

## APPENDIX A.1

## ADDRESSING ELECTROMAGNETISM, NUCLEAR STRUCTURES AND GRAVITATION

Particle	T	q's	Decay	S	I	G	J	P	C	0.5109989	err	%	137.036	Alpha	A/B	Fact	a1	r1	a2	r2	a3	r3	a4	r4	a5	r5	
e	L	aaa	stable				½			0.510999	0	0.000	1.0000000	1.0000000	1	1	1	1	0								
e1	L						½			70.02525	0	0.000	137.03600	1.0000000	1	1	1	1	0								
μ+	L		e+ ν v'				½			105.6584	5E-06	0.000005	206.768266	0.00008034889	6.9999951	48	48	6	6	1	1	6	0				
πo	M	uu' dd'	2γ		1	-	0	+	+	134.9766	0.0006	0.0004	264.142642	0.0140660	32.00004	2275	7*13*25	71	3	10	2	1	1	2	0		
π+	M	ud'	μ+ νμ		1	-	0	-		139.57018	0.0004	0.0003	273.132055	0.0145447	3.99978	275	11*25	68	3	1	1	3	0				
K+	M	us'	μ+ νμ		½		0	-		493.68	0.02	0.003	966.10188	0.0514462	9.00309	175	7*25	19	4	2	1	4	0				
Ko	M	ds'	2π		½		0	-		497.672	0.031	0.01	973.91990	0.0518626	7.00144	135	9*15	19	2	3	1	2	0				
η	M		3π		0	+	0	-	+	547.30	0.12	0.022	1071.04	0.0570343	13.0038	228	4*57	17	7	1	6	1	1	6	0		
ρ	M		2π		1	+	1	-	-	769.3	0.8	0.10	1505	0.0801690	14.9916	187	11*17	12	7	2	1	7	0				
ω	M		3π		0	-	1	-	-	782.57	0.12	0.02	1531.5	0.0815519	15.98417	196	14*14	12	4	4	0						
K**	M	us'	K π		½		1	-		891.66	0.26	0.03	1744.94	0.0929202	19.9778	215	5*43	10	15	1	5	3	0				
K*o	M	ds'	K π		½		1	-		896.10	0.27	0.03	1753.62	0.0933829	21.0111	225	15*15	10	15	1	6	2	3	2	0		
p	B	uud	stable		½		½	+		938.27200	5.E-06	0.000001	1836.15267	0.0977776	21.99996	225	15*15	10	5	4	2	2	1	2	0		
n	B	udd	p+ e- v'e		½		½	+		939.56533	0.0001	0.00001	1838.68366	0.0979124	22.0303	225	15*15	10	5	4	2	2	1	2	0		
η'	M		2π η		0	+	0	-	+	957.78	0.14	0.01	1874.3	0.0998106	19.9621	200	10*20	10	0								
fo(980)	M		2π		0	+	0	+	+	980	10	1.02	1918	0.1021261	3.98292	39	3*13	9	3	1	1	3	0				
ao(980)	M		η π		1	-	0	+	+	984.8	1.4	0.14	1927	0.1026263	4.00243	39	3*13	9	3	1	1	3	0				
φ	M		K+K-		0	+	1	-	-	1019.417	0.014	0.00	1994.95	0.1062338	9.98597	94	2*47	9	4	2	2	2	0				
Λo	B	uds	p+ π-		0		½	+		1115.683	0.006	0.0005	2183.337	0.1162657	24.9971	215	5*43	8	15	1	10	1	5	2	0		
h1(1170)	M		ρ π		0	-	1	+	-	1170	20	1.71	2290	0.1219261	19.9959	164	4*41	8	4	5	0						
