Arrangement of Elements 7th order & Element Sequences, Periodic Table

– Olivier Joseph ©–

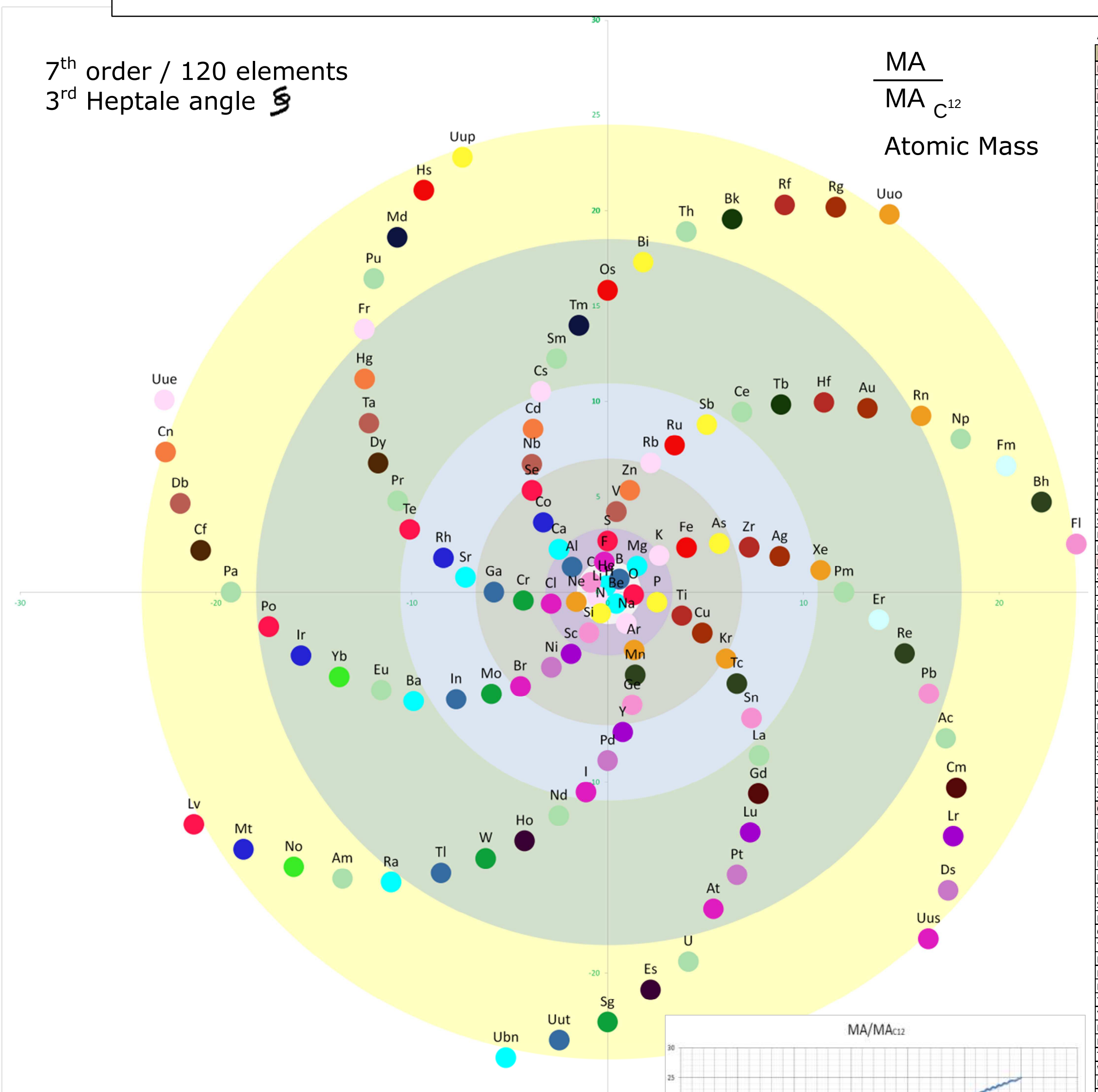
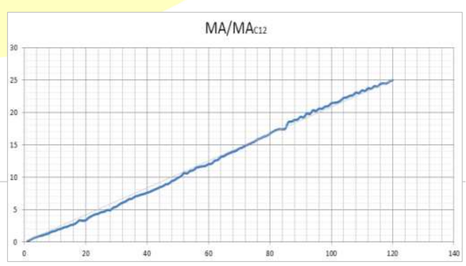
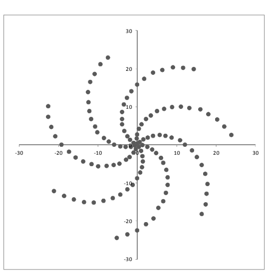


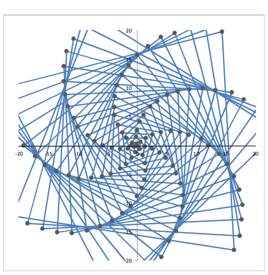
Figure 1 Spiral arrangement / 120 elements

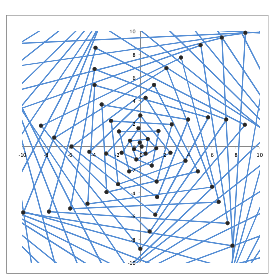


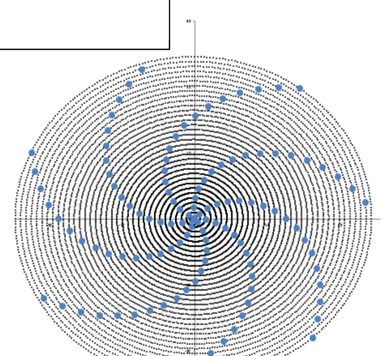
$$H(n) = \frac{1}{12}\{\,2\,n^3 + 6\,n^2 \;+\; (7 - \;3(-1)^n)\,n - 3(-1)^n - 9\}$$

$$n\ \geq 1,\, n \in \mathbb{N}$$







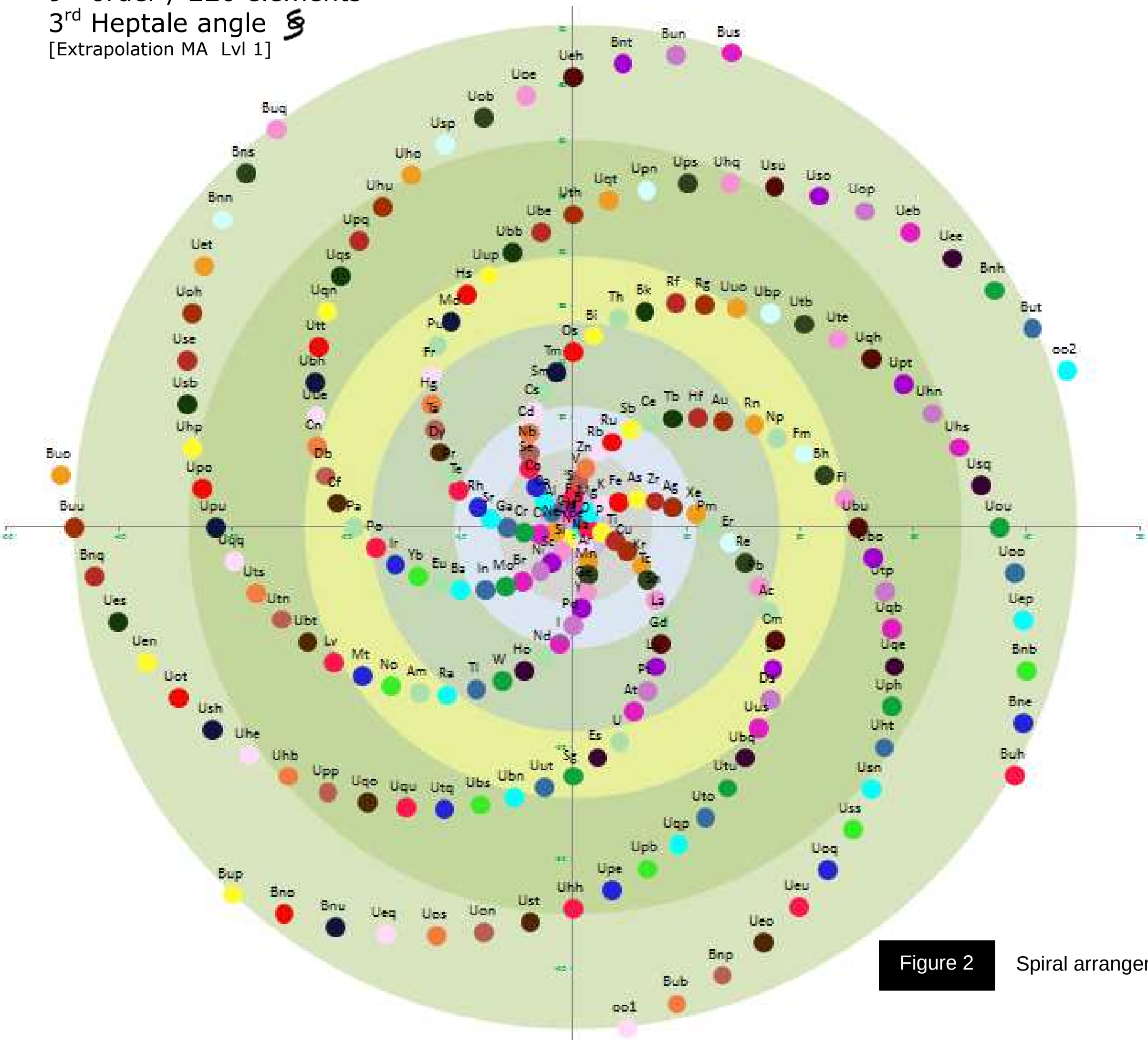


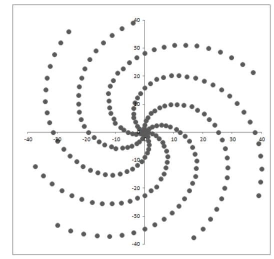
Spiral distribution
3rd Heptale angle, 7 arms

