

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 $E = 391$ MeV is 1121.66 mb

Fusion radius = 9.4 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)	391.00
Center of mass energy (MeV)	95.11
Compound nucleus excitation energy (MeV)	83.864
Q-value of reaction (MeV)	-11.244
Compound nucleus recoil energy (MeV)	295.892
Compound nucleus recoil velocity (cm/ns)	2.270e+00
Compound nucleus velocity/c	7.565e-02
Beam velocity (cm/ns)	2.999e+00
Beam velocity/c	9.997e-02

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

*** diffuseness = 2.00

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

Experimental fusion cross section (mb) 1.12e+03

Fusion L-grazing 57.00

Fusion L-diffuseness 2.00

Yrast spin at maximum excitation energy 79

Compound nucleus formation cross section (mb) 1.12e+03

Partial cross sections (mb)									
J	SIG(J)	J	SIG(J)	J	SIG(J)	J	SIG(J)	J	SIG(J)
0	0.34	15	10	30	21	45	31	60	7.5
1	1	16	11	31	21	46	31	61	5
2	1.7	17	12	32	22	47	32	62	3.2
3	2.4	18	13	33	23	48	32	63	2
4	3	19	13	34	23	49	33	64	1.3
5	3.7	20	14	35	24	50	33	65	0.8
6	4.4	21	15	36	25	51	33	66	0.49
7	5.1	22	15	37	25	52	33	67	0.31
8	5.7	23	16	38	26	53	32	68	0.19
9	6.4	24	17	39	27	54	30	69	0.12
10	7.1	25	17	40	27	55	27	70	0.072
11	7.8	26	18	41	28	56	24		
12	8.4	27	19	42	29	57	19		
13	9.1	28	19	43	29	58	15		
14	9.8	29	20	44	30	59	11		

***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 neutron proton alpha gamma
for

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		9	0.9%	10.1
48	59	107 Cd		4	0.4%	4.49
47	60	107 Ag		1	0.1%	1.12
49	57	106 In		104	10.4%	117
48	58	106 Cd		171	17.1%	192
47	59	106 Ag		37	3.7%	41.5
49	56	105 In		54	5.4%	60.6
48	57	105 Cd		176	17.6%	197

47	58	105 Ag	36	3.6%	40.4
46	59	105 Pd	2	0.2%	2.24
47	57	104 Ag	17	1.7%	19.1
46	58	104 Pd	5	0.5%	5.61
47	56	103 Ag	141	14.1%	158
46	57	103 Pd	66	6.6%	74
45	58	103 Rh	3	0.3%	3.36
47	55	102 Ag	76	7.6%	85.2
46	56	102 Pd	36	3.6%	40.4
45	56	101 Rh	4	0.4%	4.49
45	55	100 Rh	37	3.7%	41.5
44	56	100 Ru	4	0.4%	4.49
45	54	99 Rh	11	1.1%	12.3
44	55	99 Ru	2	0.2%	2.24
43	54	97 Tc	3	0.3%	3.36
41	53	94 Nb	1	0.1%	1.12
TOTAL			1000	100	1121.6

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 = 57 (106In)

Residual velocity/c $V_z = 7.93\text{e-}02$ (sig = $1.34\text{e-}03$) rms $V_{xy} = 1.70\text{e-}03$

Energy Range (MeV)	Angular range (deg)																	
	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 203																		
251 - 257	1																	
263 - 269	1	2																
269 -	3	6																

275																		
275 - 281	9	15	1															
281 - 287	9	16	1															
287 - 293	7	9	1															
293 - 299	8	4	1															
299 - 305	4	3																
305 - 311		2	1															
Above 377																		
Total	42	57	5															
dSig/dOm eg	4.9e+04	2.2e+04	1.2e+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 - 203																		
203 - 292	28	48	2															
292 - 381	14	9	3															
Above 381																		

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

Residual velocity/c Vz = 7.65e-02(sig = 1.35e-03) rms Vxy = 2.05e-03

Energy Range (MeV)	Angular range (deg)																	
	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 203																		
257 - 263	2																	
263 - 269	2	9																

269 - 275	9	11	3															
275 - 281	7	12	6															
281 - 287	14	19	6	1														
287 - 293	9	20	6	2														
293 - 299	9	9	5															
299 - 305	2	5																
305 - 311	1	2																
Above 377																		
Total	55	87	26	3														
dSig/dOm eg	6.4e+04	3.4e+04	6.1e+03	5e+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 - 203																		
203 - 292	43	70	21	2														
292 - 381	12	17	5	1														
Above 381																		

