

20091201
Heim's Mass Formula 1989 a
Neutron resonances

k

P

Q

κ

l

T1 :=

1

0

0

0

1

1

1

0

1

1

1

1

0

1

2

1

1

1

0

1

1

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0

2

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3

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3

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2

3

1

0

3

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3

1

0

4

T2 :=

"η"

"/η"

"K+"

"/K0"

"K0"

"/K+"

"e0"

"/e-"

"e-"

"/e0"

"μ-"

"/μ-"

"π+-"

"/π+-"

"π0"

"/π0"

"Λ"

"/Λ"

"Ω-"

"/Ω2-"

"p"

"/n"

"n"

"/p"

"Ξ0"

"/Ξ-"

"Ξ-"

"/Ξ0"

"Σ+"

"/Σ-"

"Σ0"

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"Σ-"

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"o++"

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"o+"

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"o-"

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hb = 1.0545919 × 10⁻³⁴

c = 2.997925 × 10⁸

γ = 6.6732 × 10⁻¹¹

R = 376.72482

ε = 1

1

α

=

137.03601894

μ = 2.25902743 × 10⁻³¹

KG2MEV = 5.60953743 × 10²⁹

i := 11..11

$$C(T1_{i,0}, T1_{i,1}, T1_{i,2}, T1_{i,3}, T1_{i,4}) = b(T1_{i,0}, T1_{i,1}, T1_{i,2}, T1_{i,3}, T1_{i,4}) = X(T1_{i,0}, T1_{i,1}, T1_{i,2}, T1_{i,3}, T1_{i,4}) = a(T1_{i,0}, T1_{i,1}, T1_{i,2}, T1_{i,3}, T1_{i,4}) =$$

0.00056966

0.01387084

1

0.25

	f(N)	W(N=0)*(1+f(N))	n	m	p	σ	M	KB
N := 0..9	f(T1 _{i,0} , T1 _{i,1} , T1 _{i,2} , T1 _{i,3} , T1 _{i,4}) = w1(T1 _{i,0} , T1 _{i,1} , T1 _{i,2} , T1 _{i,3} , T1 _{i,4}) = n(T1 _{i,0} , T1 _{i,1} , T1 _{i,2} , T1 _{i,3} , T1 _{i,4}) = m(T1 _{i,0} , T1 _{i,1} , T1 _{i,2} , T1 _{i,3} , T1 _{i,4}) = p(T1 _{i,0} , T1 _{i,1} , T1 _{i,2} , T1 _{i,3} , T1 _{i,4}) = σ(T1 _{i,0} , T1 _{i,1} , T1 _{i,2} , T1 _{i,3} , T1 _{i,4}) = M(T1 _{i,0} , T1 _{i,1} , T1 _{i,2} , T1 _{i,3} , T1 _{i,4}) = KB(T1 _{i,0} , T1 _{i,1} , T1 _{i,2} , T1 _{i,3} , T1 _{i,4}) = N(p(T1 _{i,0} , T1 _{i,1} , T1 _{i,2} , T1 _{i,3} , T1 _{i,4}))							
N =								
0	0	14828.61091953	0	0	-2	17	939.55346474	11
1	0.13887084	16887.87255734	1	4	-8	18	1124.1734277	2
2	0.19440834	17711.41661852	2	-20	-24	-13	1149.60820382	12
3	0.22911252	18226.03128554	2	-6	-16	-7	1197.74055874	16
4	0.25548336	18617.07419489	2	1	-22	-11	1251.46324104	12
5	0.27768753	18946.33122542	2	6	-35	-20	1307.37200835	4
6	0.29751075	19240.28203947	2	9	13	-2	1364.17349705	50
7	0.31584587	19512.16646823	2	13	-34	11	1417.20232547	-26
8	0.33318893	19769.33997345	3	-22	-32	-16	1329.67127224	4
9	0.34983755	20016.2158322	3	-13	-29	-9	1346.82758961	1