Σ+	B	uus	ρ πo	P	1		½	+		1189.37	0.07	0.01	2327.54	0.1239446	14.9973	121	11*11	8	1	15	0						
Σo	B	uds	Λo γ	P	1		½	+		1192.642	0.024	0.00	2333.942	0.1242856	15.0386	121	11*11	8	1	15	0						
Σ-	B	dds	η π-	P	1		½	+		1197.449	0.03	0.00	2343.349	0.1247865	15.0992	121	11*11	8	1	15	0						
b1(1235)	M		ω π		1	+	1	+	-	1229.5	3.2	0.26	2406.1	0.1281266	4.99694	39	3*13	7	4	1	1	4	0				
a1(1260)	M		ρ π		1	-	1	+	+	1230	40	3.25	2407	0.1281787	4.99897	39	3*13	7	4	1	1	4	0				
Δ++	B	uuu	N π	P	1½		1½	+		1232	2	0.16	2411	0.1283871	5.00710	39	3*13	7	4	1	1	4	0				
K1(1270)	M	us'	K ρ		½		1	+		1273	7	0.55	2491	0.1326597	33.9609	256	16*16	7	18	1	16	1	2	8	0		
f2(1270)	M		2π		0	+	2	+	+	1275.4	1.2	0.09	2495.9	0.1329098	34.0249	256	16*16	7	18	1	16	1	2	8	0		
f1(1285)	M		4π		0	+	1	+	+	1281.9	0.6	0.05	2508.6	0.1335872	32.0609	240	15*16	7	16	2	0						
η(1295)	M		η 2π		0	+	0	-	+	1297	2.8	0.22	2538	0.1351608	15.0028	111	3*37	7	6	2	3	2	0				
π(1300)	M		ρ π		1	+	0	-	+	1300	100	7.69	2544	0.1354734	15.0375	111	3*37	7	6	2	3	2	0				
Ξo	B	uss	Λ πo		½		½	+		1314.83	0.2	0.02	2573.06	0.0009999	0.99987	1	1	1	0								
a2(1320)	M		ρ π		1	-	2	+	+	1318.0	0.6	0.05	2579.3	0.0010023	1.00229	1	1	0	1	1	0						
Ξ-	B	dss	Λ π-		½		½	+		1321.31	0.13	0.01	2585.74	0.0010048	1.00480	1	1	0	1	1	1	1	0				
fo(1370)	M		2π		0	+	0	+	+	1370	130	9.49	2681	0.0010418	1.04183	1	1	0	1	1	1	1	0				
Σ(1385)+	B	uus	Λ π	P	1		1½	+		1382.8	0.4	0.03	2706.1	0.1441020	15.9953	111	3*37	6	15	1	1	15	0				
Σ(1385)o	B	uds	Λ π	P	1		1½	+		1383.7	1	0.07	2707.8	0.1441958	16.0057	111	3*37	6	15	1	1	15	0				
Σ(1385)-	B	dds	Λ π	P	1		1½	+		1387.2	0.5	0.04	2714.7	0.1445605	16.0462	111	3*37	6	15	1	1	15	0				
K1(1400)	M	us'	K* π		½		1	+		1402	7	0.50	2744	0.1461029	23.9609	164	4*41	6	20	1	4	5	0				



## APPENDIX A.3

## ADDRESSING ELECTROMAGNETISM, NUCLEAR STRUCTURE GRAVITY

K*(1680)	M	us'	K π		½	1	-	1717	27	1.57	3360	0.1789291	50.9948	285	15*19	5	30	1	21	1	9	2	3	3	0	
N(1720)	B	uud	N ππ	P	½	1½	+	1720	50	2.91	3366	0.1792417	51.0839	285	15*19	5	30	1	21	1	9	2	3	3	0	
Σ(1750)	B	uus	N K'	S	1	½	-	1750	50	2.86	3425	0.1823680	22.0665	121	11*11	5	11	2	0							