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

Residual velocity/c Vz = 7.96e-02(sig = 1.56e-03) rms Vxy = 2.21e-03

Energy Range (MeV)	Angular range (deg)																	
	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 203																		
257 - 263	1	1																
263 -	1																	

269																		
269 - 275	1	3	1															
275 - 281	1	2	1															
281 - 287	3	3	5															
287 - 293	1	3	1															
293 - 299	1	3	1															
299 - 305	1	2																
305 - 311	1																	
Above 377																		
Total	11	17	9															
dSig/dOm eg	1.3e+04	6.6e+03	2.1e+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 - 203																		
203 - 292	8	11	8															
292 - 381	3	6	1															
Above 381																		

2.4 Energy and angular distribution of residual nucleus Z = 49 and N = 56 (105In)

Residual velocity/c $V_z = 7.69\text{e-}02$ (sig = $1.24\text{e-}03$) rms $V_{xy} = 1.49\text{e-}03$

Energy Range (MeV)	Angular range (deg)																	
	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 203																		
263 - 269	1	2																

269 - 275	9	8															
275 - 281	8	4															
281 - 287	5	3	1														
287 - 293	3	3															
293 - 299	2	4															
299 - 305	1																
Above 377																	
Total	29	24	1														
dSig/dOm eg	3.4e+04	9.4e+03	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	0.00
0 - 203																	
203 - 292	25	20	1														
292 - 381	4	4															
Above 381																	

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

Residual velocity/c $V_z = 7.57\text{e-}02$ (sig = $1.22\text{e-}03$) rms $V_{xy} = 1.75\text{e-}03$

Energy Range (MeV)	Angular range (deg)																	
	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 203																		
251 - 257	1																	
263 - 269	4	5	1															
269 -	12	11	2															

275																		
275 - 281	23	17	3															
281 - 287	13	26	2	1														
287 - 293	18	14	3															
293 - 299	6	5	3															
299 - 305	1	2	1															
305 - 311		2																
Above 377																		
Total	78	82	15	1														
dSig/dOm eg	9.1e+04	3.2e+04	3.5e+03	1.7e+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 - 203																		
203 - 292	69	72	11	1														
292 - 381	9	10	4															
Above 381																		

2.6 Energy and angular distribution of residual nucleus Z = 47 and N = 58 (105Ag)

Residual velocity/c Vz = 7.61e-02(sig = 1.39e-03) rms Vxy = 1.59e-03

Energy Range (MeV)	Angular range (deg)																	
	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 203																		
263 - 269	2	1																
269 - 275	4	1	1															

275 - 281	2	1																
281 - 287	4	3	1															
287 - 293	5	2																
293 - 299	1	6																
299 - 305	1	1																
Above 377																		
Total	19	15	2															
dSig/dOmegeg	2.2e+04	5.9e+03	4.7e+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 - 203																		
203 - 292	16	8	2															
292 - 381	3	7																
Above 381																		

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

Residual velocity/c Vz = 7.96e-02(sig = 2.33e-03) rms Vxy = 3.02e-03

Energy Range (MeV)	Angular range (deg)																	
	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 203																		
239 - 245	1		1															
245 - 251	2	3	2															
251 - 257	2	5	1	2														
257 -		2	7	3														

263																		
263 - 269	2	4	7	3														
269 - 275		1	9	4														
275 - 281		6	8	3														
281 - 287	1	3	7	5														
287 - 293	2	4	8	4														
293 - 299	2	6	3															
299 - 305	3	6	1															
305 - 311	2	3	1															
311 - 317		1		1														
Above 377																		
Total	17	44	55	25														
dSig/dOm eg	2e+04	1.7e+04	1.3e+04	4.2e+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 - 203																		
203 - 292	10	28	50	23														
292 - 381	7	16	5	2														
Above 381																		

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

Residual velocity/c Vz = 7.67e-02(sig = 2.23e-03) rms Vxy = 3.22e-03

Energy Range (MeV)	Angular range (deg)																	
	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 203																		
239 - 245		1																
245 - 251	2	1	2															
251 - 257	1		4	1														
257 - 263			2	2														
263 - 269	2	2	4															
269 - 275		2	3	1														
275 - 281	1	1	5	2														
281 - 287	1	2	3	4	2													
287 - 293	1	3	1															
293 - 299	2	1	3	1														
299 - 305		1		1														
311 - 317	1																	
Above 377																		
Total	11	14	27	12	2													
dSig/dOm eg	1.3e+04	5.5e+03	6.3e+03	2e+03	2.6e+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 - 203																		
203 - 292	8	11	24	10	2													
292 - 381	3	3	3	2														
Above 381																		

