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CALCULATED FISSION PROPERTIES
OF THE HEAVIEST ELEMENTS:
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CALCULATED SINGLE-PARTICLE
LEVELS IN HEAVY NUCLEI

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Calculated Single-Particle Levels in Heavy Nuclei

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The decay properties of nuclei in many cases depend strongly on the quantum numbers of the single-particle levels in the vicinity of the Fermi surface. A striking illustration is the prolonged fission half-lives of odd nuclei relative to their even neighbours. The hinderance factor depends on the spin of unpaired odd particle and increases with increasing spin of the odd particle. The effect has been studied theoretically by ref.[1] and others. For ^{257}Fm the hinderance factor is almost ten orders of magnitude.

The computer code for calculating nuclear masses calculates single-particle levels at the deformations considered as one step in the calculations. We have run this code for all nuclei considered in the 1981 mass study[2,3] and stored the calculated single-particle levels on permanent mass storage. This is actually point (I.D.1) in the research plan ('UNIFIED MODEL ...'). A computer code has been constructed for extracting levels of nuclei that are specified to the program and plotting them. Four such plots are included in this report as figs. 1-4. The levels are plotted relative to the Fermi surface of each nucleus. It is clear from the pictures that for ^{257}Fm the calculations predict the $N=157$ neutron orbital to have spin $\frac{9}{2}+$ as is also found experimentally. The high spin is the reason for the large hinderance factor for fission of ^{257}Fm . Figures of the type included here may be used to quickly survey larger regions of nuclei for candidates for special properties, such as unusually large hinderance factors in fission. More detailed calculations are usually required to determine the magnitude of the effects. We also include tables of the plotted single-particle levels since it is not always possible to determine the spin from an inspection of the plots, when levels are overlapping.

References

- [1] J. Randrup, C. F. Tsang, P. Möller, S. G. Nilsson and S. E. Larsson, Nucl. Phys. **A217** (1973) 221.
- [2] P. Möller and J. R. Nix, Nucl. Phys. **A361** (1981) 117.
- [3] P. Möller and J. R. Nix, At. Data Nucl. Data Tables **26** (1981) 165.

Relative Single-Neutron Energy (MeV)

Z = 100 N = 143 A = 243

E (MeV)	Omega
-2.984	3/2+
-2.965	1/2+
-2.617	13/2+
-2.464	1/2-
-1.988	3/2-
-1.819	3/2-
-1.667	5/2-
-1.323	3/2+
-1.215	5/2+
-1.099	5/2-
-0.970	1/2-
0.000	7/2-
0.224	1/2+
0.488	5/2+
0.743	7/2+
1.220	9/2-
2.031	7/2+
2.388	1/2-
2.428	11/2-
2.467	9/2+
2.684	1/2+
2.923	3/2+

Z = 100 N = 145 A = 245

E (MeV)	Omega
-2.589	1/2-
-2.570	13/2+
-2.143	3/2-
-1.805	3/2-
-1.647	5/2-
-1.537	3/2+
-1.477	5/2+
-1.298	5/2-
-0.959	1/2-
-0.233	7/2-
0.000	1/2+
0.266	5/2+
0.475	7/2+
0.973	9/2-
1.869	7/2+
2.206	11/2-
2.275	1/2-
2.283	9/2+
2.457	1/2+
2.685	3/2+

Z = 100 N = 147 A = 247

E (MeV)	Omega
-2.736	13/2+
-2.727	1/2-
-2.305	3/2-
-1.980	3/2-
-1.832	5/2-
-1.766	3/2+
-1.738	5/2+
-1.498	5/2-
-1.141	1/2-
-0.470	7/2-
-0.232	1/2+
0.000	5/2+
0.173	7/2+
0.709	9/2-
1.608	7/2+
1.925	11/2-
1.988	9/2+
2.149	1/2-
2.186	1/2+
2.405	3/2+
2.958	9/2+

Z = 100 N = 149 A = 249

E (MeV)	Omega
-2.626	1/2-
-2.494	13/2+
-2.254	3/2-
-1.870	5/2+
-1.845	3/2+
-1.776	3/2-
-1.620	5/2-
-1.522	5/2-
-0.941	1/2-
-0.559	7/2-
-0.313	1/2+
-0.118	5/2+
0.000	7/2+
0.579	9/2-
1.565	7/2+
1.805	11/2-
1.913	9/2+
2.061	1/2+
2.263	3/2+
2.303	1/2-