K2(1770)	M	us'	K2* π		½	2	-	1773	8	0.45	3470	0.1847649	24.9433	135	9*15	5	10	2	5	2	0					
Σ(1775)	B	uus	N K'	D	1	2½	-	1775	5	0.28	3474	0.1849733	24.9714	135	9*15	5	10	2	5	2	0					
K3*(1780)	M	ds'	K ρ		½	3	-	1776	7	0.39	3476	0.1850775	24.9855	135	9*15	5	10	2	5	2	0					
τ+	L		e+ νe ντ'			½		1777.03	0.30	0.02	3477.56	0.1851848	25.0000	135	9*15	5	10	2	5	2	0					
Λ(1800)	B	uds	N K'	S	0	½	-	1800	50	2.78	3523	0.1875786	48.0201	256	16*16	5	16	3	0							
π(1800)	M	ud'	3π		1	-	0	+	1801	13	0.72	3524	0.1876828	48.0468	256	16*16	5	16	3	0						
Λ(1810)	B	uds	N K'	P	0	½	+	1810	40	2.21	3542	0.1886207	27.9159	148	4*37	5	8	3	4	2	0					
K2(1820)	M	us'	K2* π		½	2	-	1816	13	0.72	3554	0.1892459	28.0084	148	4*37	5	8	3	4	2	0					
Λ(1820)	B	uds	N K'	F	0	2½	+	1820	5	0.27	3562	0.1896628	22.0009	116	4*29	5	6	3	4	1	2	2	0			
Ξ(1820)	B	uss	Λ K'	D	½	1½	-	1823	5	0.27	3568	0.1899754	22.0371	116	4*29	5	6	3	4	1	2	2	0			
Λ(1830)	B	uds	N K'	D	0	2½	-	1830	10	0.55	3581	0.1907049	41.0015	215	5*43	5	10	4	1	10	0					
φ3(1850)	M		KK'		0	-	3	-	1854	7	0.38	3628	0.1932059	17.0021	88	8*11	5	3	5	2	1	1	2	0		
Do	M	cu'	K- e+ ν		½	0	-	1864.5	0.5	0.03	3648.7	0.1943001	27.0077	139	1*139	5	4	6	3	1	1	3	0			
D+	M	cd'	e+		½	0	-	1869.3	0.5	0.03	3658.1	0.1948003	27.0772	139	1*139	5	4	6	3	1	1	3	0			
Λ(1890)	B	uds	N K'	P	0	1½	+	1890	20	1.06	3699	0.1969575	25.9984	132	11*12	5	2	13	0							
Δ(1905)	B	uuu	N π	F	1½	2½	+	1905	15	0.79	3728	0.1985206	24.0210	121	11*11	5	1	24	0							
Δ(1910)	B	uuu	N π	P	1½	½	+	1910	10	0.52	3738	0.1990417	39.8083	200	10*20	5	0									
Σ(1915)	B	uus	N K'	F	1	2½	+	1915	20	1.04	3748	0.1995627	44.9016	225	15*15	5	0									
Δ(1920)	B	uuu	N π	P	1½	1½	+	1920	50	2.60	3757	0.2000838	40.0168	200	10*20	4	40	1	0							
Δ(1930)	B	uuu	N π	D	1½	2½	-	1930	40	2.07	3777	0.2011259	40.2252	200	10*20	4	40	1	0							
Σ(1940)	B	uus	N K'	D	1	1½	-	1940	10	0.52	3796	0.2021680	19.0038	94	2*47	4	18	1	1	18	0					
Ξ(1950)	B	uss	Λ K'		½	?	?	1950	15	0.77	3816	0.2032101	52.0218	256	16*16	4	48	1	4	12	0					
Δ(1950)	B	uuu	N π	F	1½	3½	+	1950	10	0.51	3816	0.2032101	52.0218	256	16*16	4	48	1	4	12	0					