2.9 Energy and angular distribution of residual nucleus Z = 47 and N = 55 (102Ag)

Residual velocity/c $V_z = 7.92e-02$ (sig = $2.38e-03$) rms $V_{xy} = 2.98e-03$

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 203																		
245 - 251	1		1															
251 - 257		5	4															
257 - 263		5	2	2														
263 - 269	1	1	4	1														
269 - 275			4	2														
275 - 281		2	3															
281 - 287	2	4	5															
287 - 293		4	2	2														
293 - 299		3	4	1														
299 - 305		5	1	2														
305 - 311		2																
311 - 317		1																
Above 377																		
Total	4	32	30	10														
dSig/dOmege	4.7e+03	1.3e+04	7e+03	1.7e+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 - 203																		
203 - 292	4	20	25	7														
292 - 381		12	5	3														
Above 381																		

2.10 Energy and angular distribution of residual nucleus Z = 46 and N = 56 (102Pd)

Residual velocity/c Vz = 7.88e-02(sig = 1.92e-03) rms Vxy = 2.83e-03

Energy Range (MeV)	Angular range (deg)																	
	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 203																		
245 - 251	1																	
251 - 257		2	1	1														
257 - 263	1	1																
263 - 269	1	3	2	1														
269 - 275		1	2															
275 - 281		2	1	3														
281 - 287		2	1															
287 - 293	1	4	1	1														
293 - 299	2	1																
Above 377																		
Total	6	16	8	6														
dSig/dOm eg	7e+03	6.3e+03	1.9e+03	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 - 203																		
203 - 292	3	14	8	6														
292 - 381	3	2																
Above 381																		

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

Residual velocity/c Vz = 7.55e-02(sig = 2.72e-03) rms Vxy = 3.64e-03

Energy Range (MeV)	Angular range (deg)																	
	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 203																		
221 - 227			1															
227 - 233	1																	
233 - 239				1														
239 - 245			2															
245 - 251			4															
257 - 263		3	2															
263 - 269	1		2	3	1													
269 - 275	1	2		1		2												
275 - 281			2															
281 - 287		1	2			1												
287 - 293				1														
293 - 299		1																
305 - 311		1																
317 - 323	1																	
Above 377																		
Total	4	8	15	6	1	3												
dSig/	4.	3.	3.	1e+0	1.	3.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

dOmegeg	7e+03	1e+03	5e+03	3	3e+02	2e+02												
0 - 203																		
203 - 292	3	6	15	6	1	3												
292 - 381	1	2																
Above 381																		

2.12 Energy and angular distribution of ALL residual nuclei

Energy Range (MeV)	Angular range (deg)																	
	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 203																		
221 - 227	1	1	1															
227 - 233	1		1															
233 - 239				1	1													
239 - 245	1	3	4	1														
245 - 251	6	5	12															
251 - 257	5	12	11	4	1													
257 - 263	4	12	16	8														
263 - 269	18	31	22	9	1													
269 - 275	40	50	27	9		2												
275 - 281	52	63	31	10	1													
281 - 287	53	85	35	12	2	1												
287 - 293	49	70	24	11	1													

293 - 299	36	44	21	2														
299 - 305	17	26	3	3														
305 - 311	5	13	3	1														
311 - 317	1	2		1														
317 - 323	1																	
Above 377																		
Total	290	417	211	72	7	3												
dSig/dOm eg	3.4e+05	1.6e+05	4.9e+04	1.2e+04	9.1e+02	3.2e+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 - 203																		
203 - 292	223	325	183	63	7	3												
292 - 381	67	92	28	9														
Above 381																		

Neutron spectra in laboratory coordinates 4258 events

Energy range (MeV)	Angular range (deg)																	
	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	5	7	12	31	34	34	33	35	23	24	11	12	10	11	6	4	1
1 - 2	2	3	7	9	34	70	49	51	34	37	22	13	7	6	4	1	1	1
2 - 3	7	5	6	19	49	94	68	44	34	24	18	13	11	5	5	1	2	
3 - 4	7	3	5	25	87	68	48	42	29	18	11	6	5	3	3	2		
4 - 5	4	5	10	49	87	63	45	34	21	10	5	4	5			1		
5 - 6	1	5	33	88	69	62	31	24	10	5	2	2	1					
6 - 7	9	16	52	83	63	44	29	14	3	2	2	1		1		1		
7 - 8	5	49	93	68	59	29	19	10	2	2	1	2		1				
8 - 9	17	70	77	54	45	29	13	9	3	3								
9 - 10	25	55	56	46	40	16	10	7	5	1								
10 - 11	13	52	36	35	26	16	9	3	1	1								
11 -	16	33	43	33	24	8	8	1	1	1	1							