Z = 100 N = 151 A = 251

E (MeV)	Ω_{mega}
-2.968	1/2-
-2.895	13/2+
-2.640	3/2-
-2.431	5/2+
-2.368	3/2+
-2.194	3/2-
-2.044	5/2-
-1.977	5/2-
-1.365	1/2-
-1.083	7/2-
-0.828	1/2+
-0.706	5/2+
-0.633	7/2+
0.000	9/2-
0.994	7/2+
1.203	11/2-
1.303	9/2+
1.464	1/2+
1.653	3/2+
2.019	1/2-
2.522	13/2-
2.732	1/2-
2.765	9/2+
2.909	3/2-

Z = 100 N = 153 A = 253

E (MeV)	Ω_{mega}
-2.909	5/2-
-2.857	5/2-
-2.222	1/2-
-2.043	7/2-
-1.782	1/2+
-1.728	5/2+
-1.696	7/2+
-1.012	9/2-
0.000	7/2+
0.174	11/2-
0.274	9/2+
0.433	1/2+
0.607	3/2+
1.313	1/2-
1.539	13/2-
1.898	1/2-
1.910	9/2+
2.041	3/2-
2.484	1/2+
2.543	11/2+
2.565	3/2+
2.797	3/2+

Z = 100 N = 155 A = 255

E (MeV)	Omega
-2.976	5/2-
-2.789	5/2-
-2.285	1/2-
-2.073	7/2-
-1.886	7/2+
-1.876	5/2+
-1.782	1/2+
-1.130	9/2-
-0.166	7/2+
0.000	11/2-
0.056	9/2+
0.281	1/2+
0.440	3/2+
1.368	13/2-
1.627	1/2-
1.835	9/2+
2.093	1/2-
2.177	3/2-
2.390	3/2+
2.427	11/2+
2.792	1/2+
2.846	5/2+
2.983	3/2+

Z = 100 N = 157 A = 257

E (MeV)	Omega
-2.957	5/2-
-2.613	5/2-
-2.257	1/2-
-1.963	7/2-
-1.897	7/2+
-1.852	5/2+
-1.641	1/2+
-1.085	9/2-
-0.180	7/2+
-0.003	11/2-
0.000	9/2+
0.304	1/2+
0.450	3/2+
1.343	13/2-
1.844	9/2+
1.932	1/2-
2.353	1/2-
2.371	3/2+
2.386	11/2+
2.389	3/2-
2.806	5/2+

Z = 100 N = 159 A = 259

E (MeV)	Ω_{mega}
-2.699	5/2-
-2.296	1/2-
-2.225	7/2+
-2.158	7/2-
-2.143	5/2+
-1.809	1/2+
-1.354	9/2-
-0.415	7/2+
-0.291	11/2-
-0.272	9/2+
0.000	1/2+
0.128	3/2+
1.127	13/2-
1.809	9/2+
1.990	1/2-
2.118	3/2+
2.323	3/2-
2.353	11/2+
2.409	1/2-
2.532	5/2+
2.962	1/2+
2.993	3/2-

Z = 100 N = 161 A = 261

E (MeV)	Ω_{mega}
-2.940	3/2-
-2.664	5/2-
-2.407	1/2-
-2.371	7/2+
-2.260	5/2+
-2.187	7/2-
-1.786	1/2+
-1.445	9/2-
-0.570	7/2+
-0.467	9/2+
-0.434	11/2-
-0.118	1/2+
0.000	3/2+
0.961	13/2-
1.679	9/2+
1.957	3/2+
2.105	1/2-
2.171	11/2+
2.349	5/2+
2.392	3/2-
2.544	1/2-
2.818	1/2+
2.878	15/2-

Z = 100 N = 163 A = 263

E (MeV)	Ω
-2.667	1/2+
-2.449	9/2-
-1.550	7/2+
-1.479	9/2+
-1.459	11/2-
-1.166	1/2+
-1.066	3/2+
0.000	13/2-
0.902	9/2+
0.960	3/2+
1.330	5/2+
1.350	1/2-
1.398	11/2+
1.560	3/2-
1.819	1/2+
1.876	1/2-
2.119	15/2-
2.134	3/2-
2.148	5/2-
2.569	1/2+
2.611	3/2+
2.755	5/2+
2.826	5/2-

