ADDENDUM #3 TO P11

THE X_i PARTICLES, ($J = 1/2\hbar$).

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Abstract.

This Addendum provides details of the energy distribution of the quarks that make up all X_i sub-atomic particles. Also presented are the energy translations that take place during their decay.

This is the third Addendum to " Derivation of the Quark Energy Distributions and Decay Products of Baryonic Sub-Atomic Particles".

Contents.

1.0 Introduction.

There are 18 X_i particles with $J = 1/2\hbar$ as shown in the following brief table with their quark complement.

Particle	Quarks
Ξ^0	uss
Ξ^-	dss
Ξ^+_c	usc
Ξ^0_c	dsc
Ξ'^+_c	usc
Ξ'^0_c	dsc
Ξ^{++}_{cc}	ucc
Ξ^+_{cc}	dcc
Ξ^0_b	usb
Ξ^-_b	dsb
Ξ'^0_b	usb
Ξ'^-_b	dsb
Ξ^+_{cb}	ucb
Ξ^0_{cb}	dcb
Ξ'^+_{cb}	ucb
Ξ'^0_{cb}	dcb
Ξ^0_{bb}	ubb
Ξ^-_{bb}	dbb

Table 1.1 - The X_i Particles.

Of the above, the decay products of Ξ'^+_c, Ξ'^0_c, Ξ^{++}_{cc}, Ξ'^0_b, Ξ'^-_b, Ξ^+_{cb}, Ξ'^+_{cb}, Ξ^0_{cb}, Ξ'^0_{cb}, Ξ^0_{bb} and Ξ^-_{bb} are reported in [1] and [2] as unknown. However, as they contain the same quark complement, it is proposed that Ξ'^+_c, Ξ'^0_c, Ξ'^0_b, Ξ'^-_b, Ξ'^+_{cb} and Ξ'^0_{cb} are high confinement energy versions of their un-primed counterparts respectively, and as a consequence, the decay of the former to the latter will take place without a quark flavour change, in an identical manner to that shown in [4] and [5], (Decay Type 8).

Of the seven particles for which the decay products have been determined, [1], [2], there are a total of 24 decay paths reported. These include a total of six decay types of which four are different from those exhibited by the Lambda and Sigma particles of [4] and [5]. It is for this four that full details are provided in this Addendum. The details to be shown are as follows.

(i) The Intrinsic Angular Momentum Configurations, (from the generalised tables in [3]).

(ii) The Quark Energy Distributions, (These are calculated from the basic theory in [3]).

(iii) The Decay Energy Translations, (These are calculated using the decay process described in [3], as augmented in [4] and [5]).

Note that as in [3], [4] and [5], only particles with $J = 1/2\hbar$ containing quarks with $J = \pm 1/2\hbar$ are considered in this Addendum.

Also note that energy will be represented as equivalent mass via the units MeV/c^2, which for conciseness will be assumed and therefore omitted in the text.
Finally, for a full appreciation of this paper it is recommended that [3], [4], [5], [6] and [7] be read first.

2.0 Nomenclature.

In this Addendum the following nomenclature will be used.

P	Indicates any Baryon.
P(#)	Indicates the type of intrinsic angular momentum configuration of P.
$q_{\#}$	Indicates the #th quark of P.
E_c	Indicates quark confinement energy.
E_k	Indicates kinetic energy.
$\rightarrow$	Indicates a particle decay.
$\Rightarrow$	Indicates a quark flavour change.

3.0 Initial Discussions.

3.1 Decay Distribution Patterns - Overall Summary.

For the seven X_i particles for which they are known, this summary lists their primary decay products, according to their intrinsic angular momentum configurations. Included, where known, are the branching fractions from [2] which have been, where possible, augmented via inclusion of their minor decay products, to raise the branching fractions to 100% for each X_i. Also included is indication of the four decays for which full details are provided in Section 4.0.

P(1)	P(2)	P(3)	Branching Fraction, (%)	Full Details Provided.
$\Xi^0(1)$	$\Xi^0(2)$			
$\Lambda^0(2)$	$\Lambda^0(1)$		99.72	
$\Sigma^0(2)$	$\Sigma^0(1)$		~0.09	
$\Sigma^+(1)$	$\Sigma^+(2)$		~0.19	
$\Xi^-(1)$	$\Xi^-(2)$			
$\Lambda^0(2)$	$\Lambda^0(3)$		99.93	
$\Xi^0(1)$	$\Xi^0(2)$		~0.02	
$\Sigma^0(2)$	$\Sigma^0(3)$		~0.04	
$\Xi^-(1)$	$\Xi^-(2)$		~0.02	
$\Xi^+_c(1)$	$\Xi^+_c(2)$	$\Xi^+_c(3)$		
	$P^+(1)$	$P^+(2)$	Not Measured	√
$\Lambda^0(2)$	$\Lambda^0(1)$	$\Lambda^0(3)$		
$\Sigma^+(1)$		$\Sigma^+(2)$		
$\Sigma^0(2)$	$\Sigma^0(1)$	$\Sigma^0(3)$		
$\Xi^-(1)$		$\Xi^-(2)$		
$\Xi^0(1)$	$\Xi^0(2)$			√
	$\Omega^-(1)$	$\Omega^-(2)$		√