12																		
12 - 13	8	33	32	25	13	9	6	2			1							
13 - 14	8	19	30	13	14	4	3	2										
14 - 15	7	15	28	16	10	5	2	2	1									
15 - 16	8	24	17	13	5	3			1									
16 - 17	3	11	6	9	4	1												
17 - 18	6	11	9	8	7	3	1	1										
18 - 19	3	3	4	5	2	1	1											
19 - 20	1	7	8	3	3	2												
20 - 21	4	6	3	3														
21 - 22		3	3	4		2												
22 - 23		2	2	1	2	1												
23 - 24	3	1	3	3	2													
24 - 25			3		1	1												
25 - 26	1	2	1	1														
26 - 27	1																	
28 - 29			3	1														
Above 30	1			1														
Total	162	438	577	627	677	565	376	279	180	127	87	52	41	26	23	12	7	2
dSig/dOmega	1901.8	1731.49	1396.91	1118.44	979.561	705.671	424.442	295.497	184.843	130.41	92.1295	58.6833	51.1867	37.5975	40.9924	29.0149	27.6112	23.321
0 - 5	22	21	35	114	288	329	244	204	153	112	80	47	40	24	23	11	7	2
5 - 10	57	195	311	339	276	180	102	64	23	13	5	5	1	2		1		
10 - 20	73	208	213	160	108	52	30	11	4	2	2							
Above 20	10	14	18	14	5	4												

Proton spectra in laboratory coordinates 626 events

Energy range (MeV)	Angular range (deg)																	
	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												1	1	3	1	1	1	
1 - 2										2	2		4	5	1	1		
2 - 3									1	6	7	8	3	3	2	2	1	
3 - 4									5	9	5	5	3	3		2		
4 - 5							2	2	4	5	9	1	3	1		2		
5 - 6						1	4	6	5	8	7	2	1			1		
6 - 7						3	4	5	6		3	4	1	1				
7 - 8					1	2	5	7	4	3	4		1					
8 - 9						3	6	8	5	1	1		1		1			
9 - 10				1	2	5	3	4	2	6	1	2						
10 - 11				1	4	6	13	2	7									
11 - 12			1		7	11	4	6	1		1				1			
12 - 13	1	1	2	3	7	7	1	3		1								
13 - 14		1	1	2	8	5	6	4	4									
14 - 15		1	7	6	5	4	6	3	1									
15 - 16	1	2	7	7	10	4	2	1	1									
16 - 17		5	5	6	3	1	2											
17 - 18	1	6	5	7	9	3	1											
18 - 19	4	4	3	2	6		2	1										
19 - 20		4	5	7	7	1	1											
20 - 21	1	1	8	1	2					1								
21 - 22	1	5	9	2	1		1											
22 - 23	2		2	1	5			1										
23 - 24	1	1	4	3	2													
24 -	1	1		2		3												

25																		
25 - 26	2	1	1															
26 - 27		2				2												
27 - 28	1	1																
28 - 29			1	1														
29 - 30		1																
Above 30		1	1															
Total	16	38	62	52	79	61	63	53	46	42	40	23	18	16	6	9	2	
dSig/dOmega	187.832	150.221	150.101	92.757	114.306	76.1875	71.1167	56.1338	47.2376	43.1277	42.3584	25.9561	22.4722	23.1369	10.6937	21.7612	7.88892	0
0 - 5							2	2	10	22	23	15	14	15	4	8	2	
5 - 10				1	3	14	22	30	22	18	16	8	4	1	1	1		
10 - 20	7	24	36	41	66	42	38	20	14	1	1				1			
Above 20	9	14	26	10	10	5	1	1		1								

Alpha spectra in laboratory coordinates 472 events

Energy range (MeV)	Angular range (deg)																	
	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										1		1		2	2	2		
1 - 2								3	1	2		1	1					
2 - 3							1	2	3	4		1	2		1			
3 - 4							3	3	4	3	3							
4 - 5							3	3	1	3	1	2						
5 - 6							1	6	2	2	1							
6 - 7							2	7	2									
7 - 8							1	6	2	1		1						
8 - 9							1	4	6	2								
9 - 10							3	1			1							
10 - 11							5		2	1								
11 - 12						2	1	4	1									
12 -							3	2										