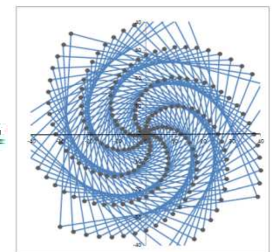
Atomic Number z

Element	z	theta	x	y	MA	10^(MA/MAc12)	MA/MAc12
H	1	0	0.084	0	1.008	1.213193454	0.083930058
He	2	102	-0.069	0.326	4.003	2.15429701	0.333305579
Li	3	204	-0.528	-0.235	6.94	3.783134573	0.57785179
Be	4	306	0.441	-0.607	9.012	5.628266948	0.750374688
B	5	408	0.602	0.669	10.81	7.944805398	0.900083264
C	6	510	-0.866	0.5	12.01	10	1
N	7	612	-0.36	-1.109	14.01	14.67330326	1.166527893
O	8	714	1.325	-0.139	16	21.48934347	1.332223147
F	9	816	-0.165	1.573	19	38.1957452	1.582014988
Ne	10	918	-1.598	-0.519	20.18	47.89238275	1.680266445
Na	11	1020	0.957	-1.658	22.99	82.08014876	1.914238135
Mg	12	1122	1.504	1.354	24.31	105.7174173	2.024146545
Al	13	1224	-1.817	1.32	26.98	176.3848509	2.246461282
Si	14	1326	-0.951	-2.137	28.09	218.2148305	2.338884263
P	15	1428	2.522	-0.536	30.97	379.0394643	2.57868443
S	16	1530	-2E-15	2.669	32.06	467.1347027	2.669442132
Cl	17	1632	-2.887	-0.614	35.45	894.7607212	2.951706911
Ar	18	1734	1.353	-3.039	39.95	2120.2871	3.326394671
K	19	1836	2.634	1.914	39.1	1801.442135	3.255620316
Ca	20	1938	-2.48	2.233	40.08	2173.796996	3.337218984
Sc	21	2040	-1.872	-3.242	44.96	5540.475568	3.743547044
Ti	22	2142	3.791	-1.232	47.87	9679.326265	3.985845129
V	23	2244	0.443	4.218	50.94	17436.74617	4.241465445
Cr	24	2346	-4.306	-0.453	52	21366.09864	4.329725229
Mn	25	2448	1.414	-4.351	54.94	37542.33082	4.574521232
Fe	26	2550	4.027	2.325	55.85	44698.343	4.650291424
Co	27	2652	-3.283	3.646	58.93	80676.00416	4.90674438
Ni	28	2754	-2.872	-3.953	58.69	77047.94015	4.886761032
Cu	29	2856	4.834	-2.152	63.55	195624.7561	5.291423813
Zn	30	2958	1.132	5.325	65.38	277841.3215	5.443796836
Ga	31	3060	-5.805	-9E-15	69.72	638502.151	5.805162365
Ge	32	3162	1.257	-5.915	72.63	1115476.562	6.04746045
As	33	3264	5.699	2.537	74.92	1730353.707	6.238134888
Se	34	3366	-3.864	5.319	78.96	3754233.082	6.574521232
Br	35	3468	-4.452	-4.944	79.9	4495617.387	6.652789342
Kr	36	3570	6.043	-3.489	83.8	9495519.596	6.977518734
Rb	37	3672	2.199	6.768	85.47	13078848.99	7.116569525
Sr	38	3774	-7.256	0.763	87.62	19750905.49	7.295587011
Y	39	3876	0.774	-7.362	88.91	25292834.49	7.402997502
Zr	40	3978	7.224	2.347	91.22	39385577.61	7.595337219
Nb	41	4080	-3.868	6.7	92.91	54456946.87	7.736053289
Mo	42	4182	-5.938	-5.346	95.96	97725595.7	7.990008326
Tc	43	4284	6.601	-4.796	98	144499644.2	8.159866778
Ru	44	4386	3.423	7.688	101.07	260307747.5	8.415487094
Rh	45	4488	-8.381	1.782	102.91	370418574.5	8.568692756
Pd	46	4590	-4E-14	-8.861	106.42	726021043.9	8.860949209
Ag	47	4692	8.785	1.867	107.87	958698243.6	8.981681932
Cd	48	4794	-3.807	8.551	112.41	2289287041	9.35970025
In	49	4896	-7.734	-5.619	114.82	3633844687	9.560366361
Sn	50	4998	7.345	-6.614	118.71	7660605784	9.884263114
Sb	51	5100	5.069	8.78	121.76	13747323468	10.13821815
Te	52	5202	-10.1	3.283	127.6	42119150210	10.6244796
I	53	5304	-1.104	-10.51	126.9	36829416448	10.56619484
Xe	54	5406	10.87	1.143	131.29	85452262062	10.93172356
Cs	55	5508	-3.42	10.52	132.91	1.16577E+11	11.06661116
Ba	56	5610	-9.903	-5.717	137.33	2.72043E+11	11.4346378
La	57	5712	7.739	-8.595	138.91	3.68294E+11	11.56619484
Ce	58	5814	6.858	9.439	140.12	4.64456E+11	11.66694421
Pr	59	5916	-10.72	4.772	140.91	5.40409E+11	11.73272273
Nd	60	6018	-2.497	-11.75	144.24	1.02327E+12	12.00999167
Pm	61	6120	12.07	4E-14	145	1.18378E+12	12.07327227
Sm	62	6222	-2.603	12.25	150.36	3.30801E+12	12.51956703
Eu	63	6324	-11.56	-5.146	151.96	4.49562E+12	12.65278934
Gd	64	6426	7.696	-10.59	157.25	1.23953E+13	13.09325562
Tb	65	6528	8.855	9.834	158.93	1.71056E+13	13.23313905
Dy	66	6630	-11.72	6.765	162.5	3.3915E+13	13.53039134
Ho	67	6732	-4.244	-13.06	164.93	5.40409E+13	13.73272273
Er	68	6834	13.85	-1.456	167.26	8.44749E+13	13.92672773
Tm	69	6936	-1.47	13.99	168.93	1.16353E+14	14.06577852
Yb	70	7038	-13.7	-4.453	173.05	2.56346E+14	14.40882598
Lu	71	7140	7.284	-12.62	174.97	3.70419E+14	14.56869276
Hf	72	7242	11.04	9.944	178.49	7.27414E+14	14.86178185
Ta	73	7344	-12.19	8.856	180.95	1.16577E+15	15.06661116
W	74	7446	-6.226	-13.98	183.84	2.02882E+15	15.30724396
Re	75	7548	15.17	-3.224	186.21	3.1958E+15	15.50457952
Os	76	7650	5E-14	15.84	190.23	6.90718E+15	15.83930058
Ir	77	7752	-15.66	-3.328	192.22	1.01157E+16	16.00499584
Pt	78	7854	6.607	-14.84	195.08	1.75037E+16	16.24313072
Au	79	7956	13.27	9.64	196.97	2.51478E+16	16.40049958
Hg	80	8058	-12.41	11.18	200.59	5.03402E+16	16.70191507
Tl	81	8160	-8.509	-14.74	204.38	1.04108E+17	17.01748543
Pb	82	8262	16.41	-5.331	207.2	1.78768E+17	17.25228976
Bi	83	8364	1.819	17.31	208.98	2.51478E+17	17.40049958
Po	84	8466	-17.31	-1.819	209	2.52444E+17	17.40216486
At	85	8568	5.403	-16.63	210	3.05794E+17	17.48542881
Rn	86	8670	16.01	9.242	222	3.05208E+18	18.48459617
Fr	87	8772	-12.42	13.8	223	3.69709E+18	18.56786012
Ra	88	8874	-11.06	-15.22	226	6.57131E+18	18.81765196
Ac	89	8976	17.27	-7.688	227	7.96005E+18	18.9009159
Th	90	9078	4.017	18.9	232.04	2.09202E+19	19.32056619
Pa	91	9180	-19.24	2E-13	231.04	1.72704E+19	19.23730225
U	92	9282	4.121	-19.39	238.03	6.59656E+19	19.81931724
Np	93	9384	18.03	8.026	237	5.41446E+19	19.73355537
Pu	94	9486	-11.94	16.44	244	2.07206E+20	20.316403
Am	95	9588	-13.54	-15.04	243	1.71056E+20	20.23313905
Cm	96	9690	17.81	-10.28	247	3.68294E+20	20.56619484
Bk	97	9792	6.355	19.56	247	3.68294E+20	20.56619484
Cf	98	9894	-20.78	2.185	251	7.92959E+20	20.89925062
Es	99	9996	2.193	-20.87	252	9.60538E+20	20.98251457
Fm	100	10098	20.35	6.613	257	2.50515E+21	21.3988343
Md	101	10200	-10.74	18.6	258	3.03458E+21	21.48209825
No	102	10302	-16.03	-14.43	259	3.67589E+21	21.5653622
Lr	103	10404	17.65	-12.82	262	6.53362E+21	21.81515404
Rf	104	10506	9.042	20.31	267	1.70402E+22	22.23147377
Db	105	10608	-21.83	4.639	268	2.06413E+22	22.31473772
Sg	106	10710	-4E-13	-22.56	271	3.66885E+22	22.56452956
Bh	107	10812	22.15	4.709	272	4.4442E+22	22.64779351
Hs	108	10914	-9.381	21.07	277	1.15908E+23	23.06411324
Mt	109	11016	-18.59	-13.51	276	9.56862E+22	22.98084929
Ds	110	11118	17.39	-15.66	281	2.49557E+23	23.39716903
Rg	111	11220	11.66	20.19	280	2.06018E+23	23.31390508
Cn	112	11322	-22.57	7.333	285	5.3731E+23	23.73022481
Uut	113	11424	-2.472	-23.52	284	4.43569E+23	23.64696087
Fl	114	11526	23.93	2.515	289	1.15686E+24	24.0632806
Uup	115	11628	-7.41	22.81	288	9.55029E+23	23.98001665
Lv	116	11730	-21.13	-12.2	293	2.49079E+24	24.39633639
Uus	117	11832	16.38	-18.19	294	3.01717E+24	24.47960033
Uuo	118	11934	14.39	19.8	294	3.01717E+24	24.47960033
Uue	119	12036	-22.63	10.08	297.3096	5.9676E+24	24.7758
Ubn	120	12138	-5.194	-24.44	299.808	9.63829E+24	24.984

9th order / 220 elements
3rd Heptale angle ֍
[Extrapolation MA Lvl 1]