P(1)	P(2)	P(3)	Branching Fraction, (%)	Full Details Provided.
$\Xi^0_c(1)$	$\Xi^0_c(2)$	$\Xi^0_c(3)$		
$P^+(1)$	$P^+(2)$		Not measured	
$\Lambda^0(2)$	$\Lambda^0(3)$	$\Lambda^0(1)$		
$\Xi^-(1)$	$\Xi^-(2)$			
	$\Omega^-(1)$	$\Omega^-(2)$		
$\Xi^+_{cc}(1)$	$\Xi^+_{cc}(2)$			
$P^+(1)$	$P^+(2)$		Not Measured	
$\Lambda^+_c(2)$	$\Lambda^+_c(1)$			
$\Xi^0_b(1)$	$\Xi^0_b(2)$	$\Xi^0_b(3)$		
$P^+(1)$		$P^+(2)$	All 10^{-1}	
$\Lambda^+_c(1)$	$\Lambda^+_c(2)$	$\Lambda^+_c(3)$		
$\Xi^-(1)$		$\Xi^-(2)$		√
$\Xi^-_b(1)$	$\Xi^-_b(2)$	$\Xi^-_b(3)$		
$\Xi^-(1)$	$\Xi^-(2)$		100	

Table 3.1 - Overall Summary of Decay Configuration Patterns.

Note:- In Table 3.1 the branching fraction for the decay of Ξ^0_b are all quoted in [2] as $< 10^{-1}$. This is anomalous as the branching fractions for all particle decays must total 100%.

3.2 Types of Decay.

The types of decay exhibited by all X_i particles in Table 3.1 is shown in the table below. These types arise according to, in the Interim Energy Distribution Tables, the nature of the quark flavour change(s), and how the quark confinement energy varies.

Particle Decay	Decay Type	Interim Energy Distribution - Confinement Energy Sign			Quark Flavour Change	
		q_1	q_2	q_3	Down	Up
$\Xi^0 \rightarrow \Lambda^0$	1	+ve	+ve	+ve	q_3	
$\rightarrow \Sigma^0$	1	+ve	+ve	+ve	q_3	
$\rightarrow \Sigma^+$	1	+ve	+ve	+ve	q_3	
$\Xi^- \rightarrow \Lambda^0$	1	+ve	+ve	+ve	q_3	
$\rightarrow \Xi^0$	1ϕ	+ve	+ve	+ve	q_2	
$\rightarrow \Sigma^0$	1	+ve	+ve	+ve	q_3	
$\rightarrow \Sigma^-$	1	+ve	+ve	+ve	q_3	
$\Xi^+_c \rightarrow p^+$	12	+ve	+ve	+ve	q_3, q_2	
$\rightarrow \Lambda^0$	1	+ve	+ve	+ve	q_3	
$\rightarrow \Sigma^+$	1	+ve	+ve	+ve	q_3	
$\rightarrow \Sigma^0$	1	+ve	+ve	+ve	q_3	
$\rightarrow \Sigma^-$	5	+ve	+ve	+ve	q_3	q_1

Particle Decay	Decay Type	Interim Energy Distribution - Confinement Energy Sign			Quark Flavour Change	
		q_1	q_2	q_3	Down	Up
$\rightarrow\Xi^0$	17	-ve	+ve	+ve	q_3	
$\rightarrow\Omega^-$	13	-ve ($J = 3/2\hbar$)	+ve	+ve	q_3	q_1
$\Xi^0_c\rightarrow p^+$	12	+ve	+ve	+ve	q_3, q_2	
$\rightarrow\Lambda^0$	1	+ve	+ve	+ve	q_3	
$\rightarrow\Xi^-$	17	-ve	+ve	+ve	q_3	
$\rightarrow\Omega^-$	13	-ve ($J = 3/2\hbar$)	+ve	+ve	q_3	q_1
$\Xi^+_{cc}\rightarrow p^+$	12	+ve	+ve	+ve	q_3, q_2	
$\rightarrow\Lambda^+_c$	1	+ve	+ve	+ve	q_3	
$\Xi^0_b\rightarrow p^+$	12	+ve	+ve	+ve	q_3, q_2	
$\rightarrow\Lambda^+_c$	12	+ve	+ve	+ve	q_3, q_2	
$\rightarrow\Xi^-$	11	-ve	+ve	+ve	q_3	q_1
$\Xi^-_b\rightarrow\Xi^-$	17	-ve	+ve	+ve	q_3	

Table 3.2 - Types of Decay Exhibited by X_i Particles.