13																		
13 - 14							7	4	1									
14 - 15						1	7	1										
15 - 16						3	4											
16 - 17						7	5											
17 - 18						6	5											
18 - 19						4		1										
19 - 20					1	7	3	1										
20 - 21					1	6	2											
21 - 22					2	4	1											
22 - 23						2												
23 - 24					1	6												
24 - 25				1	1	4	1											
25 - 26					3	2	1											
26 - 27				2	2	3	1											
27 - 28					7	2		1										
28 - 29				2	4	2												
29 - 30				2	3													
Above 30	13	40	57	58	30	3	2											
Total	13	40	57	65	55	64	56	45	27	16	14	6	4	5	2	3		
dSig/ dOmega	152. 613	158. 127	137. 996	115. 946	79.5 803	79.9 344	63.2 148	47.6 607	27.7 264	16.4 296	14.8 254	6. 7711 5	4. 9938 3	7. 2302 8	3. 5645 6	7. 2537 3	0	0
0 - 5								7	11	10	12	5	4	5	2	3		
5 - 10								8	24	12	5	2	1					
10 - 20					1	30	40	13	4	1								
Above 20	13	40	57	65	54	34	8	1										

Gamma ray spectrum 8965 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 E_{cm} is less than E_{min}

=====

Energy range (MeV)	Unbound	Bound	TOTAL
0 - 1	0	563	563
1 - 2	5663	2739	8402
Total	5663	3302	8965

4.3 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 = **4.95349** hbar

**** successive decays through single yrast cascade assumed

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

Ex(MeV)	Neut	Prot	Alpha	Gamma
0 - 1	101			563
1 - 2	721			8402
2 - 3	974			
3 - 4	736	3		
4 - 5	553	15		
5 - 6	395	45		
6 - 7	282	92		
7 - 8	157	95		
8 - 9	110	84	1	
9 - 10	73	79	2	
10 - 11	55	57	8	
11 - 12	38	48	26	
12 - 13	21	42	50	
13 - 14	7	22	60	
14 - 15	16	16	62	
15 - 16	7	9	66	
16 - 17	6	8	46	

17 - 18	3	4	37	
18 - 19	1	3	28	
19 - 20	1	1	24	
20 - 21		1	20	
21 - 22			16	
22 - 23	1		9	
23 - 24		2	7	
24 - 25			3	
25 - 26			1	
26 - 27			3	
27 - 28			2	
29 - 30			1	
Total	4258	626	472	8965
Average Energy	4.07868	9.2476	15.9831	1.4372

Track down of decay modes at **83.7639** , **42.432** , **10** MeV excitation

Ex = 83.7639

**Gamma = 0.405
MeV**

**Lifetime =
1.64e-21 sec**

**Average J =
18.672**

**Stand.dev. =
6.680**

	Part	Num	DeIJ	RMS-dJ
Neut	2510	0.344223	2.59051	14.5487
Prot	300	0.206667	2.46171	15.4575
Alph	190	-2.41053	5.38028	19.1992

Ex = 42.432

**Gamma = 0.0615
MeV**

**Lifetime =
1.49e-20 sec**

**Average J =
15.019**

**Stand.dev. =
5.467**

	Part	Num	DeIJ	RMS-dJ
Neut	2397	-0.609929	2.16295	13.2115
Prot	341	-0.715543	1.99413	14.7009
Alph	257	-2.70817	4.84627	17.8755

Ex = 10

Gamma =
0.000206 MeVLifetime =
2.49e-11 sec

Average J = 8.627

Stand.dev. =
3.711

	Part	Num	DeJ	RMS-dJ
Neut	2036	-0.968075	1.91532	11.7905
Prot	119	-1.09244	1.96182	12.0252
Alph	42	-1.97619	3.49489	14.9048
Gamm	794	-1.73678	1.90221	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		18
0.15 - 0.25		37
0.25 - 0.35		6
0.35 - 0.45		31
0.45 - 0.55		6
0.55 - 0.65	166	299
1.05 - 1.15	554	7848
Above 3.05	0	0

M states at final J vs Ex

0 - 3	0.24	1.74	1.00	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3 - 6	0.24	2.15	3.64	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6 - 9	0.37	2.26	2.58	..	..	..	..	..	..	..	..	..	..	..	..	..	..
9 - 12	0.91	2.26	2.52	2.08	..	..	..	..	..	..	..	..	..	..	..	..	..
12 - 15	1.41	2.31	2.55	2.97	..	..	..	..	..	..	..	..	..	..	..	..	..
15 - 18	1.29	1.98	2.51	2.83	5.00	..	..	..	..	..	..	..	..	..	..	..	..
18 -	1.43	2.18	2.74	2.49	2.85	..	..	..	..	..	..	..	..	..	..	..	..

