..	..	..	..	..	..	13	20.0769	5.38462
60 - 63	..	2	8	17	10	3	1	1	..	..	..	..	..	..	..	..	42	18.3095	5.98207
63 - 66	1	5	13	11	19	5	4	..	..	..	..	..	..	..	..	..	58	18.2931	6.98276
66 - 69	..	1	..	1	1	3	..	..	..	..	..	..	..	..	..	..	6	21.1667	7.31247
75 - 78	1	6	14	27	27	11	6	1	..	..	..	..	..	..	..	..	93	19.2581	6.74083
Ex / J	-4	-9	-14	-19	-24	-29	-34	-39	-44	-49	-54	-59	-64	-69	-74	-79	**sum**	**avrg**	**stdv**
Sum	6	39	97	117	86	28	12	2	..	..	..	..	..	..	..	..			

Decay summary. Mode = G-E1 Total = 723 Out of = 1000 events Multiplicity = 0.723

Average Ecm = 1.3 Average spin removed = 0.23

0 - 3	268	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	268	2	0
3 - 6	251	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	251	2	0
6 - 9	159	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	159	2	0
9 - 12	44	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	44	2	0
12 - 15	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	2	0
Ex / J	-4	-9	-14	-19	-24	-29	-34	-39	-44	-49	-54	-59	-64	-69	-74	-79	**sum**	**avrg**	**stdv**
Sum	723	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			

Decay summary. Mode = G-E2 Total = 8269 Out of = 1000 events Multiplicity = 8.269

Average Ecm = 1.4 Average spin removed = 1.1

0 - 3	1221	112	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1333	2.42011	1.3871
3 - 6	2047	400	21	..	..	..	..	..	..	..	..	..	..	..	..	..	2468	2.89546	2.02507
6 - 9	1269	629	181	1	..	..	..	..	..	..	..	..	..	..	..	..	2080	4.38942	3.2651
9 - 12	435	682	323	25	..	..	..	..	..	..	..	..	..	..	..	..	1465	6.7884	3.82058
12 - 15	50	238	297	75	1	..	..	..	..	..	..	..	..	..	..	..	661	10.0257	3.95676
15 - 18	..	14	115	51	5	..	..	..	..	..	..	..	..	..	..	..	185	13.2703	3.14212
18 - 21	..	..	9	39	7	..	..	..	..	..	..	..	..	..	..	..	55	16.8182	2.69066
21 - 24	..	..	..	6	12	1	..	..	..	..	..	..	..	..	..	..	19	20.6842	2.73482

24 - 27	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1	22	0
27 - 30	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	12	0
75 - 78	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	7	0
Ex / J	-4	-9	-14	-19	-24	-29	-34	-39	-44	-49	-54	-59	-64	-69	-74	-79	**sum**	**avrg**	**stdv**
Sum	5022	2076	947	197	26	1	..	..	..	..	..	..	..	..	..	..			

Fission probability as function of excitation

Ex.Energy	Probability
75 - 78	0.00e+00
66 - 69	0.00e+00
63 - 66	0.00e+00
60 - 63	0.00e+00
57 - 60	0.00e+00
54 - 57	0.00e+00
51 - 54	0.00e+00
48 - 51	0.00e+00
45 - 48	0.00e+00
42 - 45	0.00e+00
39 - 42	0.00e+00
36 - 39	0.00e+00
33 - 36	0.00e+00
30 - 33	0.00e+00
27 - 30	0.00e+00
24 - 27	0.00e+00
21 - 24	0.00e+00
18 - 21	0.00e+00
15 - 18	0.00e+00
12 - 15	0.00e+00
9 - 12	0.00e+00
6 - 9	0.00e+00
3 - 6	0.00e+00
0 - 3	0.00e+00

Total sum of fission probabilities 0.000e+00

Excitation energy window - average = 0 FWHM = 0

Spin window - average = 0 FWHM = 0

Average fabs projection 0 Average rms proj 0