	f(N)	W(N=0)*(1+f(N))	n	m	p	σ	M	KB
N := 10..19	f(T1 _{i,0} , T1 _{i,1} , T1 _{i,2} , T1 _{i,3} , T1 _{i,4}) = w1(T1 _{i,0} , T1 _{i,1} , T1 _{i,2} , T1 _{i,3} , T1 _{i,4}) = n(T1 _{i,0} , T1 _{i,1} , T1 _{i,2} , T1 _{i,3} , T1 _{i,4}) = m(T1 _{i,0} , T1 _{i,1} , T1 _{i,2} , T1 _{i,3} , T1 _{i,4}) = p(T1 _{i,0} , T1 _{i,1} , T1 _{i,2} , T1 _{i,3} , T1 _{i,4}) = σ(T1 _{i,0} , T1 _{i,1} , T1 _{i,2} , T1 _{i,3} , T1 _{i,4}) = M(T1 _{i,0} , T1 _{i,1} , T1 _{i,2} , T1 _{i,3} , T1 _{i,4}) = KB(T1 _{i,0} , T1 _{i,1} , T1 _{i,2} , T1 _{i,3} , T1 _{i,4}) = N(p(T1 _{i,0} , T1 _{i,1} , T1 _{i,2} , T1 _{i,3} , T1 _{i,4}))							
N =								
10	0.36598112	20255.60249352	3	-8	-2	18	1374.12486538	10
11	0.38174589	20489.37225676	3	-3	-18	-8	1400.41891533	14
12	0.3972193	20718.82132918	3	1	-26	-15	1433.69571743	11
13	0.41246376	20944.87557308	3	4	-7	10	1470.47137839	11
14	0.42752508	21168.21395419	3	7	-4	-3	1509.60987774	28
15	0.44243758	21389.34569676	3	10	-16	-14	1550.39376369	23
16	0.45722754	21608.6602076	3	12	22	-6	1602.00988739	67
17	0.47191537	21826.46035867	3	15	-14	4	1641.04609236	8
18	0.48651721	22042.98525939	4	-22	-27	-4	1533.97069362	-1
19	0.50104594	22258.42619734	4	-14	-23	-2	1548.39971287	2

$$N := 20 \dots 29$$
 $f(N)$
$$W(N=0) \cdot (1 + f(N))$$

n

m

p

 σ

M

KB

$$N = f(T_{1,0}, T_{1,1}, T_{1,i}, w_{1-}(T_{1,0}, T_{1,1}, T_{1,2}, n(T_{1,0}, m(T_{1,0}, p(T_{1,0}, \sigma(T_{1,0}, T_{1M}(T_{1,0}, T_{1,1}, T_{1,2}, KB[T_{1,0}, T_{1,1}, T_{1,2}, T_{1,3}, T_{1,4}, N, (p(T_{1,0}, T_{1,1}, T_{1,2}, T_{1,i})))$$

20	0.51551202	22472.93802432	4	-9	-7	6	1571.07951515	15
21	0.52992398	22686.64743729	4	-4	-30	8	1595.56831524	-17
22	0.54428889	22899.65909895	4	-1	1	21	1626.96521774	11
23	0.55861263	23112.06022821	4	3	-33	-18	1657.948218	5
24	0.57290013	23323.92408896	4	6	-32	8	1694.34210195	-20
25	0.58715559	23535.31267371	4	8	10	42	1734.65289387	2
26	0.60138255	23746.27879092	4	11	-12	-1	1771.80456489	15
27	0.61558408	23956.86770496	4	13	16	-14	1819.73614624	66
28	0.6297628	24167.11843685	4	16	-30	-10	1862.77936583	1
29	0.64392099	24377.06480481	4	18	-17	-15	1908.234194	23

N := 30 .. 39

 $f(N)$
$$W(N=0) \cdot (1 + f(N))$$

n

m

p

 σ

M

KB

$$N = f(T_{1,0}, T_{1,1}, T_{1,i}, w_{1-}(T_{1,0}, T_{1,1}, T_{1,2}, n(T_{1,0}, m(T_{1,0}, p(T_{1,0}, \sigma(T_{1,0}, T_{1M}(T_{1,0}, T_{1,1}, T_{1,2}, KB[T_{1,0}, T_{1,1}, T_{1,2}, T_{1,3}, T_{1,4}, N, (p(T_{1,0}, T_{1,1}, T_{1,2}, T_{1,i})))$$