4.0 Intrinsic Angular Momentum Configuration Tables, Energy Distribution Tables and Decay Energy Translations.

In this Section only the details of those four particle decays designated for such in Table 3.1 are presented. This four are for Decay Types 12, 13, 16 and 17. For the remaining particles, whose decay types are unknown or are as per those in [3], [4] and [5], pertinent details are, in the interests of conciseness, relegated to Appendix A.

4.1 The Ξ^+_c Particle.

4.1.1 Intrinsic Angular Momentum Configuration.

The Ξ^+_c particle contains three different quarks and can therefore exist in three different configurations.

Ξ^+_c(#)	u_1	s_1	c_1	Decay Modes
1	↑	↑	↓	See Table 3.2
2	↑	↓	↑	
3	↓	↑	↑	

Table 4.1 - Intrinsic Angular Momentum Configuration of Ξ^+_c

In Table 4.1 each arrow represents the direction of an intrinsic angular momentum of $J = 1/2\hbar$.

4.1.2 Energy Distribution Table.

This is determined from the basic theory in [3], is shown in the following table, and is applicable to all three configurations in Table 4.1.

Energy	u_1	s_1	c_1	Total
Matter	2.40	100.00	1250	1352.40
Resonance	86.80	2.083	0.17	89.05
Confinement	1.82	75.89	948.64	1026.35
Total	91.02	177.97	2198.81	2467.80

Table 4.2 - Energy Distribution for Ξ^+_c.

4.1.3 Decay Energy Translations.

(i) Decay $\Xi^+_c \rightarrow p^+$, (Decay Type 12).

The decay process here is similar to Decay Type 1 except that in addition to q_3 changing flavour to a lower energy quark, q_2 does so also. The Interim Energy Distribution Table is as follows

Energy	u_1	$\Xi^+_c(s_1) \Rightarrow u_2$	$\Xi^+_c(c_1) \Rightarrow d_1$	Total
Matter	2.40	2.40	4.75	9.55
Resonance	58.63	58.63	29.62	146.88
Confinement	29.99	116.94	2164.44	2311.37
Total	91.02	177.97	2198.81	2467.80

Table 4.3 - Interim Energy Distribution for $\Xi^+_c \rightarrow p^+$.

The decay is completed by the following confinement energy translations.

$E_c(u_1)$ Increases via absorption from d_1 by 166.50 to 196.49, (the p^+ level).
$E_c(u_2)$ Increases via absorption from d_1 by 79.55 to 196.49, (the p^+ level).
$E_c(d_1)$ Therefore decreases by 246.05 to 1918.39.

Finally, d_1 ejects 1529.51 in the form of neutral meson(s) plus E_k to reduce to 388.88, the Proton level. This completes the decay.

(ii) Decay $\Xi^+_c \rightarrow \Xi^0$, (Decay Type 17).

The decay process here is similar to Decay Type 1 except that in the Interim Energy Distribution Table, the sign of the confinement energy of q_1 is -ve instead of +ve.

Energy	u_1	s_1	$\Xi^+_c(c_1) \Rightarrow s_2$	Total
Matter	2.40	100.00	100.00	202.40
Resonance	103.50	2.48	2.48	108.46
Confinement	-14.88	75.49	2096.33	2156.94
Total	91.02	177.97	2198.81	2467.80

Table 4.4 - Interim Energy Distribution for $\Xi^+_c \rightarrow \Xi^0$.

The decay is completed by the following confinement energy translations.

$E_c(u_1)$ Increases via absorption from s_2 by 26.79 to 11.91, (the Ξ^0 level).

$E_c(s_1)$ Increases via absorption from s_2 by 420.55 to 496.04, (the Ξ^0 level).
$E_c(s_2)$ Therefore decreases by 447.34 to 1648.99.

Finally, s_2 ejects 1152.95 in the form of meson(s) plus E_k to reduce to 496.04, the Ξ^0 level. This completes the decay.

(iii) Decay $\Xi^+_c \rightarrow \Omega^-$, (Decay Type 13).