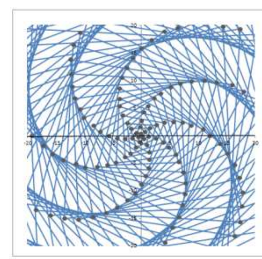
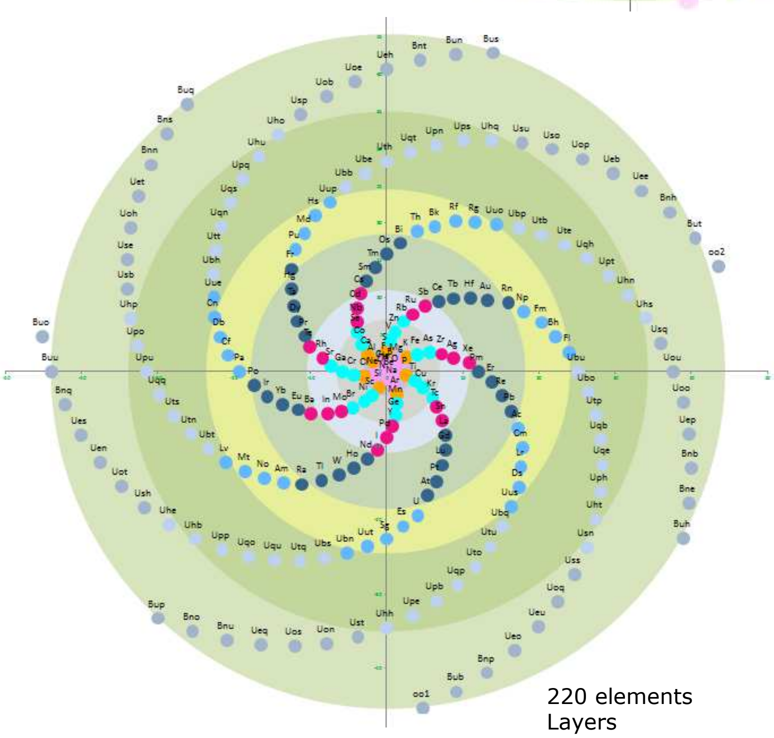
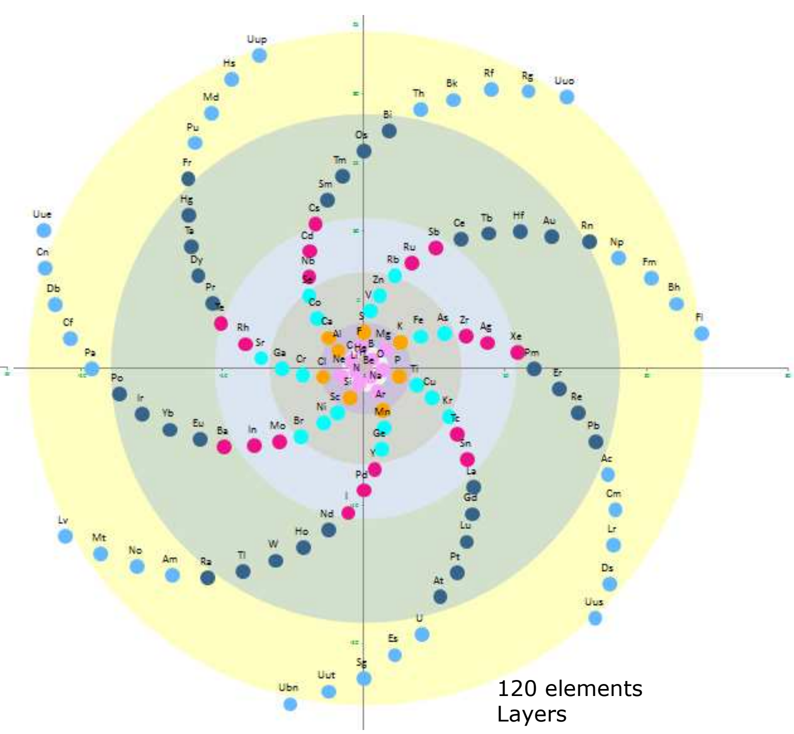


Figure 2 Spiral arrangement extended to 220 elements





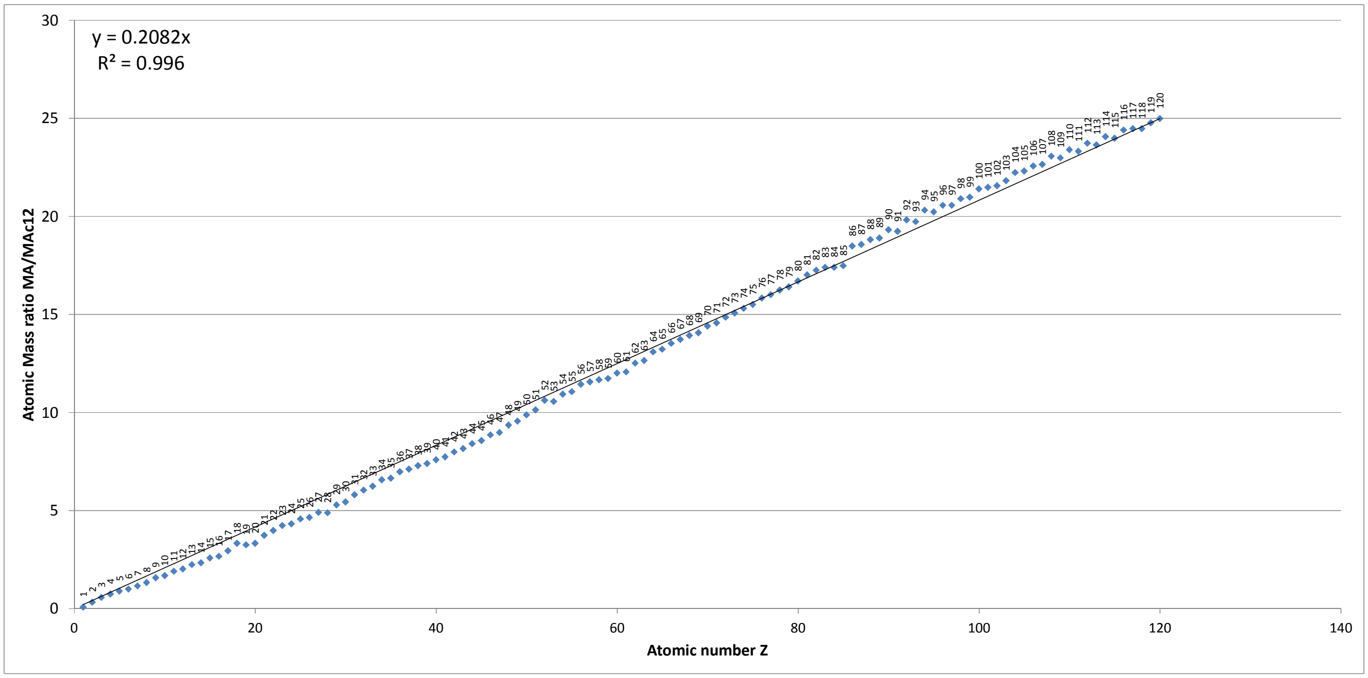
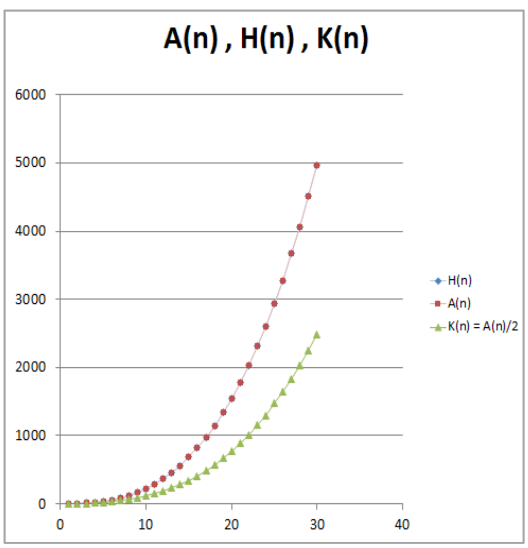


Figure 3 Atomic mass vs. Atomic number

Z = The Atomic Number, the Number of Protons in the Nucleus



n	H(n)	A(n)	K(n) = A(n)/2
1	1	0	0
2	3	2	1
3	11	10	5
4	19	18	9
5	37	36	18
6	55	54	27
7	87	86	43
8	119	118	59
9	169	168	84
10	219	218	109
11	291	290	145
12	363	362	181
13	461	460	230
14	559	558	279
15	687	686	343
16	815	814	407
17	977	976	488
18	1139	1138	569
19	1339	1338	669
20	1539	1538	769
21	1781	1780	890
22	2023	2022	1011
23	2311	2310	1155
24	2599	2598	1299
25	2937	2936	1468
26	3275	3274	1637
27	3667	3666	1833
28	4059	4058	2029
29	4509	4508	2254
30	4959	4958	2479

$$\mathbf{H}(\boldsymbol{n}) = \mathbf{A}(\boldsymbol{n}) + \mathbf{1}$$

$$\mathbf{H}(\boldsymbol{n}) = \frac{\mathbf{1}}{\mathbf{12}}\{\,\mathbf{2}\,\boldsymbol{n}^{\mathbf{3}} + \mathbf{6}\,\boldsymbol{n}^{\mathbf{2}} + (\mathbf{7} - \mathbf{3}(-\mathbf{1})^{\boldsymbol{n}})\,\boldsymbol{n} - \mathbf{3}(-\mathbf{1})^{\boldsymbol{n}} - \mathbf{9}\}$$

$n \geq 1$

$\mathrm{H}(2p) = \frac{1}{6}(8p^3 + 12p^2 + 4p - 6)$ *Even numbers* $p \geq 1$

$\mathrm{H}(2p+1) = \frac{1}{6}(8p^3 + 24p^2 + 28p + 6)$ *Odd numbers* $p \geq 0$

$$\mathbf{A}(\boldsymbol{n}) = \frac{\mathbf{1}}{\mathbf{12}}\{\,\mathbf{2}\,\boldsymbol{n}^{\mathbf{3}} + \mathbf{6}\,\boldsymbol{n}^{\mathbf{2}} + (\mathbf{7} - \mathbf{3}(-\mathbf{1})^{\boldsymbol{n}})\,\boldsymbol{n} - \mathbf{3}(-\mathbf{1})^{\boldsymbol{n}} - \mathbf{21}\}$$