Z = 100 N = 165 A = 265

E (MeV)	Ω
-2.289	7/2+
-2.268	9/2+
-2.130	11/2-
-1.765	1/2+
-1.669	3/2+
-0.783	13/2-
0.000	9/2+
0.222	3/2+
0.400	11/2+
0.569	5/2+
0.876	1/2-
1.073	3/2-
1.079	1/2+
1.176	15/2-
1.381	1/2-
1.620	3/2-
1.628	5/2-
2.026	1/2+
2.071	3/2+
2.204	5/2+
2.252	5/2-
2.454	7/2+
2.511	7/2-
2.684	5/2+
2.900	9/2+

Z = 102 N = 143 A = 245

E (MeV)	Ω_{mega}
-2.903	3/2+
-2.851	1/2+
-2.487	13/2+
-2.283	1/2-
-1.856	3/2-
-1.680	3/2-
-1.534	5/2-
-1.299	3/2+
-1.240	5/2+
-1.035	5/2-
-0.827	1/2-
0.000	7/2-
0.270	1/2+
0.461	5/2+
0.660	7/2+
1.171	9/2-
2.026	7/2+
2.362	11/2-
2.417	9/2+
2.670	1/2-
2.687	1/2+
2.910	3/2+

Z = 102 N = 145 A = 247

E (MeV)	Ω_{mega}
-2.690	13/2+
-2.460	1/2-
-2.057	3/2-
-1.894	3/2-
-1.758	5/2-
-1.566	3/2+
-1.540	5/2+
-1.274	5/2-
-1.048	1/2-
-0.276	7/2-
0.000	1/2+
0.158	5/2+
0.320	7/2+
0.867	9/2-
1.726	7/2+
2.045	11/2-
2.084	9/2+
2.378	1/2+
2.508	1/2-
2.592	3/2+

Z = 102 N = 147 A = 249

E (MeV)	Omega
-2.488	13/2+
-2.400	1/2-
-2.045	3/2-
-1.729	3/2-
-1.712	5/2+
-1.684	3/2+
-1.585	5/2-
-1.339	5/2-
-0.888	1/2-
-0.405	7/2-
-0.118	1/2+
0.000	5/2+
0.107	7/2+
0.698	9/2-
1.645	7/2+
1.887	11/2-
1.971	9/2+
2.212	1/2+
2.409	3/2+
2.624	1/2-

Z = 102 N = 149 A = 251

E (MeV)	Omega
-2.980	1/2+
-2.363	13/2+
-2.218	1/2-
-1.907	3/2-
-1.747	5/2+
-1.683	3/2+
-1.620	3/2-
-1.484	5/2-
-1.269	5/2-
-0.786	1/2-
-0.403	7/2-
-0.106	1/2+
-0.063	5/2+
0.000	7/2+
0.646	9/2-
1.601	7/2+
1.812	11/2-
1.888	9/2+
2.140	1/2+
2.325	3/2+
2.865	1/2-

Z = 102 N = 151 A = 253

E (MeV)	Omega
-2.734	1/2-
-2.723	13/2+
-2.455	3/2-
-2.413	5/2+
-2.314	3/2+
-2.006	3/2-
-1.884	5/2-
-1.843	5/2-
-1.176	1/2-
-1.035	7/2-
-0.748	1/2+
-0.599	5/2+
-0.668	7/2+
0.000	9/2-
1.040	7/2+
1.191	11/2-
1.311	9/2+
1.487	1/2+
1.659	3/2+
2.357	1/2-
2.560	13/2-
2.939	1/2-
2.963	9/2+

Z = 102 N = 153 A = 255

E (MeV)	Omega
-2.929	3/2-
-2.815	5/2-
-2.656	5/2-
-2.113	1/2-
-1.939	7/2-
-1.733	7/2+
-1.720	5/2+
-1.621	1/2+
-0.991	9/2-
0.000	7/2+
0.143	11/2-
0.220	9/2+
0.460	1/2+
0.617	3/2+
1.516	13/2-
1.800	1/2-
2.016	9/2+
2.263	1/2-
2.348	3/2-
2.589	3/2+
2.601	11/2+
2.941	1/2+