21																	
21 - 24	0.75	1.92	2.42	2.52	1.25	..	..	..	..	..	..	..	..	..	..	..	..
24 - 27	0.92	2.44	2.47	2.59	4.56	..	..	..	..	..	..	..	..	..	..	..	..
27 - 30	1.64	2.16	2.46	2.17	3.57	..	..	..	..	..	..	..	..	..	..	..	..
30 - 33	1.50	2.08	2.27	2.51	2.38	5.00	..	..	..	..	..	..	..	..	..	..	..
33 - 36	1.50	2.61	2.65	2.78	2.25	7.00	..	..	..	..	..	..	..	..	..	..	..
36 - 39	1.00	2.22	2.63	2.24	3.55	2.00	..	..	..	..	..	..	..	..	..	..	..
39 - 42	1.22	2.07	2.51	2.07	2.39	4.67	..	..	..	..	..	..	..	..	..	..	..
42 - 45	1.13	2.22	2.11	2.46	1.96	2.00	..	..	..	..	..	..	..	..	..	..	..
45 - 48	1.25	1.73	2.22	2.45	2.56	2.83	3.00	..	..	..	..	..	..	..	..	..	..
48 - 51	..	2.21	2.29	2.47	2.77	1.00	..	..	..	..	..	..	..	..	..	..	..
51 - 54	0.75	1.70	2.08	1.85	2.11	2.17	..	..	..	..	..	..	..	..	..	..	..
54 - 57	0.60	1.97	1.97	1.97	1.96	2.56	1.00	..	..	..	..	..	..	..	..	..	..
57 - 60	0.71	1.63	1.58	2.28	2.00	1.89	1.00	..	..	..	..	..	..	..	..	..	..
60 - 63	1.00	1.40	1.89	1.76	1.80	2.62	3.50	..	..	..	..	..	..	..	..	..	..
63 - 66	..	1.31	2.00	2.04	1.73	1.20	1.00	..	..	..	..	..	..	..	..	..	..
66 - 69	1.25	1.40	1.87	1.39	1.56	1.94	2.33	1.00	..	..	..	..	..	..	..	..	..
69 - 72	1.25	1.84	1.32	1.40	1.47	1.36	1.00	..	..	..	..	..	..	..	..	..	..
72 - 75	1.00	0.65	0.77	1.04	0.96	0.87	0.44	..	..	..	..	..	..	..	..	..	..
75 - 78	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
78 - 81	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
81 - 84	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
84 - 87	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
87 - 90	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ex /	-4.00	-9.00	-14.0	-19.0	-24.0	-29.0	-34.0	-39.0	-44.0	-49.0	-54.0	-59.0	-64.0	-69.0	-74.0	-79.0	

J 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

Decay summary. Mode = NEUT Total = 4258 Out of = 1000 events Multiplicity = 4.258

Average Ecm = 4.1 Average spin removed = 1.4

9 - 12	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	2	0
12 - 15	7	35	8	..	..	..	..	..	..	..	..	..	..	..	..	..	50	7.1	2.73679
15 - 18	12	98	57	..	..	..	..	..	..	..	..	..	..	..	..	..	167	8.34731	2.91789
18 - 21	7	57	70	16	..	..	..	..	..	..	..	..	..	..	..	..	150	10.1667	3.67045
21 - 24	7	54	93	37	1	..	..	..	..	..	..	..	..	..	..	..	192	11.2448	3.93005
24 - 27	12	44	75	56	6	..	..	..	..	..	..	..	..	..	..	..	193	12	4.72015
27 - 30	9	48	98	47	6	..	..	..	..	..	..	..	..	..	..	..	208	11.8317	4.31294
30 - 33	9	38	76	60	14	2	..	..	..	..	..	..	..	..	..	..	199	12.9548	5.02186
33 - 36	4	36	49	40	13	1	..	..	..	..	..	..	..	..	..	..	143	12.8741	5.09747
36 - 39	6	26	70	45	18	3	..	..	..	..	..	..	..	..	..	..	168	13.5476	5.14528
39 - 42	8	36	57	54	17	3	..	..	..	..	..	..	..	..	..	..	175	13.2857	5.41728
42 - 45	7	34	70	55	22	3	..	..	..	..	..	..	..	..	..	..	191	13.5707	5.28199
45 - 48	3	26	50	46	19	3	..	..	..	..	..	..	..	..	..	..	147	14.0748	5.24383
48 - 51	1	21	52	39	28	5	..	..	..	..	..	..	..	..	..	..	146	14.9795	5.38194
51 - 54	3	23	44	44	29	3	..	..	..	..	..	..	..	..	..	..	146	14.8082	5.48886
54 - 57	5	23	57	53	42	8	..	..	..	..	..	..	..	..	..	..	188	15.4043	5.75256
57 - 60	5	25	54	55	31	17	1	..	..	..	..	..	..	..	..	..	188	15.6436	6.24377
60 - 63	1	11	41	39	20	9	2	..	..	..	..	..	..	..	..	..	123	16.1057	5.77465
63 - 66	1	11	26	37	16	2	3	..	..	..	..	..	..	..	..	..	96	15.8542	5.70449
66 - 69	4	15	54	51	34	16	2	1	..	..	..	..	..	..	..	..	177	16.435	6.2858