30	0.65806065	24586.7362634	5	-17	-33	-1	1766.94268796	-12
31	0.67218351	24796.15858539	5	-11	-29	0	1784.35643029	-8
32	0.68629109	25005.35441955	5	-7	-5	-15	1808.3716119	39
33	0.70038474	25214.34375011	5	-3	-4	-7	1834.95874205	32
34	0.71446566	25423.14427737	5	1	-27	-9	1864.02816362	4
35	0.72853492	25631.77173494	5	4	-21	19	1897.30998051	-17
36	0.74259344	25840.24015549	5	7	-29	-3	1934.30741121	-5
37	0.75664209	26048.5620946	5	9	8	41	1974.9102393	1
38	0.77068162	26256.74882004	5	12	-22	0	2013.2822063	1
39	0.78471272	26464.81047286	5	14	3	-6	2057.90217102	41

N := 40 .. 49

 $f(N)$
$$W(N=0) \cdot (1 + f(N))$$

n

m

p

 σ

M

KB

$$N =$$
$$f(T_{1,0}, T_{1,1}, T_{1,i}, w_1 - (T_{1,0}, T_{1,1}, T_{1,2}, n(T_{1,0}, m(T_{1,0}, p(T_{1,0}, \sigma(T_{1,0}, T_1 M(T_{1,0}, T_{1,1}, T_{1,2}, KB[T_{1,0}, T_{1,1}, T_{1,2}, T_{1,3}, T_{1,4}, N, (p(T_{1,0}, T_{1,1}, T_{1,2}, T_{1,i}$$

40	0.79873599	26672.75620471	5	16	21	70	2109.34021416	-11
41	0.81275201	26880.59429565	5	18	32	-14	2160.72608752	88
42	0.82676128	27088.33225552	6	-22	-29	-6	2011.04746789	-2
43	0.84076425	27295.97691143	6	-14	-29	10	2025.12684898	-18
44	0.85476136	27503.53448366	6	-9	-20	-5	2044.79082849	9
45	0.86875297	27711.01065156	6	-5	-10	17	2069.80153465	0
46	0.88273944	27918.41061116	6	-1	-21	-11	2097.12388825	13
47	0.89672109	28125.73912548	6	2	-7	32	2129.69474808	-11
48	0.91069823	28333.00056873	6	5	-7	2	2163.56513253	19
49	0.92467111	28540.19896515	6	8	-20	11	2200.45343167	-7

N := 50 .. 59

$$f(N)$$
$$W(N=0)^*(1+f(N))$$

n

m

p

 σ

M

KB

$$N =$$
$$f(T_{1,0}, T_{1,1}, T_{1,i}, w_1 - (T_{1,0}, T_{1,1}, T_{1,2}, n(T_{1,0}, m(T_{1,0}, p(T_{1,0}, \sigma(T_{1,0}, TM(T_{1,0}, T_{1,1}, T_{1,2}, KB[T_{1,0}, T_{1,1}, T_{1,2}, T_{1,3}, T_{1,4}, N, (p(T_{1,0}, T_{1,1}, T_{1,2}, T_{1,3})))$$

50	0.93863998	28747.3380234	6	10	13	47	2244.17196387	1
51	0.95260509	28954.42116683	6	13	-21	-11	2282.07829088	13
52	0.96656664	29161.45156042	6	15	-1	-8	2326.4970315	37
53	0.98052483	29368.43213473	6	17	13	-7	2375.57642497	55
54	0.99447984	29575.36560716	6	19	21	-8	2426.2841709	67
55	1.00843185	29782.25450104	6	21	23	-12	2476.94192266	74
56	1.02238101	29989.10116261	7	-17	-33	-11	2294.27866263	-2
57	1.03632747	30195.90777628	7	-11	-31	-13	2311.55093999	3
58	1.05027137	30402.67637841	7	-7	-8	1	2334.88875506	19
59	1.06421283	30609.40886956	7	-3	-9	-3	2360.65757328	21

N := 60..69	f(N)	W(N=0)*(1+f(N))	n	m	p	σ	M	KB
N =	$f(T1_{i,0}, T1_{i,1}, T1_{i,2}, w1 - (T1_{i,0}, T1_{i,1}, T1_{i,2}, n(T1_{i,0}, m(T1_{i,0}, p(T1_{i,0}, \sigma(T1_{i,0}, T1_{i,1}, T1_{i,2},$							$KB(T1_{i,0}, T1_{i,1}, T1_{i,2}, T1_{i,3}, T1_{i,4}, N, (p(T1_{i,0}, T1_{i,1}, T1_{i,2}, T1_{i,3},$