$n \geq 1$

$\mathrm{A}(2p) = \frac{2}{3}(2p^3 + 3p^2 + p - 3)$ *Even numbers* $p \geq 1$

$\mathrm{A}(2p+1) = \frac{2}{3}p(2p^2 + 6p + 7)$ *Odd numbers* $p \geq 0$

$$\mathbf{K}(\boldsymbol{n}) = \mathbf{A}(\boldsymbol{n})/\mathbf{2}$$

$n \geq 1$

$\mathrm{K}(2p) = \frac{\mathrm{A}(2p)}{2}$ *Even numbers* $p \geq 1$

$\mathrm{K}(2p+1) = \frac{\mathrm{A}(2p+1)}{2}$ *Odd numbers* $p \geq 0$

$\mathrm{K}(2p+1) = \mathrm{K}(2p) + (p+1)^2$

$\mathrm{H}(2p+1) = \mathrm{H}(2p) + 2(p+1)^2$

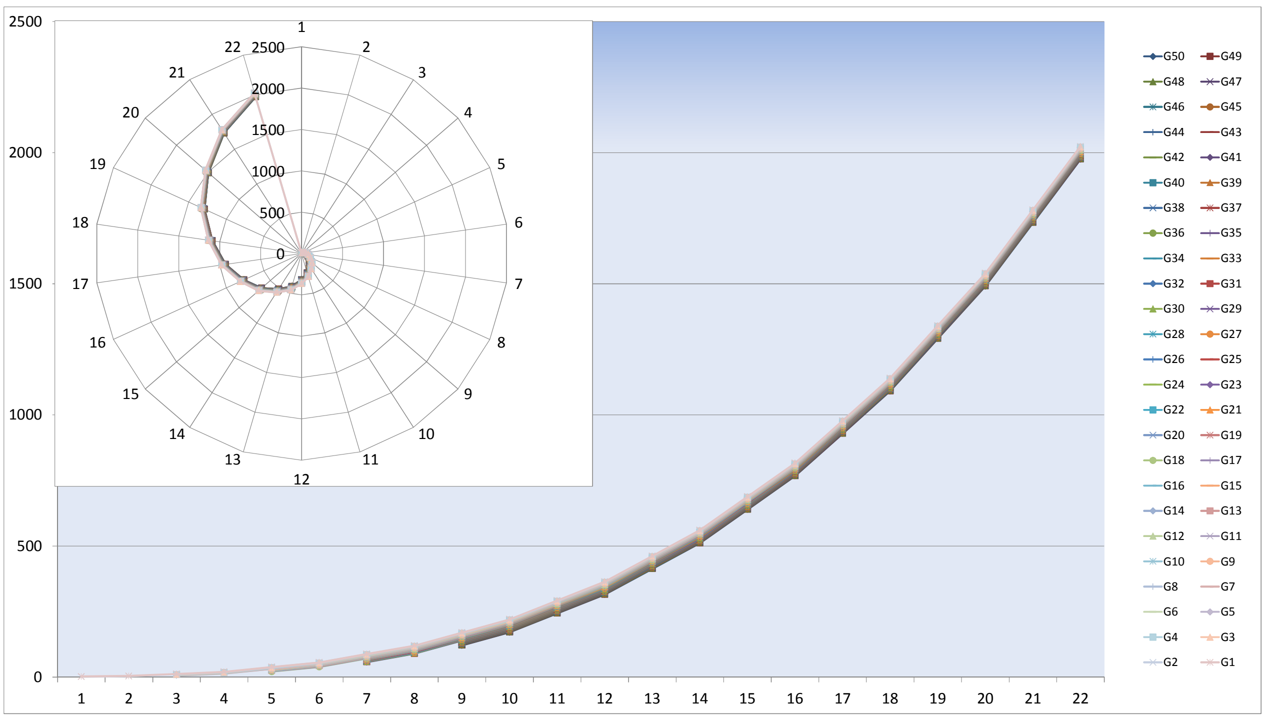
Table 1 H(n) sequence (Group IA) elements (H, Li, Na, K, Rb, Cs,…and beyond), and sub-sequences

1	2	3	4	5	6	7	8	…
1	3	11	19	37	55	87	119	…
H	Li	Na	K	Rb	Cs	Fr	Uue	…

OJ - G Sequences – sequences of elements

	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	An	Hn	Hn+1		
Gx	G50	G49	G48	G47	G46	G45	G44	G43	G42	G41	G40	G39	G38	G37	G36	G35	G34	G33	G32	G31	G30	G29	G28	G27	G26	G25	G24	G23	G22	G21	G20	G19	G18	G17	G16	G15	G14	G13	G12	G11	G10	G9	G8	G7	G6	G5	G4	G3	G2	G1	n	Sum
																																																	1	2	1	2
																																																	3	4	2	2
																																											5	6	7	8	9	10	11	12	3	8
																																											13	14	15	16	17	18	19	20	4	8
																																	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	5	18
																																	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	6	18
																			57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	7	32
																			89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	8	32
	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	9	50
	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	10	50
...	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	11	72
...	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	12	72
...	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	13	98
...	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	14	98
...	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	15	128
...	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	16	128
...	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	17	162
...	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	18	162
...	1291	1292	1293	1294	1295	1296	1297	1298	1299	1300	1301	1302	1303	1304	1305	1306	1307	1308	1309	1310	1311	1312	1313	1314	1315	1316	1317	1318	1319	1320	1321	1322	1323	1324	1325	1326	1327	1328	1329	1330	1331	1332	1333	1334	1335	1336	1337	1338	1339	1340	19	200
...	1491	1492	1493	1494	1495	1496	1497	1498	1499	1500	1501	1502	1503	1504	1505	1506	1507	1508	1509	1510	1511	1512	1513	1514	1515	1516	1517	1518	1519	1520	1521	1522	1523	1524	1525	1526	1527	1528	1529	1530	1531	1532	1533	1534	1535	1536	1537	1538	1539	1540	20	200
...	1733	1734	1735	1736	1737	1738	1739	1740	1741	1742	1743	1744	1745	1746	1747	1748	1749	1750	1751	1752	1753	1754	1755	1756	1757	1758	1759	1760	1761	1762	1763	1764	1765	1766	1767	1768	1769	1770	1771	1772	1773	1774	1775	1776	1777	1778	1779	1780	1781	1782	21	242
...	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	22	242

Table 2 Periodic table elements allocation and its presumed adequate extension



OJ - G Triangle

Sum																																		Sum
2											1	1											2											2
2											1	1											2											2
8										3	1	1	3										2	6										8
8										3	1	1	3										2	6										8
18									5	3	1	1	3	5									2	6	10									18
18									5	3	1	1	3	5									2	6	10									18
32								7	5	3	1	1	3	5	7								2	6	10	14								32
32								7	5	3	1	1	3	5	7								2	6	10	14								32
50							9	7	5	3	1	1	3	5	7	9							2	6	10	14	18							50
50							9	7	5	3	1	1	3	5	7	9							2	6	10	14	18							50
72						11	9	7	5	3	1	1	3	5	7	9	11						2	6	10	14	18	22						72
72						11	9	7	5	3	1	1	3	5	7	9	11						2	6	10	14	18	22						72
98					13	11	9	7	5	3	1	1	3	5	7	9	11	13					2	6	10	14	18	22	26					98
98					13	11	9	7	5	3	1	1	3	5	7	9	11	13					2	6	10	14	18	22	26					98
128				15	13	11	9	7	5	3	1	1	3	5	7	9	11	13	15				2	6	10	14	18	22	26	30				128
128				15	13	11	9	7	5	3	1	1	3	5	7	9	11	13	15				2	6	10	14	18	22	26	30				128
162			17	15	13	11	9	7	5	3	1	1	3	5	7	9	11	13	15	17			2	6	10	14	18	22	26	30	34			162
162			17	15	13	11	9	7	5	3	1	1	3	5	7	9	11	13	15	17			2	6	10	14	18	22	26	30	34			162
200		19	17	15	13	11	9	7	5	3	1	1	3	5	7	9	11	13	15	17	19		2	6	10	14	18	22	26	30	34	38		200
200		19	17	15	13	11	9	7	5	3	1	1	3	5	7	9	11	13	15	17	19		2	6	10	14	18	22	26	30	34	38		200
242	21	19	17	15	13	11	9	7	5	3	1	1	3	5	7	9	11	13	15	17	19	21	2	6	10	14	18	22	26	30	34	38	42	242
242	21	19	17	15	13	11	9	7	5	3	1	1	3	5	7	9	11	13	15	17	19	21	2	6	10	14	18	22	26	30	34	38	42	242

Figures 1,2 and 4,5 show that the elements are notably arranged in a specific pattern (in a spiral form made up of 7 arms) when an angle approximately equal to ʂ≈102 degrees is set. It is to be noted that other angle values generate various interesting patterns with different but less remarkable distribution of elements.

With this specific angle of about 102 degrees, all the elements of a given group (corresponding to chemical elements with similar properties, such as Ne, Ar, Kr, Xe, Rn for the noble gases...) also become specifically distributed among each arm of the spiral in a notable arranged way, fairly close to a regular spiral pattern as well, curved in the opposite direction.