69 - 72	6	24	72	79	71	34	3	..	..	..	..	..	..	..	..	..	289	17.173	6.27825
72 - 75	3	14	27	41	36	11	7	..	..	..	..	..	..	..	..	..	139	17.5396	6.72402
84 - 87	8	64	136	234	188	105	40	5	..	..	..	..	..	..	..	..	780	18.6026	6.77446
Ex / J	-4	-9	-14	-19	-24	-29	-34	-39	-44	-49	-54	-59	-64	-69	-74	-79	sum	avrg	stdv
Sum	131	763	1336	1128	611	225	58	6	..	..	..	..	..	..	..	..

Decay summary. Mode = PROT Total = 626 Out of = 1000 events Multiplicity = 0.626

Average Ecm = 9.2 Average spin removed = 1.2

15 - 18	5	6	12	..	..	..	..	..	..	..	..	..	..	..	..	..	23	8.52174	4.02027
18 - 21	..	10	10	2	..	..	..	..	..	..	..	..	..	..	..	..	22	10.1818	3.21412
21 - 24	1	8	11	5	1	..	..	..	..	..	..	..	..	..	..	..	26	11.4231	4.4564
24 - 27	..	5	7	12	..	..	..	..	..	..	..	..	..	..	..	..	24	13.4583	3.94735
27 - 30	1	12	15	7	..	..	..	..	..	..	..	..	..	..	..	..	35	11	3.92792
30 - 33	1	10	7	6	1	..	..	..	..	..	..	..	..	..	..	..	25	11.2	4.83322
33 - 36	..	2	6	9	2	..	..	..	..	..	..	..	..	..	..	..	19	14.8947	4.07682
36 - 39	1	9	9	3	1	..	..	..	..	..	..	..	..	..	..	..	23	10.6957	4.47636
39 - 42	1	4	8	4	2	..	..	..	..	..	..	..	..	..	..	..	19	12.5263	5.10282
42 - 45	1	2	8	11	2	..	..	..	..	..	..	..	..	..	..	..	24	14.2917	4.5596
45 - 48	1	6	9	7	4	1	..	..	..	..	..	..	..	..	..	..	28	13.7857	5.85758
48 - 51	..	2	9	9	1	..	..	..	..	..	..	..	..	..	..	..	21	14.1429	3.64216
51 - 54	1	2	6	10	3	..	..	..	..	..	..	..	..	..	..	..	22	14.7273	4.93763
54 - 57	..	3	9	6	4	..	1	..	..	..	..	..	..	..	..	..	23	15.2609	5.82511
57 - 60	1	3	13	20	8	..	..	..	..	..	..	..	..	..	..	..	45	15.4444	4.57314
60 - 63	1	4	7	8	2	1	..	..	..	..	..	..	..	..	..	..	23	13.9565	5.66053
63 - 66	..	1	1	4	3	1	..	..	..	..	..	..	..	..	..	..	10	18	5.38516
66 - 69	..	3	5	7	2	1	..	..	..	..	..	..	..	..	..	..	18	15.0556	5.30694
69 - 72	1	7	14	12	11	6	..	..	..	..	..	..	..	..	..	..	51	16.2157	6.44529
72 - 75	..	1	3	8	11	..	..	..	..	..	..	..	..	..	..	..	23	18.3043	4.22657
84 - 87	3	11	27	32	34	12	3	..	..	..	..	..	..	..	..	..	122	17.3689	6.50246
Ex / J	-4	-9	-14	-19	-24	-29	-34	-39	-44	-49	-54	-59	-64	-69	-74	-79	sum	avrg	stdv
Sum	19	111	196	182	92	22	4	..	..	..	..	..	..	..	..	..