60	1.07815197	30816.10702568	7	1	-35	-17	2391.02927985	1
61	1.09208891	31022.77250815	7	4	-31	-15	2423.35014154	5
62	1.10602376	31229.40687286	7	6	17	21	2465.09667672	33
63	1.1199566	31436.01157844	7	9	-1	12	2497.75282786	17
64	1.13388753	31642.58799379	7	12	-34	-18	2539.55932059	3
65	1.14781665	31849.13740482	7	14	-10	-6	2580.24410946	23
66	1.16174402	32055.66102068	7	16	5	35	2626.85083243	3
67	1.17566973	32262.15997939	7	18	17	-13	2676.99321954	67
68	1.18959386	32468.63535301	7	20	22	-6	2727.84029182	67
69	1.20351645	32675.08815232	7	22	21	1	2778.3987188	58

N := 70..79	f(N)	W(N=0)*(1+f(N))	n	m	p	σ	M	KB
N =	$f(T1_{i,0}, T1_{i,1}, T1_{i,2}, w1 - (T1_{i,0}, T1_{i,1}, T1_{i,2}, n(T1_{i,0}, m(T1_{i,0}, p(T1_{i,0}, \sigma(T1_{i,0}, T1_{i,1}, T1_{i,2},$							$KB[T1_{i,0}, T1_{i,1}, T1_{i,2}, T1_{i,3}, T1_{i,4}, N, (p(T1_{i,0}, T1_{i,1}, T1_{i,2}, T1_{i,3},$

70	1.21743759	32881.51933116	8	-21	-26	-8	2593.22004969	4
71	1.23135734	33087.9297904	8	-14	-13	13	2608.87855483	0
72	1.24527574	33294.32038151	8	-9	-3	10	2630.86293577	17
73	1.25919286	33500.69190997	8	-4	-32	-15	2653.52315661	3
74	1.27310874	33707.04513828	8	-1	-6	-15	2682.06022124	38
75	1.28702344	33913.38078882	8	2	7	-9	2716.40805196	49
76	1.300937	34119.69954643	8	5	5	34	2749.93397067	4
77	1.31484947	34326.00206084	8	8	-7	2	2784.81317948	19
78	1.32876088	34532.28894888	8	11	-34	3	2826.90500059	-18
79	1.34267127	34738.56079655	8	13	-9	-7	2866.06649073	25

N := 80 .. 89

$$f(N)$$
$$W(N=0) \cdot (1 + f(N))$$

n

m

p

 σ

M

KB

$$N =$$
$$f(T_{1,0}, T_{1,1}, T_{1,i}, w_1 - (T_{1,0}, T_{1,1}, T_{1,2}, n(T_{1,0}, m(T_{1,0}, p(T_{1,0}, \sigma(T_{1,0}, T_1 M(T_{1,0}, T_{1,1}, T_{1,2}, KB[T_{1,0}, T_{1,1}, T_{1,2}, T_{1,3}, T_{1,4}, N, (p(T_{1,0}, T_{1,1}, T_{1,2}, T_{1,3})))$$

80	1.35658069	34944.81816088	8	15	9	43	2912.82774204	0
81	1.37048917	35151.06157176	8	17	24	6	2964.05349723	57
82	1.38439674	35357.29153354	8	19	31	-15	3014.85319657	88
83	1.39830344	35563.50852653	8	21	33	-3	3065.9119954	79
84	1.41220929	35769.71300846	8	23	29	21	3115.99693326	49
85	1.42611433	35975.90541576	9	-25	-32	10	2923.99401112	-22
86	1.44001858	36182.0861648	9	-16	-21	2	2935.70148458	0
87	1.45392207	36388.25565301	9	-10	-27	-11	2954.01929917	6
88	1.46782483	36594.41425999	9	-6	-12	12	2977.63482994	2
89	1.48172688	36800.56234842	9	-2	-18	-12	3004.07528086	18

N := 90 .. 99

 $f(N)$
$$W(N=0) \cdot (1 + f(N))$$

n

m

p

 σ

M

KB

$$N =$$
$$f(T_{1,0}, T_{1,1}, T_{1,i}, w_1 - (T_{1,0}, T_{1,1}, T_{1,2}, n(T_{1,0}, m(T_{1,0}, p(T_{1,0}, \sigma(T_{1,0}, TM(T_{1,0}, T_{1,1}, T_{1,2}, KB[T_{1,0}, T_{1,1}, T_{1,2}, T_{1,3}, T_{1,4}, N, (p(T_{1,0}, T_{1,1}, T_{1,2}, T_{1,3})))$$