Ds+	M	cs'	τ+		0	0	-	1968.6	0.6	0.03	3852.5	0.2051484	8.00079	39	3*13	4	7	1	1	7	0					
D*(2007)o	M	cu'	D π		½	1	-	2006.7	0.5	0.02	3927.0	0.2091188	30.9496	148	4*37	4	24	1	7	3	3	2	1	3	0	
D*(2010)+	M	cd'	D π		½	1	-	2010.0	0.5	0.02	3933.5	0.2094627	31.0005	148	4*37	4	24	1	7	3	3	2	1	3	0	
f2(2010)	M		φ φ		0	+	2	+	2011	60	2.98	3935	0.2095669	31.0159	148	4*37	4	24	1	7	3	3	2	1	3	0
a4(2040)	M		KK'		1	-	4	+	2014	15	0.74	3941	0.2098796	31.0622	148	4*37	4	24	1	7	3	3	2	1	3	0
Ξ(2030)	B	uss	Λ K'		½	?	?	2025	5	0.25	3963	0.2110259	60.1424	285	15*19	4	45	1	15	3	0					
Σ(2030)	B	uus	N K'	F	1	3½	+	2030	7	0.34	3973	0.2115469	33.0013	156	12*13	4	24	1	9	2	6	1	3	2	0	
f4(2050)	M		ω ω		0	+	4	+	2034	11	0.54	3980	0.2119638	27.9792	132	11*12	4	20	1	8	2	4	2	0		
K4*(2045)	M	us'	K2* π		½	4	+	2045	9	0.44	4002	0.2131101	47.9498	225	15*15	4	33	1	15	2	3	5	0			
Λ(2100)	B	uds	N K'	G	0	3½	-	2100	10	0.48	4110	0.2188417	56.0235	256	16*16	4	32	1	24	1	8	3	0			
Λ(2110)	B	uds	N K'	F	0	2½	+	2110	20	0.95	4129	0.2198838	40.0188	182	14*13	4	22	1	18	1	4	4	2	2	0	
Ds*+	M	cs'	Ds+ γ		0	1	-	2112.4	0.7	0.03	4133.9	0.2201339	44.0268	200	10*20	4	24	1	20	1	4	5	0			
N(2250)	B	uud	N π	G	½	4½	-	2135	70	3.28	4178	0.2224890	50.0600	225	15*15	4	25	2	0							
N(2190)	B	uud	N π	G	½	3½	-	2190	50	2.28	4286	0.2282206	32.8638	144	12*12	4	12	2	9	1	3	3	0			

## APPENDIX A.4

## ADRESSING ELECTROMAGNETISM, NUCLEAR STRUCTURE GRAVITY

N(2220)	B	uud	N $\pi$	H	$\frac{1}{2}$	$4\frac{1}{2}$	+	2200	60	2.73	4305	0.2292627	33.0138	144	12*12	4	12	2	9	1	3	3	0			
$\Sigma$ (2250)	B	uus	N K'		1	?	?	2250	25	1.11	4403	0.2344732	60.0251	256	16*16	4	16	3	12	1	4	3	0			
$\Omega$ (2050)	B	sss	$\Xi^- \pi^+ K^-$		0	?	?	2252	9	0.40	4407	0.2346816	45.9976	196	14*14	4	12	3	10	1	2	5	0			
$\Lambda c^+$	B	udc	$p K^0$		0	$\frac{1}{2}$	+	2284.9	0.6	0.03	4471.4	0.2381101	40.0025	168	12*14	4	8	5	0							
f2(2300)	M		$\phi \phi$		0	+	2	+	2297	28	1.22	4495	0.2393711	28.0064	117	9*13	4	5	5	3	1	2	1	1	2	0
f2(2340)	M		$\phi \phi$		0	+	2	+	2339	60	2.57	4577	0.2437479	29.0060	119	7*17	4	3	9	2	1	1	2	0		
$\Lambda$ (2350)	B	uds	N K'	H	0	$4\frac{1}{2}$	+	2350	15	0.64	4599	0.2448942	47.9993	196	14*14	4	4	12	0							