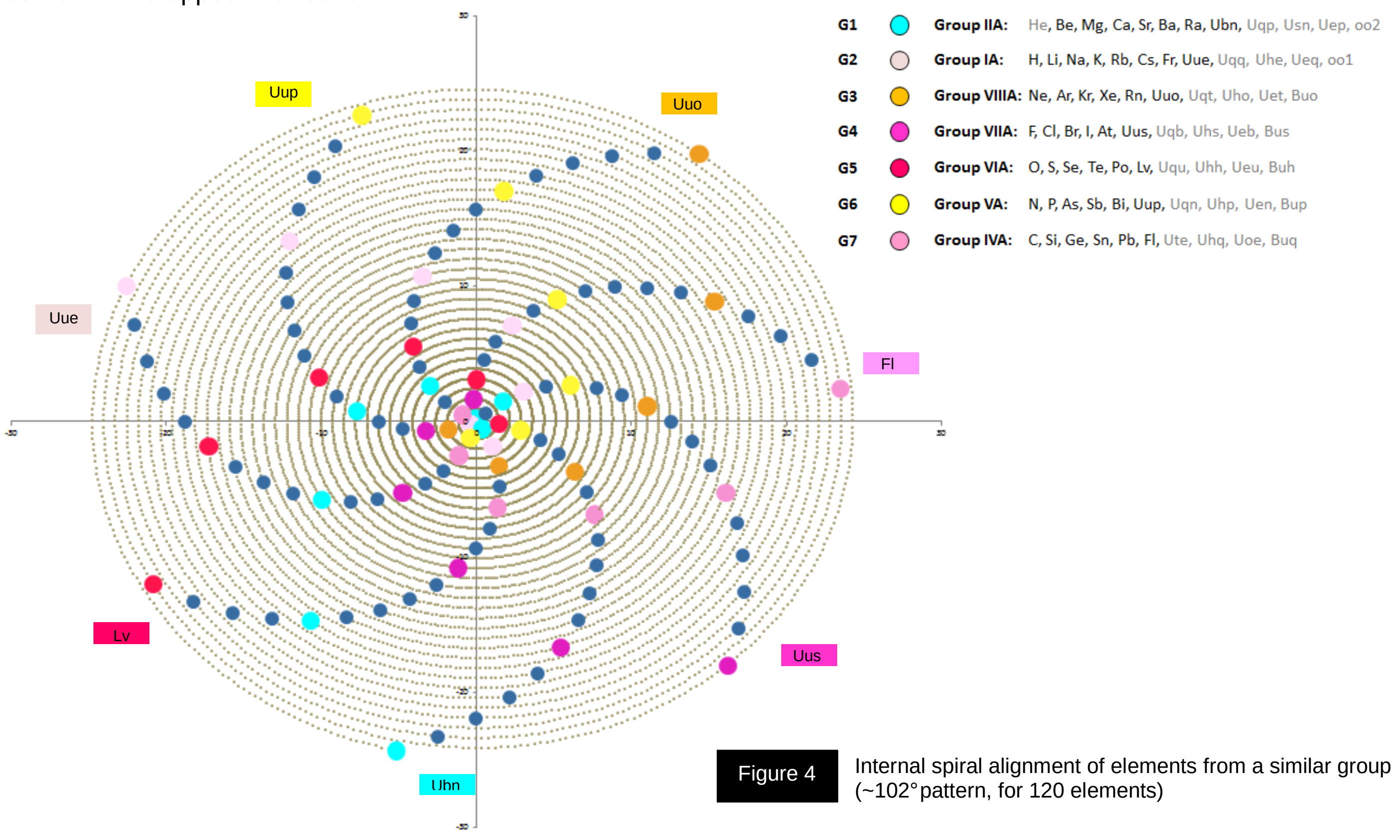


Figure 4 Internal spiral alignment of elements from a similar group (~102° pattern, for 120 elements)

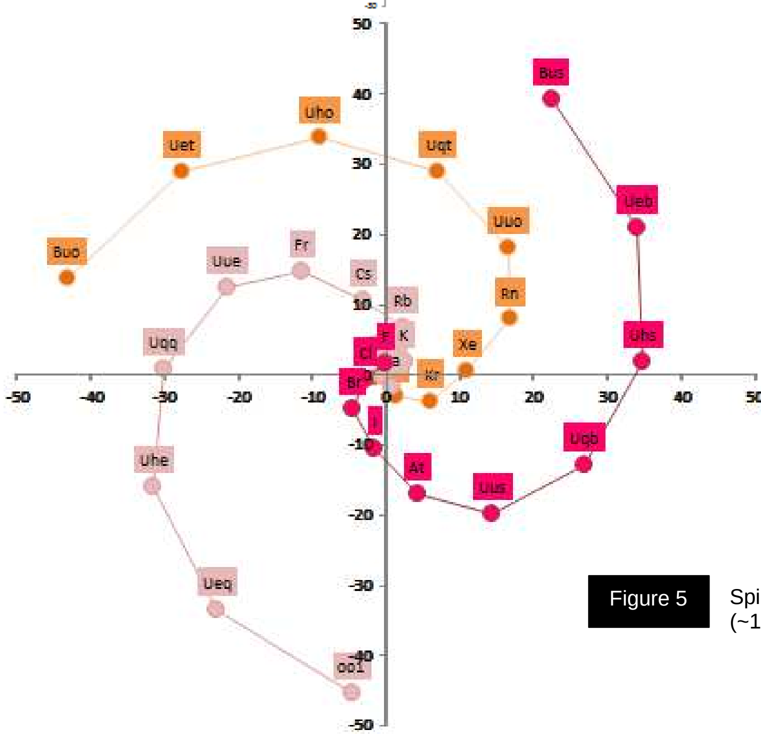
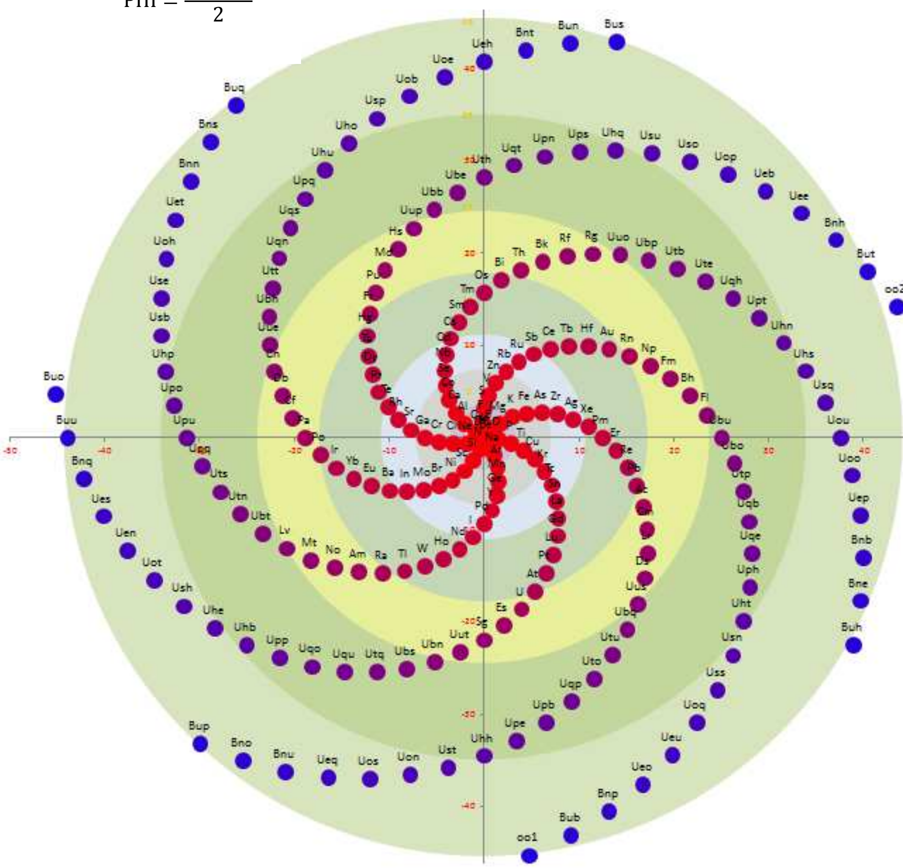


Figure 5 Spiral curve pattern per group (e.g. Group IA, VIIA, VIIIA) (~102° pattern, for extended 220 elements)

PHI *Theor. Deviation 220 elements*
3^{rd} Heptale angle
Matching / Ratio: ε
Slope: *log(PHI)*

$$\text{PHI} = \frac{1+\sqrt{5}}{2}$$

9^{th} order / 220 elements
3^{rd} Heptale angle
[Extrapolation MA Lvl 1]



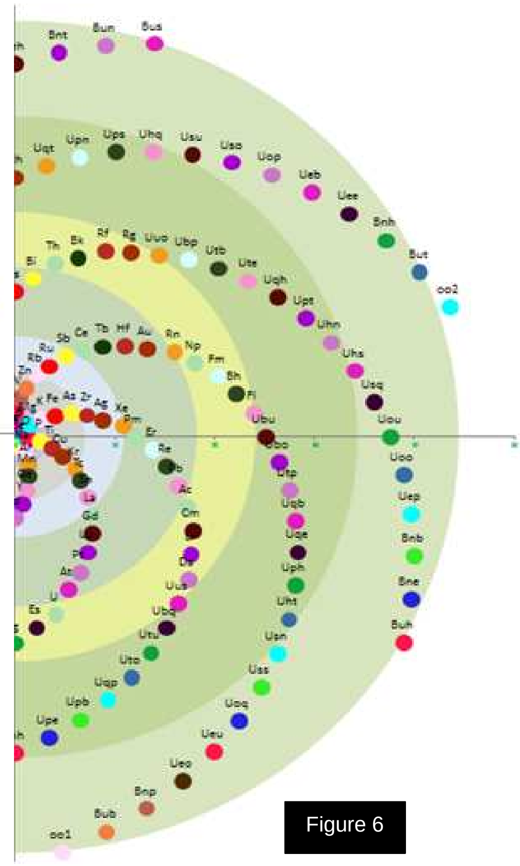
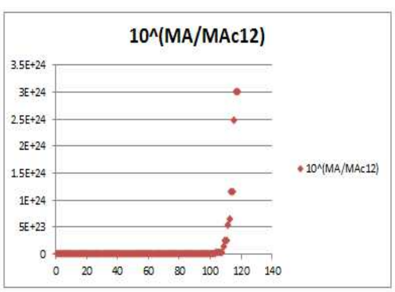
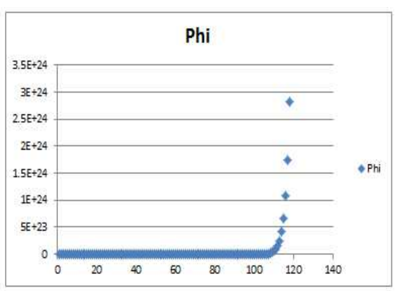
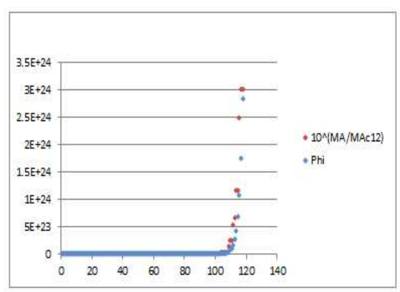