90	1.49562825	37006.70026509	9	1	-1	-13	3036.22414417	42
91	1.50952895	37212.82834167	9	4	3	-6	3070.30811553	41
92	1.523429	37418.94689559	9	7	-8	17	3104.23963197	39
93	1.53732844	37625.05623077	9	10	-29	5	3144.4840815	-13
94	1.55122728	37831.15663831	9	12	-1	2	3184.90277996	27
95	1.56512553	38037.24839722	9	14	21	-5	3233.98185818	64
96	1.57902321	38243.33177498	9	17	-33	-15	3276.02759067	2
97	1.59292035	38449.40702814	9	19	-25	11	3322.34097365	-13
98	1.60681696	38655.47440291	9	21	-24	-14	3371.50356651	13
99	1.62071305	38861.53413565	9	23	-28	-1	3424.36429827	-5

N := 100 .. 109

	f(N)	W(N=0)*(1+f(N))	n	m	p	σ	M	KB
N =	$f\left(T1_{i,0}, T1_{i,1}, T1_{i,2}, w1_{i,0}, T1_{i,1}, T1_{i,2}, n\left(T1_{i,0}, m\left(T1_{i,0}, p\left(T1_{i,0}, \sigma\left(T1_{i,0}, T1_{i,1}, T1_{i,2}, KB\left[T1_{i,0}, T1_{i,1}, T1_{i,2}, T1_{i,3}, T1_{i,4}, N, \left(p\left(T1_{i,0}, T1_{i,1}, T1_{i,2}, T1_{i,3}, T1_{i,4}, N\right)\right)\right)\right)\right)\right)\right)$							
100	1.63460864	39067.58645334	9	24	43	-14	3489.97791236	103
101	1.64850375	39273.63157407	9	26	30	-9	3537.6724003	80
102	1.66239838	39479.66970746	10	-18	-31	-14	3295.59380413	4
103	1.67629256	39685.70105508	10	-12	-19	2	3312.51452751	3
104	1.69018629	39891.72581079	10	-7	-26	-13	3333.88279456	9
105	1.70407959	40097.74416117	10	-3	-27	7	3360.10171217	-12
106	1.71797247	40303.7562858	10	0	-6	-10	3389.8091623	33
107	1.73186495	40509.76235762	10	3	2	-13	3423.42300332	46
108	1.74575702	40715.76254322	10	6	-3	-9	3457.44148173	36
109	1.75964871	40921.75700313	10	9	-21	21	3495.00396961	-19

N := 110 .. 119

	f(N)	W(N=0)*(1+f(N))	n	m	p	σ	M	KB
N =	$f\left(T1_{i,0}, T1_{i,1}, T1_{i,2}, w1_{i,0}, T1_{i,1}, T1_{i,2}, n\left(T1_{i,0}, m\left(T1_{i,0}, p\left(T1_{i,0}, \sigma\left(T1_{i,0}, T1_{i,1}, T1_{i,2}, KB\left[T1_{i,0}, T1_{i,1}, T1_{i,2}, T1_{i,3}, T1_{i,4}, N, \left(p\left(T1_{i,0}, T1_{i,1}, T1_{i,2}, T1_{i,3}, T1_{i,4}, N\right)\right)\right)\right)\right)\right)\right)$							
110	1.77354002	41127.74589211	10	11	8	39	3537.41506287	3
111	1.78743097	41333.72935937	10	14	-31	-9	3579.60538267	-1
112	1.80132157	41539.70754885	10	16	-15	-14	3622.04860502	24
113	1.81521181	41745.68059945	10	18	-6	20	3668.78708349	3
114	1.82910172	41951.64864521	10	20	0	-3	3718.33310938	34
115	1.8429913	42157.61181558	10	22	-3	26	3768.55308271	1
116	1.85688056	42363.57023557	10	24	-9	-8	3821.25405339	26
117	1.8707695	42569.52402594	10	26	-22	8	3877.5835786	-7
118	1.88465815	42775.47330342	10	27	45	19	3947.83070299	73
119	1.89854649	42981.41818081	11	-21	-30	-15	3689.79266749	6