Z = 102 N = 155 A = 257

E (MeV)	Omega
-2.892	3/2-
-2.798	5/2-
-2.655	5/2-
-2.086	1/2-
-2.017	7/2-
-1.910	7/2+
-1.863	5/2+
-1.689	1/2+
-1.120	9/2-
-0.109	7/2+
0.000	11/2-
0.079	9/2+
0.305	1/2+
0.449	3/2+
1.419	13/2-
1.918	1/2-
2.040	9/2+
2.327	1/2-
2.357	3/2-
2.466	3/2+
2.616	11/2+
2.901	5/2+

Z = 102 N = 157 A = 259

E (MeV)	Omega
-2.947	3/2-
-2.832	3/2-
-2.797	5/2-
-2.507	5/2-
-2.082	1/2-
-1.941	7/2+
-1.929	7/2-
-1.864	5/2+
-1.564	1/2+
-1.097	9/2-
-0.145	7/2+
-0.026	11/2-
0.000	9/2+
0.303	1/2+
0.434	3/2+
1.371	13/2-
2.025	9/2+
2.178	1/2-
2.422	3/2+
2.545	3/2-
2.553	11/2+
2.573	1/2-
2.835	5/2+

Z = 102 N = 159 A = 261

E (MeV)	Omega
-2.963	3/2-
-2.658	5/2-
-2.377	1/2-
-2.271	7/2+
-2.165	5/2+
-2.143	7/2-
-1.731	1/2+
-1.373	9/2-
-0.483	7/2+
-0.380	9/2+
-0.351	11/2-
0.000	1/2+
0.122	3/2+
1.022	13/2-
1.709	9/2+
2.078	3/2+
2.119	1/2-
2.187	11/2+
2.430	3/2-
2.468	5/2+
2.523	1/2-
2.877	15/2-
2.945	1/2+

Z = 102 N = 161 A = 263

E (MeV)	Omega
-2.946	5/2-
-2.874	1/2-
-2.748	3/2-
-2.532	5/2-
-2.392	7/2+
-2.254	5/2+
-2.210	1/2-
-2.127	7/2-
-1.672	1/2+
-1.434	9/2-
-0.518	7/2+
-0.447	9/2+
-0.433	11/2-
-0.103	1/2+
0.000	3/2+
1.008	13/2-
1.878	9/2+
2.024	3/2+
2.321	1/2-
2.359	11/2+
2.394	5/2+
2.554	3/2-
2.799	1/2-
2.892	1/2+

Z = 102 N = 163 A = 265

E (MeV)	Omega
-2.616	1/2+
-2.465	9/2-
-1.536	7/2+
-1.494	9/2+
-1.482	11/2-
-1.169	1/2+
-1.080	3/2+
0.000	13/2-
0.990	3/2+
0.994	9/2+
1.342	5/2+
1.441	1/2-
1.467	11/2+
1.620	3/2-
1.854	1/2+
1.979	1/2-
2.154	5/2-
2.178	3/2-
2.188	15/2-
2.661	1/2+
2.691	3/2+
2.810	5/2+
2.817	5/2-

Z = 102 N = 165 A = 267

E (MeV)	Omega
-2.412	7/2+
-2.403	9/2+
-2.317	11/2-
-1.968	1/2+
-1.880	3/2+
-0.904	13/2-
0.000	9/2+
0.111	3/2+
0.405	11/2+
0.449	5/2+
0.658	1/2-
0.839	3/2-
0.974	1/2+
1.147	1/2-
1.166	15/2-
1.365	3/2-
1.370	5/2-
1.822	1/2+
1.859	3/2+
1.984	5/2+
2.008	5/2-
2.218	7/2+
2.261	7/2-
2.662	9/2+
2.708	5/2+

Z = 104 N = 143 A = 247

E (MeV)	Omega
-2.807	3/2+
-2.736	1/2+
-2.567	13/2+
-2.113	1/2-
-1.743	3/2-
-1.711	3/2-
-1.605	5/2-
-1.284	3/2+
-1.258	5/2+
-0.969	5/2-
-0.878	1/2-
0.000	7/2-
0.317	1/2+
0.395	5/2+
0.548	7/2+
1.107	9/2-
1.925	7/2+
2.244	11/2-
2.261	9/2+
2.651	1/2+
2.859	3/2+
2.948	1/2-