$\Delta$ (2420)	B	uuu	N $\pi$	H	$1\frac{1}{2}$	$5\frac{1}{2}$	+	2420	80	3.31	4736	0.2521890	52.9597	210	14*15	3	51	1	2	25	1	2	0			
D1(2420)o	M	cu'	$D^+ \pi^-$		$\frac{1}{2}$	1	+	2422.2	1.8	0.07	4740.1	0.2524182	53.0078	210	14*15	3	51	1	2	25	1	2	0			
$\Sigma c o$	B	ddc	$\Lambda c \pi$		1	$\frac{1}{2}$	+	2452.2	0.6	0.02	4798.8	0.2555445	45.9980	180	12*15	3	42	1	4	10	2	2	0			
$\Sigma c^{++}$	B	uuc	$\Lambda c \pi$		1	$\frac{1}{2}$	+	2452.8	0.6	0.02	4800.0	0.2556070	46.0093	180	12*15	3	42	1	4	10	2	2	0			
$\Sigma c^+$	B	udc	$\Lambda c \pi$		1	$\frac{1}{2}$	+	2453.6	0.9	0.04	4801.6	0.2556904	46.0243	180	12*15	3	42	1	4	10	2	2	0			
D2*(2460)o	M	cu'	$D^+ \pi^-$		$\frac{1}{2}$	2	+	2458.9	2	0.08	4811.9	0.2562427	31.0054	121	11*11	3	28	1	3	9	1	3	0			
D2*(2460)+	M	cd'	$D^0 \pi$		$\frac{1}{2}$	2	+	2459	4	0.16	4812	0.2562532	31.0066	121	11*11	3	28	1	3	9	1	3	0			
$\Xi c^+$	B	usc	$\Lambda K^- \pi^+ \pi^+$		$\frac{1}{2}$	$\frac{1}{2}$	+	2466.3	1.4	0.06	4826.4	0.2570139	33.9258	132	11*12	3	30	1	4	7	2	2	0			
$\Xi c o$	B	dsc	$\Lambda K^0$		$\frac{1}{2}$	$\frac{1}{2}$	+	2471.8	1.4	0.06	4837.2	0.2575870	34.0015	132	11*12	3	30	1	4	7	2	2	0			
$\Sigma c(2520)o$	B	ddc	$\Lambda c \pi$		1	$1\frac{1}{2}$	+	2517.5	1.4	0.06	4926.6	0.2623495	41.9759	160	10*16	3	34	1	8	4	2	4	0			
$\Sigma c(2520)^{++}$	B	uuc	$\Lambda c \pi$		1	$1\frac{1}{2}$	+	2519.4	1.5	0.06	4930.3	0.2625475	42.0076	160	10*16	3	34	1	8	4	2	4	0			
Ds1(2536)+	M	cs'	$D^+ K^0$		0	1	+	2535.35	0.34	0.01	4961.56	0.2642096	14.0031	53	53	3	11	1	3	3	2	1	1	2	0	
DsJ(2573)+	M	cs'	$D^* K^+$		0	?	?	2573.5	1.7	0.07	5036.2	0.2681852	43.9824	164	4*41	3	32	1	12	2	8	1	4	2	0	
$\Xi' c^+$	B	usc	$\Xi c^+ \gamma$		$\frac{1}{2}$	$\frac{1}{2}$	+	2574.1	3.3	0.13	5037.4	0.2682478	43.9926	164	4*41	3	32	1	12	2	8	1	4	2	0	
$\Xi' c o$	B	dsc	$\Xi c o \gamma$		$\frac{1}{2}$	$\frac{1}{2}$	+	2578.8	3.2	0.12	5046.6	0.2687375	44.0730	164	4*41	3	32	1	12	2	8	1	4	2	0	
$\Lambda c(2593)^+$	B	udc	$\Lambda c \pi^+ \pi^-$		0	$\frac{1}{2}$	-	2593.9	0.8	0.03	5076.1	0.2703111	17.0296	63	7*9	3	12	1	5	2	2	2	1	2	0	