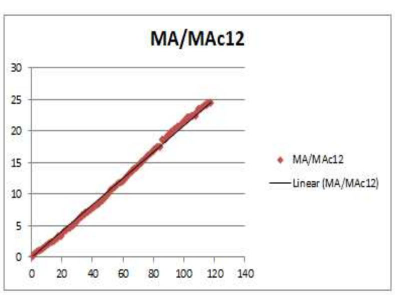
Figure 6

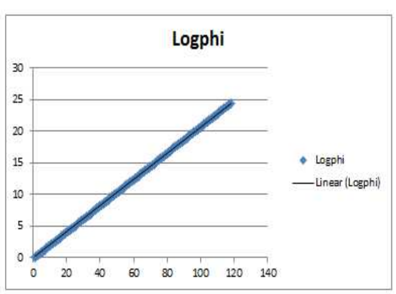
LogPHI vs. MA/MA_{c12} - Matching comparison



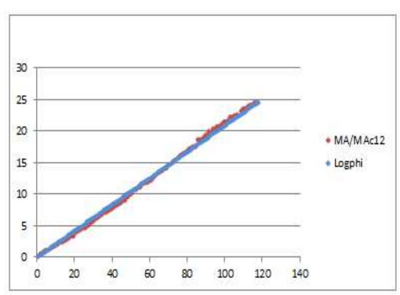








Y = log(PHI) x-log(PHI)
$R^2 = 1$



Figures 6 and 7 exhibit another feature of the arrangement with the very close match observed between the two arrangements, consisting of the MA/MA_{c12} pattern as radial distance on one side and the LogPHI pattern (PHI = golden mean $\frac{1+\sqrt{5}}{2}$) as radial distance on the other side.

As depicted here below, both models appear to fairly overlap.

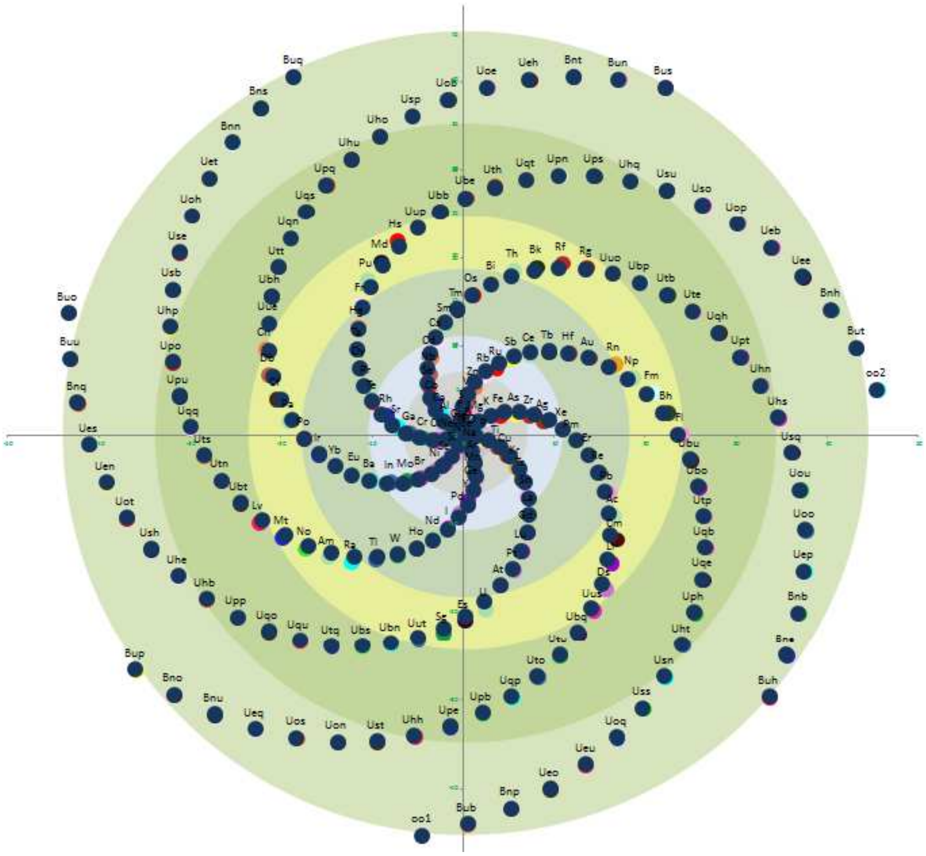


Figure 7 LogPHI (in upper position and blue color) vs. MA/MA_{c12} overlapped patterns, showing very minor deviations.

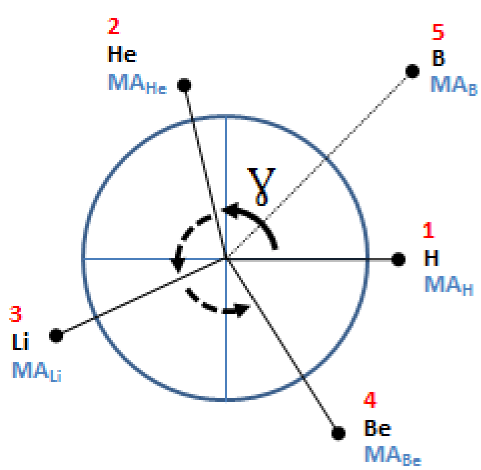
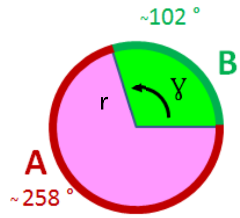


Figure 8 First five elements positioning, according to the constant angle ɣ = § spacing and MA/MA_{c12} as the radial distance

Best Ɣ angle and associated Ж ratio determination

Given Ɣ angle, between two successive elements, characterized as follows, together with its associated Ж ratio:



$$A + B = 2\pi r$$
$$B = Ɣ\, r$$

$$Ɣ_{Rad} = Ɣ_{Deg} \cdot \frac{\pi}{180} \quad = \cdot \frac{2\pi\, B}{A + B}$$

$$Ж = \frac{A}{B}$$ (called Ж ratio)

$$Ɣ_{Rad} = \frac{2\pi}{Ж + 1} \qquad Ɣ_{Deg} = \frac{360}{Ж + 1}$$

leading to:

$$Ж = \frac{2\pi - Ɣ_{Rad}}{Ɣ_{Rad}} \qquad Ж = \frac{360 - Ɣ_{Deg}}{Ɣ_{Deg}}$$

Among the pool of possible angle values, the best candidate angle $Ɣ_{Best}$ would presently be an angle that generates at least 7 spiral arms (close to a multiple of $2\pi/7$ in theory) and providing the most possible optimized distribution of elements. Such a preferred angle is an irrational angle.
The angle of π rotations or a derived multiple of π $(i.e. \;\; k * \pi * 360°)$ matches the requirements.

$$Ɣ_{Best} = \; 2 * \pi * 360$$

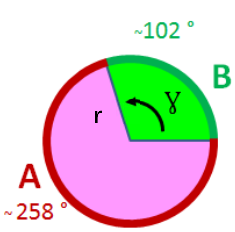
This angle shall moreover be adequately expressed, by isolating its most valuable part with its remainder in a range of 0° to 360° (360 as the divisor). Therefore, $Ɣ_{Best}$ is equivalently evaluated to $Ɣ_{Deg}$.

$$Ɣ_{Best} = \; 2 * \pi * \; 360 = Ɣ_{Deg} + 6 * 360 \qquad (Ɣ_{Deg} = \text{Modulo}\,[Ɣ_{Best}, 360°])$$

$$Ɣ_{Deg} = 2\,(\pi - 3) * 360$$ $Ɣ_{Deg}$ ≈ 101.9467106° = § ≈ 102°

$$Ɣ_{Rad} = Ɣ_{Deg} \cdot \frac{\pi}{180} \qquad Ɣ_{Rad} = 4\,\pi(\pi - 3)$$ $Ɣ_{Rad}$ ≈ 1.779305761

$$Ж = \frac{7 - 2\pi}{2(\pi - 3)}$$ Ж ≈ 2.531256653



~102°..	28.3 %	2.531256653 =	$Ж_1 = \frac{7 - 2\pi}{2(\pi - 3)}$
~258°..	71.7 %	0.39506069 =	$Ж_2 = \frac{2(\pi - 3)}{7 - 2\pi}$

Quadratic equation: $Ж_1$, $Ж_2$ solutions

Finding the second degree polynomial equation having its 2 roots as $Ж_1$ and $Ж_2$, in the form of an equation and resulting from the equivalency between ratios.

B	A	n A + m B
1	$\frac{A}{B}$	$\frac{nA+mB}{A}$

$$\mathbf{X^2 - nX - m = 0} \Leftarrow \frac{A}{B} = \frac{nA+mB}{A} \qquad Ж = \frac{A}{B}$$

Equation solved by:

$$\begin{cases} X_1 = \dfrac{n+\sqrt{n^2+4m}}{2} = \dfrac{7-2\pi}{2(\pi-3)} = Ж_1 \\ X_2 = \dfrac{n-\sqrt{n^2+4m}}{2} = \dfrac{2(\pi-3)}{2\pi-7} = -Ж_2 = -\dfrac{1}{Ж_1} \end{cases}$$

$$\Rightarrow \begin{cases} n = \dfrac{4\pi-13}{2(\pi-3)(2\pi-7)} \\ m = 1 \end{cases}$$

$$\Rightarrow \mathbf{X^2 - \frac{4\pi-13}{2(\pi-3)(2\pi-7)}X - 1 = 0}$$

$X_1 = Ж_1 = 2.531256653$

$X_2 = -Ж_2 = -0.39506069$

In other words, this means:

$$\Rightarrow \mathbf{X^2 = \Pi\, X + 1} \quad \text{given} \quad \Pi = \frac{4\pi-13}{2(\pi-3)(2\pi-7)} \approx 2.136195963$$