Decay summary. Mode = ALPH Total = 472 Out of = 1000 events Multiplicity = 0.472

Average Ecm = 16 Average spin removed = 4.1

15 - 18	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	7	0
18 - 21	..	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	3	12	0
21 - 24	..	3	2	1	..	..	..	..	..	..	..	..	..	..	..	..	6	10.3333	3.72678
24 - 27	..	3	7	2	..	..	..	..	..	..	..	..	..	..	..	..	12	11.5833	3.20048
27 - 30	1	4	1	..	1	..	..	..	..	..	..	..	..	..	..	..	7	9.14286	5.89015
30 - 33	..	3	3	2	1	..	..	..	..	..	..	..	..	..	..	..	9	12.5556	4.96904
33 - 36	..	3	10	5	1	..	..	..	..	..	..	..	..	..	..	..	19	13.0526	3.83164
36 - 39	..	6	5	2	3	3	..	..	..	..	..	..	..	..	..	..	19	14.8947	7.31181
39 - 42	..	3	6	11	4	3	..	..	..	..	..	..	..	..	..	..	27	16.6296	5.5986
42 - 45	..	..	11	14	3	4	..	..	..	..	..	..	..	..	..	..	32	17	4.84123
45 - 48	..	5	8	7	11	2	1	..	..	..	..	..	..	..	..	..	34	17	6.41689
48 - 51	..	1	4	3	2	..	..	..	..	..	..	..	..	..	..	..	10	15	4.58258
51 - 54	..	2	1	7	6	3	..	..	..	..	..	..	..	..	..	..	19	18.8421	5.66859
54 - 57	..	3	3	4	3	1	..	..	..	..	..	..	..	..	..	..	14	15.5714	6.10286
57 - 60	1	4	6	4	7	1	..	..	..	..	..	..	..	..	..	..	23	15.2609	6.52898
60 - 63	..	..	5	7	8	3	..	..	..	..	..	..	..	..	..	..	23	18.9565	4.83176
63 - 66	..	1	3	5	3	2	..	..	..	..	..	..	..	..	..	..	14	17.7143	5.62429
66 - 69	..	2	2	11	5	1	1	..	..	..	..	..	..	..	..	..	22	17.9091	5.56702
69 - 72	1	..	8	14	16	13	2	..	..	..	..	..	..	..	..	..	54	20.4259	5.99568
72 - 75	..	2	5	4	7	4	2	..	..	..	..	..	..	..	..	..	24	19.5	7.07107
84 - 87	1	7	13	28	20	15	10	4	..	..	..	..	..	..	..	..	98	20.3673	7.81729
Ex / J	-4	-9	-14	-19	-24	-29	-34	-39	-44	-49	-54	-59	-64	-69	-74	-79	sum	avrg	stdv
Sum	4	55	106	131	101	55	16	4	..	..	..	..	..	..	..	..

Decay summary. Mode = G-E1 Total = 720 Out of = 1000 events Multiplicity = 0.72

Average Ecm = 1.3 Average spin removed = 0.21

0 - 3	269	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	269	2	0
3 - 6	264	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	264	2	0
6 - 9	149	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	149	2	0
9 - 12	35	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	35	2	0
12 - 15	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	2	0
Ex / J	-4	-9	-14	-19	-24	-29	-34	-39	-44	-49	-54	-59	-64	-69	-74	-79	sum	avrg	stdv
Sum	720	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

Decay summary. Mode = G-E2 Total = 8245 Out of = 1000 events Multiplicity = 8.245

Average Ecm = 1.5 Average spin removed = 1.1

0 - 3	1180	102	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1283	2.4053	1.37884
3 - 6	1972	413	14	..	..	..	..	..	..	..	..	..	..	..	..	..	2399	2.91913	2.01063
6 - 9	1291	546	138	1	..	..	..	..	..	..	..	..	..	..	..	..	1976	4.08755	3.10607
9 - 12	537	630	259	24	..	..	..	..	..	..	..	..	..	..	..	..	1450	6.2069	3.84061
12 - 15	46	318	293	66	..	..	..	..	..	..	..	..	..	..	..	..	723	9.62102	3.7391
15 - 18	..	22	188	87	4	..	..	..	..	..	..	..	..	..	..	..	301	13.2126	2.98523
18 - 21	..	..	24	58	13	..	..	..	..	..	..	..	..	..	..	..	95	16.4211	3.06621
21 - 24	..	..	..	9	6	..	..	..	..	..	..	..	..	..	..	..	15	19	2.44949
24 - 27	..	..	..	..	3	..	..	..	..	..	..	..	..	..	..	..	3	22	0
Ex / J	-4	-9	-14	-19	-24	-29	-34	-39	-44	-49	-54	-59	-64	-69	-74	-79	sum	avrg	stdv
Sum	5026	2031	917	245	26	..	..	..	..	..	..	..	..	..	..	..

Fission probability as function of excitation

Ex.Energy Probability

84 - 87	0.00e+00
72 - 75	0.00e+00
69 - 72	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