N(2600)	B	uud	N $\pi$	I	$\frac{1}{2}$	$5\frac{1}{2}$	-	2600	70	2.69	5088	0.2709468	60.9630	225	15*15	3	42	1	19	2	4	4	3	1	1	
$\Lambda c(2625)^+$	B	udc	$\Lambda c \pi^+ \pi^-$		0	$1\frac{1}{2}$	-	2626.6	0.8	0.03	5140.1	0.2737188	78.0099	285	15*19	3	51	1	27	1	24	1	3	8	0	
$\Xi c(2645)o$	B	dsc	$\Xi c^+ \pi^-$		$\frac{1}{2}$	$1\frac{1}{2}$	+	2644.5	1.8	0.07	5175.2	0.2755842	54.0145	196	14*14	3	34	1	20	1	14	1	6	2	2	
$\Xi c(2645)^+$	B	usc	$\Xi c o \pi^+$		$\frac{1}{2}$	$1\frac{1}{2}$	+	2647.4	2	0.08	5180.8	0.2758864	54.0737	196	14*14	3	34	1	20	1	14	1	6	2	2	
$\Lambda b o$	B	udb	$\psi(1S) \Lambda$		0	$\frac{1}{2}$	+	2654	9	0.34	5194	0.2765742	25.9980	94	2*47	3	16	1	10	1	6	1	4	1	2	
$\Omega c o$	B	ssc	$\Sigma^+ K^- K^- \pi^+$		0	$\frac{1}{2}$	+	2704	4	0.15	5292	0.2817847	30.9963	110	10*11	3	17	1	14	1	3	4	2	1	1	
$\Xi c(2815)^+$	B	usc	$\Xi c^+ \pi^+ \pi^-$		$\frac{1}{2}$	$1\frac{1}{2}$	-	2814.9	1.8	0.06	5508.6	0.2933416	66.0019	225	15*15	3	27	2	12	2	3	4	0			
$\Xi c(2815)o$	B	dsc	$\Xi c o \pi^+ \pi^-$		$\frac{1}{2}$	$1\frac{1}{2}$	-	2819.0	2.5	0.09	5516.6	0.2937689	66.0980	225	15*15	3	27	2	12	2	3	4	0			
$\eta c(1S)$	M	cc'	$\eta' 2\pi$	S	0	+	0	-	2979.8	1.8	0.06	5831.3	0.3105259	36.0210	116	4*29	3	8	4	4	2	0				
$\psi(1S)$	M		$\rho \rho' \rho$		0	-	1	-	3096.87	0.04	0.001	6060.4	0.3227258	70.9997	220	20*11	3	7	10	1	7	0				
$\chi c 0(1P)$	M		$2(\pi^+ \pi^-)$		0	+	0	+	3415.0	0.8	0.02	6683.0	0.3558782	79.0050	222	6*37	2	64	1	15	4	4	3	3	1	1
$\chi c 1(1P)$	M		$3(\pi^+ \pi^-)$		0	+	1	+	3510.51	0.12	0.003	6869.9	0.3658313	59.9963	164	4*41	2	44	1	16	2	12	1	4	3	0
$\chi c 2(1P)$	M		$2(\pi^+ \pi^-)$		0	+	2	+	3556.18	0.13	0.004	6959.3	0.3705906	63.0004	170	10*17	2	44	1	19	2	6	3	1	6	0
$\psi(2s)$	M		$3(\pi^+ \pi^-) \pi^0$		0	-	1	-	3685.96	0.09	0.002	7213.2	0.3841150	14.9805	39	3*13	2	9	1	6	1	3	2	0		
$\psi(3770)$	M		$D D'$		0	-	1	-	3769.9	2.5	0.07	7377.5	0.3928624	66.0009	168	12*14	2	36	1	30	1	6	5	0		
$\psi(4040)$	M		$e^+ e^-$		0	-	1	-	4040	10	0.25	7906.1	0.4210097	119.9878	285	15*19	2	45	2	30	1	15	2	0		
$\psi(4160)$	M		$e^+ e^-$		0	-	1	-	4159	20	0.48	8139.0	0.4334107	104.0186	240	15*16	2	32	3	8	4	0				