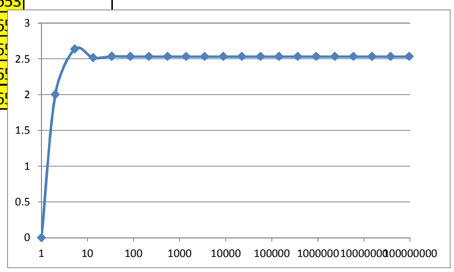
Or which can be rearranged to

$$\mathbf{\frac{1}{X} = X - \Pi}$$

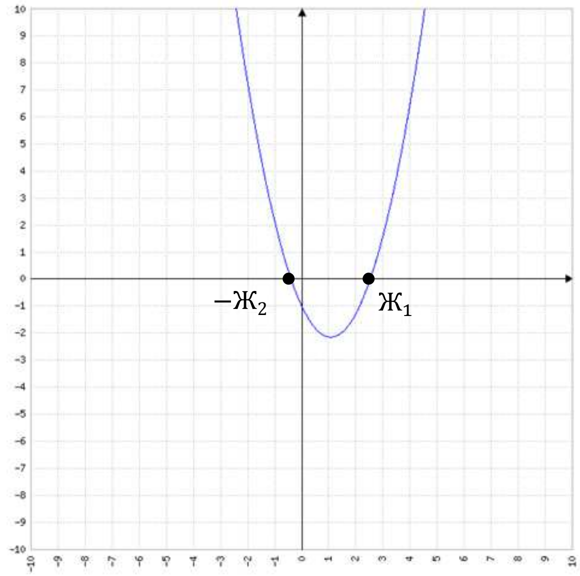
Leading to Ж:

$$\Rightarrow Ж = \Pi + \cfrac{1}{\Pi + \cfrac{1}{\Pi + \cfrac{1}{\Pi + \cfrac{1}{\Pi + \cfrac{1}{\Pi + \cdots}}}}}.$$

0	u1= 1=B	1	0	
1	u2= 2=A	2	2	u2/u1
2	u3= ΠA+B	5.272392	2.636195963	u3/u2
3	u4=Π(ΠA+B)+A	13.26286	2.515530434	u4/u3
4	...	33.60446	2.533726435	u5/u4
5	...	85.04858	2.530871563	u6/u5
6	...	215.2849	2.531316764	...
7		544.9393	2.531247271	...
8		1379.382	2.531258117	
9		3491.57	2.531256424	
10		8838.06	2.531256689	
11		22371.4	2.531256647	
12		56627.75	2.531256654	
13		143339.4	2.531256653	
14		362828.7	2.531256653	
15		918412.6	2.531256653	
16		2324738	2.531256653	
17		5884509	2.5312566	
18		14895201	2.5312566	
19		37703577	2.5312566	
20		95437431	2.5312566	



Ratio properly converging to $Ж_1$ after a few iterations as n index increases



Ж approximation, Sequences associated to Ж :

Specifying the recursive sequences:

$$\mathbf{X_n} = \Pi + \frac{1}{\mathbf{X_{n+1}}}$$

$$n \geq 1$$

$$X_0 = \Pi$$

Alternatively, the below recurrence relation can be expressed and approximates Ж :

$$\mathbf{U_{n+2}} = \Pi\, \mathbf{U_{n+1}} + \mathbf{U_n}$$

$$n \geq 1$$

$$U_1 = 1$$
$$U_2 = \Pi$$
....

$$Ж = \lim_{n\to\infty}\left(\frac{\mathbf{U_{n+1}}}{\mathbf{U_n}}\right).$$

$\frac{\mathbf{U_{n+1}}}{\mathbf{U_n}}$ ratio properly converging to $Ж_1$

		Un	Un+1/Un
1	U1	1	
2	U2	2.136195963	2.60431781
3	U3	5.563333192	2.520173677
4	U4	14.02056587	2.532994013
5	U5	35.5140094	2.530985684
6	U6	89.88544937	2.531298948
7	U7	227.5269435	2.531250052
8	U8	575.9275875	2.531257683
9	U9	1457.821131	2.531256492
10	U10	3690.119202	2.531256678
11	U11	9340.638872	2.531256649
12	U12	23643.55425	2.531256654
13	U13	59847.90401	2.531256653
14	U14	151490.4052	2.531256653
15	U15	383461.096	2.531256653
16	U16	970638.4504	2.531256653
17	U17	2456935.035	2.531256653
18	U18	6219133.154	2.531256653
19	U19	15742222.17	2.531256653
20	U20	39847604.6	2.531256653
21	U21	100864514.3	2.531256653
22	U22	255313972.8	2.531256653
23	U23	646265192.1	2.531256653
24	U24	1635863067	2.531256653
25	U25	4140789272	2.531256653
26	U26	10481400394	2.531256653
27	U27	26531114479	2.531256653
28	U28	67157060035	2.531256653
29	U29	1.69992E+11	2.531256653
30	U30	4.30293E+11	2.531256653
31	U31	1.08918E+12	2.531256653
32	U32	2.757E+12	2.531256653

U(k) sequence according to k index (using Binet forms):

As previously stated, the 2 roots $X_1 = Ж_1 = Ж$ and $X_2 = -1/Ж$ satisfy the equation $\mathbf{X^2} = \Pi\,\mathbf{X} + \mathbf{1}$

$X_1{}^{\mathbf{2}} = \Pi\,X_1 + 1$ $\qquad X_1{}^{\mathbf{k+2}} = \Pi\,X_1{}^{\mathbf{k+1}} + X_1{}^{\mathbf{k}}$

$X_2{}^{\mathbf{2}} = \Pi\,X_2 + 1$ $\qquad X_2{}^{\mathbf{k+2}} = \Pi\,X_2{}^{\mathbf{k+1}} + X_2{}^{\mathbf{k}}$

Thus, the sequence $\mathbf{F_k} = \alpha\,Ж^k + \beta\left(-\frac{1}{Ж}\right)^k$ satisfies the same recurrence relation

$$\mathbf{F_{k+2}} = \Pi\,\mathbf{F_{k+1}} + \mathbf{F_k}$$

Indeed,

$$\mathbf{F_{k+2}} = \alpha\,Ж^{k+2} + \beta\left(-\frac{1}{Ж}\right)^{k+2} = \alpha\,\Pi Ж^{k+1} + \alpha\,Ж^k + \beta\,\Pi\left(-\frac{1}{Ж}\right)^{k+1} + \beta\left(-\frac{1}{Ж}\right)^k = \Pi\,\mathbf{F_{k+1}} + \mathbf{F_k}$$

$$\mathbf{F_k} = \alpha\,Ж^k + \beta\left(-\frac{1}{Ж}\right)^k$$

$$\mathbf{F_0} = \alpha + \beta$$

$$\mathbf{F_1} = \alpha\,Ж - \beta\left(\frac{1}{Ж}\right)$$

Setting initial conditions:

$\mathbf{F_0} = 0$

$\mathbf{F_1} = 1$

$\mathbf{F_2} = \Pi$

It follows, after simplification:

$\alpha = -\beta$

$$\alpha = \frac{2(\pi - 3)(7 - 2\pi)}{(8\pi^2 - 52\pi + 85)} \approx 0.341726437$$

$\mathbf{F_k}$ can consequently be expressed, according to k index and Ж ratio as follows:

$$\mathbf{F_k} = \mathbf{U}(k) = \frac{2(\pi - 3)(7 - 2\pi)}{(8\pi^2 - 52\pi + 85)}\left[Ж^k - \left(-\frac{1}{Ж}\right)^k\right] \quad \text{where} \quad Ж = \frac{7 - 2\pi}{2(\pi - 3)}$$

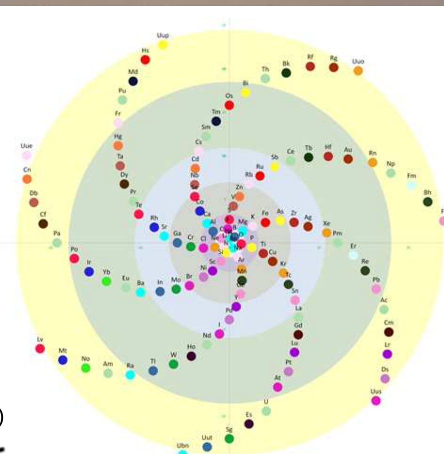
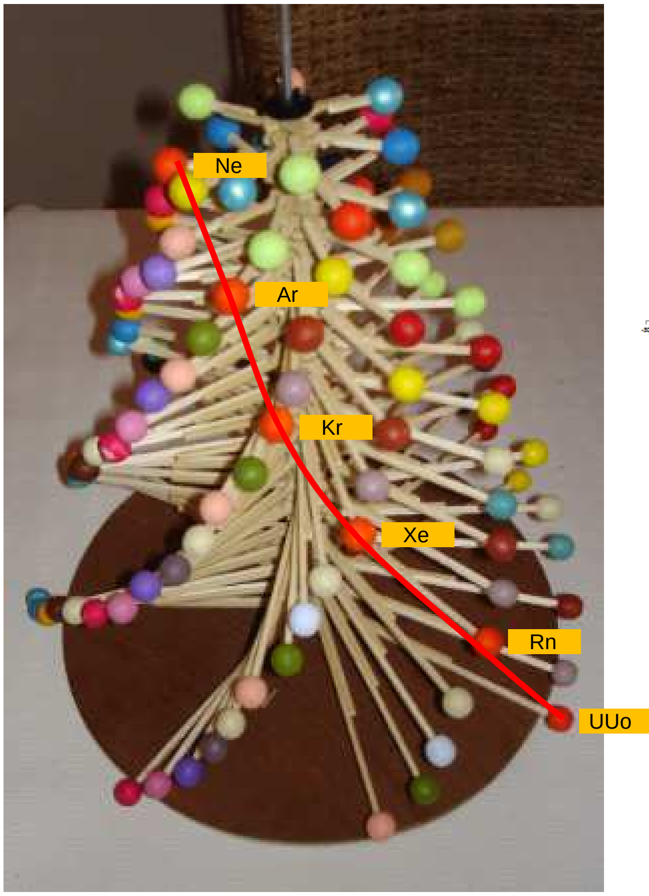
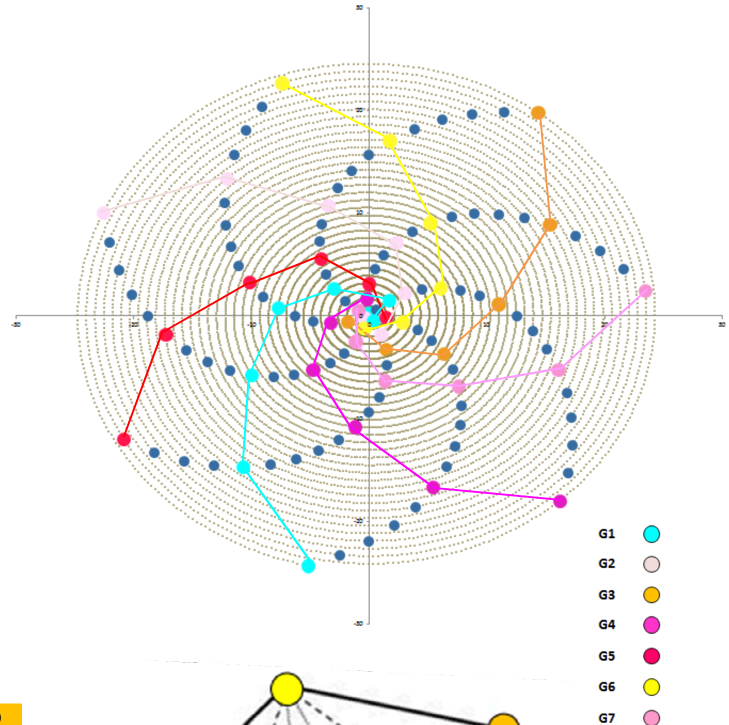
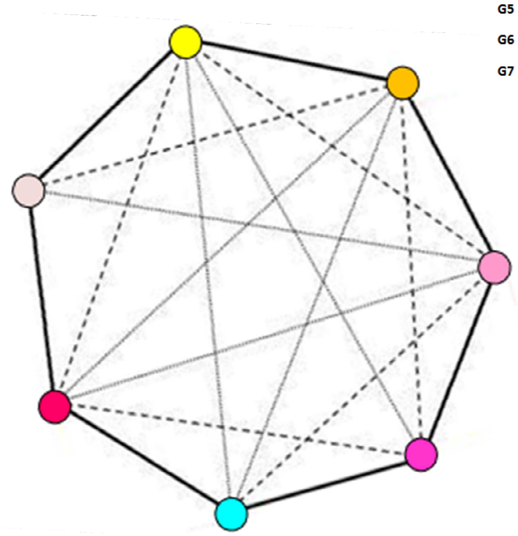