Z = 104 N = 145 A = 249

E (MeV)	Omega
-2.958	1/2+
-2.561	13/2+
-2.254	1/2-
-1.915	3/2-
-1.763	3/2-
-1.631	5/2-
-1.630	5/2+
-1.603	3/2+
-1.235	5/2-
-0.916	1/2-
-0.330	7/2-
0.000	1/2+
0.038	5/2+
0.136	7/2+
0.739	9/2-
1.644	7/2+
1.890	11/2-
1.950	9/2+
2.283	1/2+
2.476	3/2+
2.866	1/2-

Z = 104 N = 147 A = 251

E (MeV)	Omega
-2.934	1/2+
-2.323	13/2+
-2.184	1/2-
-1.872	3/2-
-1.696	5/2+
-1.630	3/2+
-1.552	3/2-
-1.416	5/2-
-1.231	5/2-
-0.708	1/2-
-0.362	7/2-
-0.037	1/2+
0.000	5/2+
0.060	7/2+
0.692	9/2-
1.673	7/2+
1.862	11/2-
1.958	9/2+
2.228	1/2+
2.410	3/2+
2.941	1/2-

Z = 104 N = 149 A = 253

E (MeV)	Omega
-2.967	3/2+
-2.795	1/2+
-2.167	13/2-
-1.967	1/2-
-1.705	5/2+
-1.702	3/2-
-1.604	3/2+
-1.411	3/2-
-1.284	5/2+
-1.129	5/2-
-0.575	1/2-
-0.333	7/2-
-0.033	5/2+
-0.011	7/2+
0.000	1/2+
0.670	9/2-
1.668	7/2+
1.823	11/2-
1.917	9/2+
2.184	1/2+
2.352	3/2+

Z = 104 N = 151 A = 255

E (MeV)	Omega
-2.551	13/2+
-2.507	1/2-
-2.395	5/2+
-2.272	3/2-
-2.265	3/2+
-1.818	3/2-
-1.762	5/2-
-1.671	5/2-
-0.987	7/2-
-0.986	1/2-
-0.703	7/2+
-0.694	5/2+
-0.669	1/2+
0.000	9/2-
1.087	7/2+
1.180	11/2-
1.320	9/2+
1.502	1/2+
1.659	3/2+
2.600	13/2-
2.675	1/2-

Z = 104 N = 153 A = 257

E (MeV)	Omega
-2.761	3/2-
-2.751	5/2-
-2.616	5/2-
-2.044	7/2-
-1.938	1/2-
-1.852	7/2+
-1.816	5/2+
-1.719	1/2+
-1.107	9/2-
0.000	7/2+
0.058	11/2-
0.201	9/2+
0.366	1/2+
0.511	3/2+
1.526	13/2-
1.828	1/2-
2.208	9/2+
2.233	1/2-
2.291	3/2-
2.600	3/2+
2.808	11/2+
2.883	1/2+

Z = 104 N = 155 A = 259

E (MeV)	Omega
-2.927	3/2-
-2.691	3/2-
-2.633	5/2-
-2.504	5/2-
-1.958	7/2-
-1.932	7/2+
-1.887	1/2-
-1.853	5/2+
-1.594	1/2+
-1.111	9/2-
-0.053	7/2+
0.000	11/2-
0.102	9/2+
0.324	1/2+
0.452	3/2+
1.470	13/2-
2.181	1/2-
2.246	9/2+
2.535	3/2-
2.538	3/2+
2.573	1/2-
2.807	11/2+
2.952	5/2+

Z = 104 N = 157 A = 261

E (MeV)	Omega
-2.947	1/2-
-2.858	3/2-
-2.728	3/2-
-2.705	5/2-
-2.448	5/2-
-1.972	1/2-
-1.961	7/2+
-1.909	7/2-
-1.859	5/2+
-1.512	1/2+
-1.099	9/2-
-0.115	7/2+
-0.034	11/2-
0.000	9/2+
0.317	1/2+
0.438	3/2+
1.388	13/2-
2.134	9/2+
2.306	1/2-
2.470	3/2+
2.630	3/2-
2.636	11/2+
2.686	1/2-
2.865	5/2+

Z = 104 N = 159 A = 263

E (MeV)	Omega
-2.939	5/2-
-2.924	1/2-
-2.784	3/2-
-2.543	5/2-
-2.309	7/2+
-2.197	1/2-
-2.173	5/2+
-2.099	7/2-
-1.635	1/2+
-1.377	9/2-
-0.446	7/2+
-0.376	9/2+
-0.367	11/2-
0.000	1/2+
0.107	3/2+
1.055	13/2-
1.894	9/2+
2.127	3/2+
2.328	1/2-
2.360	11/2+
2.497	5/2+
2.581	3/2-
2.762	1/2-

Z = 104 N = 161 A = 265

E (MeV)	Omega
-2.946	3/2-
-2.857	5/2-
-2.780	1/2-
-2.657	3/2-
-2.473	5/2-
-2.413	7/2+
-2.253	5/2+
-2.106	7/2-
-2.102	1/2-
-1.611	1/2+
-1.436	9/2-
-0.491	7/2+
-0.448	9/2+
-0.443	11/2-
-0.093	1/2+
0.000	3/2+
1.022	13/2-
1.985	9/2+
2.066	3/2+
2.419	5/2+
2.428	1/2-
2.442	11/2+
2.630	3/2-
2.915	1/2-
2.940	1/2+

Z = 104 N = 163 A = 267

E (MeV) Omega

-2.993	1/2-
-2.564	1/2+
-2.482	9/2-
-1.525	7/2+
-1.509	9/2+
-1.506	11/2-
-1.176	1/2+
-1.096	3/2+
0.000	13/2-
1.016	3/2+
1.085	9/2+
1.352	5/2+
1.526	1/2-
1.537	11/2+
1.676	3/2-
1.886	1/2+
2.081	1/2-
2.159	5/2-
2.224	3/2-
2.258	15/2-
2.753	1/2+
2.770	3/2+
2.806	5/2-
2.865	5/2+

Z = 106 N = 147 A = 253

E (MeV)	Omega
-2.886	3/2+
-2.709	1/2+
-2.077	13/2+
-1.853	1/2-
-1.676	5/2+
-1.608	3/2-
-1.568	3/2+
-1.299	3/2-
-1.174	5/2-
-1.062	5/2-
-0.454	1/2-
-0.301	7/2-
-0.011	5/2+
0.000	7/2+
0.066	1/2+
0.683	9/2-
1.720	7/2+
1.835	11/2-
1.961	9/2+
2.229	1/2+
2.391	3/2+

Z = 106 N = 149 A = 255

E (MeV)	Omega
-2.869	3/2+
-2.664	1/2+
-1.801	13/2+
-1.778	5/2+
-1.706	1/2-
-1.640	3/2+
-1.510	3/2-
-1.062	5/2-
-1.052	3/2-
-0.899	5/2-
-0.354	7/2-
-0.212	1/2-
-0.129	7/2+
-0.104	5/2+
0.000	1/2+
0.591	9/2-
1.730	7/2+
1.766	11/2-
1.952	9/2+
2.111	1/2+
2.259	3/2+

Z = 106 N = 151 A = 257

E (MeV)	Omega
-2.379	13/2+
-2.379	5/2+
-2.285	1/2-
-2.221	3/2+
-2.091	3/2-
-1.647	5/2-
-1.630	3/2-
-1.490	5/2-
-0.941	7/2-
-0.797	1/2-
-0.738	7/2+
-0.694	5/2+
-0.594	1/2+
0.000	9/2-
1.133	7/2+
1.169	11/2-
1.330	9/2+
1.510	1/2+
1.653	3/2+
2.641	13/2-
2.967	1/2-

Z = 106 N = 153 A = 259

E (MeV)	Omega
-2.681	5/2-
-2.619	3/2-
-2.480	5/2-
-2.041	7/2-
-1.936	7/2+
-1.863	5/2+
-1.794	1/2-
-1.688	1/2+
-1.153	9/2-
0.000	7/2+
0.002	11/2-
0.167	9/2+
0.327	1/2+
0.456	3/2+
1.521	13/2-
2.045	1/2-
2.356	9/2+
2.414	3/2-
2.418	1/2-
2.615	3/2+
2.942	11/2+