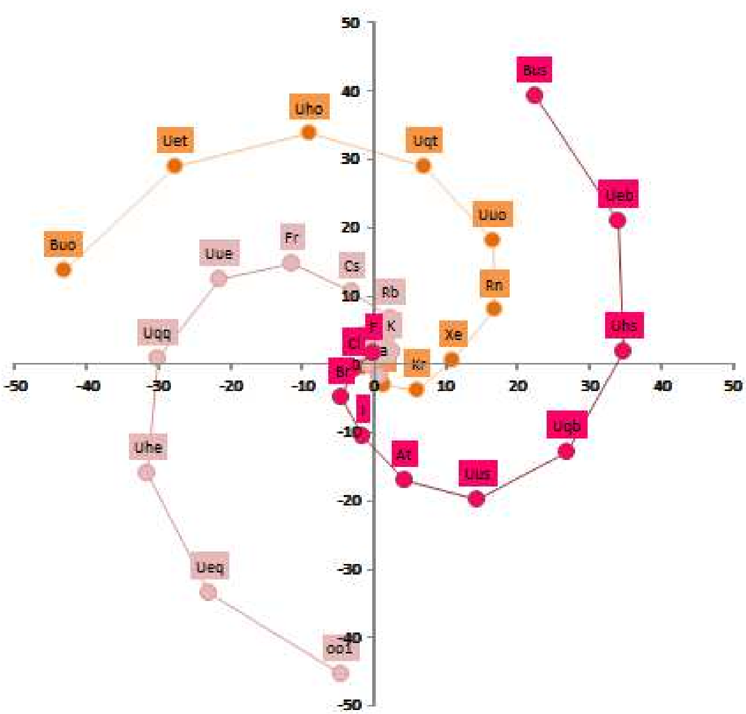
Figure 8 Initial and final arrangement mock-up (conical helix)

$$\gamma_{Deg} \approx 101.9467106° \approx 102° =$$


Ne
Ar
Kr
Xe
Rn
UUo


G1
G2
G3
G4
G5
G6
G7

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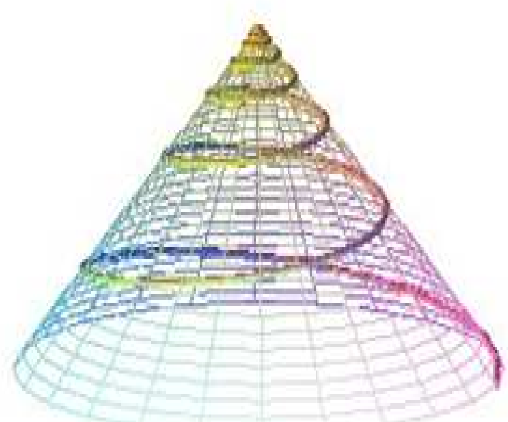

Ж and Powers of Ж:

index	Sequence	Ж	logЖ
1	1	1	0
2	Ж	2.531256653	0.403336
3	Ж^2=П*Ж+1	6.407260243	0.806672
4	Ж^3=П*Ж^2+Ж=П*П*Ж+П+Ж=(П^2+1)*Ж+П	16.21842012	1.210009
5	Ж^4=(П^2+1)*Ж^2+П*Ж=П(П^2+2)*Ж+П^2+1	41.05298382	1.613345
6	Ж^5=…	103.9156384	2.016681
7		263.0371511	2.420017
8		665.8145387	2.823353
9		1685.347481	3.226689
10		4266.047023	3.630026
11		10798.45991	4.033362
12		27333.67349	4.436698
13		69188.54287	4.840034
14		175133.9594	5.24337
15		443309	5.646707
16		1122128.856	6.050043
17		2840396.131	6.453379
18		7189771.604	6.856715
19		18199157.21	7.260051
20		46066737.76	7.663387
21		116606736.4	8.066724
22		295161577.4	8.47006

Spiral arrangement in numbers:

The below figure shows the distribution of elements in spiral shape with the successive layers, elements names, and their atomic numbers.

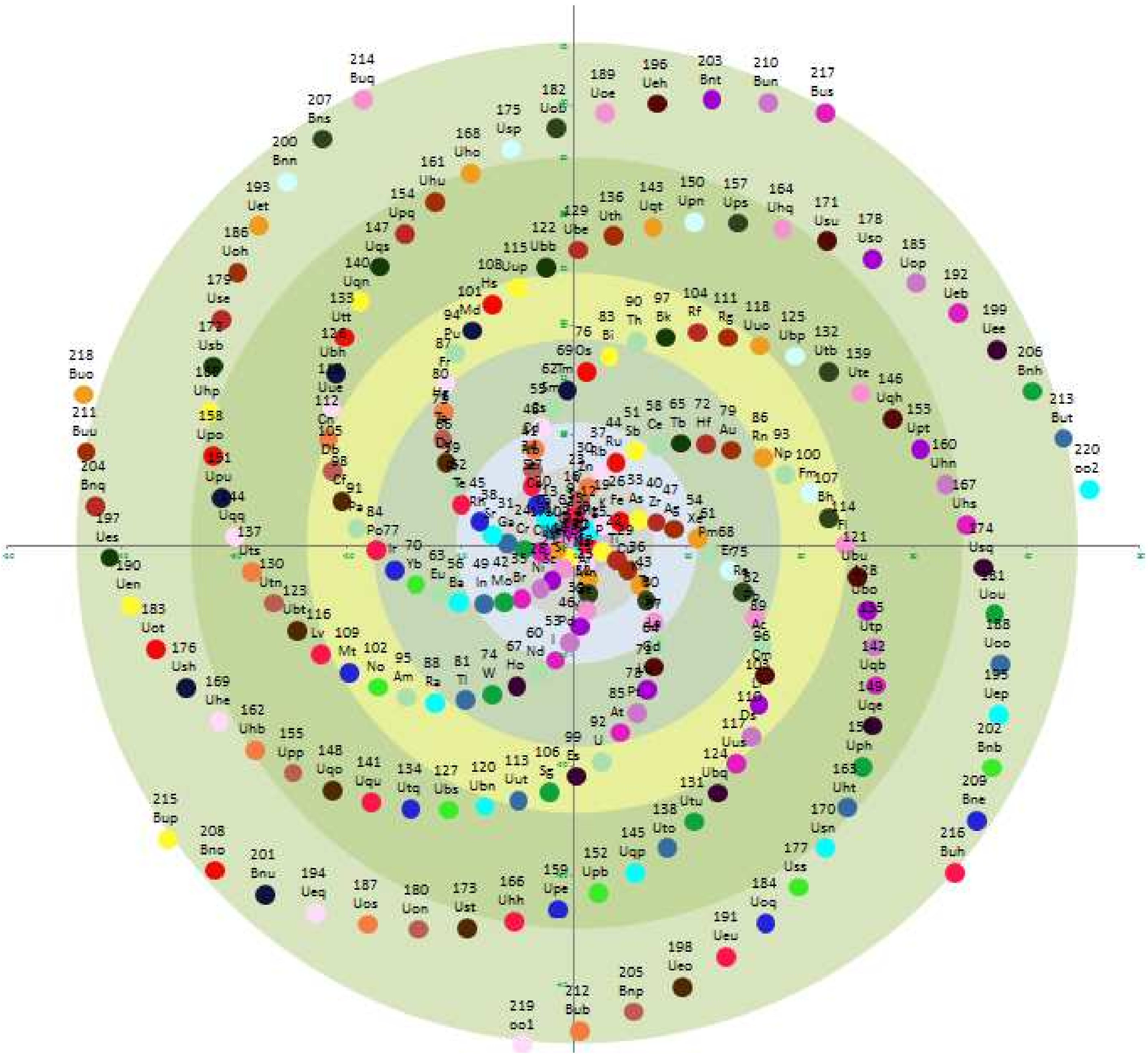

Figure 9 Spiral arrangement of elements with their Atomic numbers and names

ANNEXE Standard form of the periodic table

(two standard representations as grids of elements with the periods in rows and groups in columns, and used as the baseline for the calculations and definition of the above 7-arms spiral arrangement of elements).