Z = 106 N = 155 A = 261

E (MeV)	Omega
-2.953	1/2-
-2.834	3/2-
-2.572	3/2-
-2.553	5/2-
-2.413	5/2-
-1.945	7/2+
-1.928	7/2-
-1.842	5/2+
-1.769	1/2-
-1.536	1/2+
-1.103	9/2-
-0.017	7/2+
0.000	11/2-
0.108	9/2+
0.344	1/2+
0.461	3/2+
1.494	13/2-
2.315	1/2-
2.363	9/2+
2.591	3/2+
2.628	3/2-
2.693	1/2-
2.899	11/2+
2.986	5/2+

Z = 106 N = 157 A = 263

E (MeV)	Omega
-2.753	1/2-
-2.706	3/2-
-2.553	5/2-
-2.542	3/2-
-2.326	5/2-
-2.004	7/2+
-1.873	5/2+
-1.867	7/2-
-1.795	1/2-
-1.428	1/2+
-1.107	9/2-
-0.085	7/2+
-0.055	11/2-
0.000	9/2+
0.310	1/2+
0.417	3/2+
1.416	13/2-
2.316	9/2+
2.514	3/2+
2.516	1/2-
2.783	3/2-
2.806	11/2+
2.888	5/2+
2.919	1/2-

Z = 106 N = 159 A = 265

E (MeV)	Omega
-2.828	3/2-
-2.819	1/2-
-2.691	5/2-
-2.631	3/2-
-2.460	5/2-
-2.324	7/2+
-2.168	5/2+
-2.087	7/2-
-1.913	1/2-
-1.622	1/2+
-1.380	9/2-
-0.345	7/2+
-0.344	11/2-
-0.290	9/2+
0.000	1/2+
0.094	3/2+
1.168	13/2-
2.193	9/2+
2.236	3/2+
2.407	1/2-
2.593	5/2+
2.625	3/2-
2.675	11/2+
2.860	1/2-

Z = 106 N = 161 A = 267

E (MeV)	Omega
-2.723	3/2-
-2.659	1/2-
-2.610	5/2-
-2.488	3/2-
-2.414	7/2+
-2.359	5/2-
-2.236	5/2+
-2.077	7/2-
-1.805	1/2-
-1.579	1/2+
-1.424	9/2-
-0.406	11/2-
-0.378	7/2+
-0.349	9/2+
-0.081	1/2+
0.000	3/2+
1.146	13/2-
2.186	3/2+
2.296	9/2+
2.512	1/2-
2.526	5/2+
2.680	3/2-
2.771	11/2+

Z = 106 N = 163 A = 269

E (MeV)	Omega
-2.842	1/2-
-2.514	9/2-
-2.479	1/2+
-1.551	11/2-
-1.534	9/2+
-1.521	7/2+
-1.216	1/2+
-1.151	3/2+
0.000	13/2-
1.024	3/2+
1.235	9/2+
1.340	5/2+
1.663	1/2-
1.675	11/2+
1.749	3/2-
1.902	1/2+
2.154	5/2-
2.293	1/2-
2.336	3/2-
2.396	15/2-
2.784	5/2-
2.939	3/2+
2.943	1/2+
2.950	7/2-
2.984	5/2+

Z = 106 N = 165 A = 271

E (MeV)	Omega
-2.587	9/2+
-2.542	11/2-
-2.539	7/2+
-2.176	1/2+
-2.117	3/2+
-1.038	13/2-
0.000	3/2+
0.167	9/2+
0.299	5/2+
0.549	11/2+
0.801	1/2-
0.863	3/2-
0.875	1/2+
1.233	5/2-
1.306	15/2-
1.430	1/2-
1.447	3/2-
1.830	5/2-
1.972	7/2-
2.053	3/2+
2.062	1/2+
2.079	5/2+
2.172	7/2+
2.498	9/2+
2.939	7/2-
2.941	5/2+

Z = 106 N = 167 A = 273

E (MeV)	Omega
-2.761	1/2+
-2.652	9/2+
-2.537	7/2+
-2.384	11/2-
-1.842	1/2+
-1.780	3/2+
-1.119	13/2-
-0.217	9/2+
0.000	11/2+
0.023	3/2+
0.292	5/2+
0.846	15/2-
0.892	1/2+
1.325	1/2-
1.433	3/2-
1.722	5/2-
1.810	1/2-
1.868	3/2-
2.271	5/2-
2.351	1/2+
2.359	3/2+
2.373	5/2+
2.384	7/2-
2.519	7/2+
2.612	5/2+
2.822	9/2+