This decay is unusual in that the c quark in Ξ^+_c decays to an s quark in Ω^- with a resonance energy equivalent to an intrinsic angular momentum of $J = 3/2\hbar$. In addition the u quark in Ξ^+_c makes a flavour change up two levels to an s quark. The Interim Energy Distribution Table is as follows

Energy	s_1	$\Xi^+_c(u_1)\Rightarrow s_2$	$\Xi^+_c(c_1)\Rightarrow s_3$	Total
Matter	100.00	100.00	100.00	300.00
Resonance	26.53	26.53	238.73	291.79
Confinement	51.44	-35.51	1860.08	1876.01
Total	177.97	91.02	2198.81	2467.80

Table 4.5 - Interim Energy Distribution for $\Xi^+_c \rightarrow \Omega^-$.

The decay is completed by the following confinement energy translations.

$E_c(s_1)$ Increases via absorption from s_3 by 308.78 to 360.22, (the Ω^- level).
$E_c(s_2)$ Increases via absorption from s_3 by 395.73 to 360.22, (the Ω^- level).
$E_c(s_3)$ Therefore decreases by 704.51 to 1155.57.

Finally, s_3 ejects 795.35 in the form of positive meson(s) plus E_k to reduce to 360.22, the Ω^- level. This completes the decay.

4.2 The Ξ^0_b Particle.

4.2.1 Intrinsic Angular Momentum Configuration.

The Ξ^0_b particle contains three different quarks and can therefore exist in three different configurations.

Ξ^0_b (#)	u_1	s_1	b_1	**Decay Modes**
1	↑	↑	↓	See Table 3.2
2	↑	↓	↑	
3	↓	↑	↑	

Table 4.6 - Intrinsic Angular Momentum Configuration of Ξ^0_b.

4.2.2 Energy Distribution Table.

Energy	u_1	s_1	b_1	Total
Matter	2.40	100.00	4300	4402.40
Resonance	76.96	1.85	0.043	78.85
Confinement	0.71	29.68	1276.16	1306.55
Total	80.07	131.53	5576.20	5787.80

Table 4.7 - Energy Distribution for Ξ^0_b.

4.2.3 Decay Energy Translations.

(i) Decay $\Xi^0_b \rightarrow \Xi^-$, (Decay Type 16).

In this decay the lowest energy quark in Ξ^0_b, $\Xi^0_b(u_1)$, changes flavour up to a d quark while the highest, $\Xi^0_b(b_1)$, changes flavour down two levels to a s quark. The Interim Energy Distribution Table is as follows.

Energy	s_1	$\Xi^0_b(u_1) \Rightarrow d_1$	$\Xi^+_c(b_1) \Rightarrow s_2$	Total
Matter	100.00	4.75	100.00	204.75
Resonance	4.63	97.40	4.63	106.66
Confinement	26.90	-22.08	5471.57	5476.39
Total	131.53	80.07	5576.20	5787.80

Table 4.8 - Interim Energy Distribution for $\Xi^0_b \rightarrow \Xi^-$.

The decay is completed by the following confinement energy translations.

$E_c(d_1)$ Increases via absorption from s_2 by 45.52 to 23.44, (the Ξ^- level).
$E_c(s_1)$ Increases via absorption from s_2 by 466.54 to 493.44, (the Ξ^- level).
$E_c(s_2)$ Therefore decreases by 512.06 to 4959.51.

Finally, s_2 ejects 4466.07 in the form of positive meson(s) plus E_k to reduce to 493.44, the Ξ^- level. This completes the decay.

5.0 Conclusions.

The most, if not the only, significant point of interest in the decay of the X_i particles, is the decay of Ξ^+_c to Ω^-, (and these comments also apply to the decay $\Xi^0_c \rightarrow \Omega^-$, as shown in Table 3.1). This point is that the Ξ^+_c particle, with an intrinsic angular momentum of $J=1/2\hbar$ decays to the Ω^- particle with an intrinsic angular momentum of $J=3/2\hbar$. This is brought about by the flavour change of $\Xi^+_c(c_1)$ with $J=1/2\hbar$ to $\Omega^-(s_3)$ with $J=3/2\hbar$. Consequently, this would appear to directly contravene the concept of conservation of angular momentum. Whenever a spinning object loses mass, its spin rate increases to compensate so maintaining angular momentum at a constant level. This compensation occurs because in such an object there is no secondary source of energy to compensate for the loss of mass. In the case of the decay of the above particles however, there is a secondary source of energy in the form of quark confinement energy. Therefore, whenever a sub-atomic particle decays and loses mass, the exchange of quark matter, confinement and resonance energy allows for a variety of effects to take place. These include,

(i) Exchange of resonance and confinement energy to maintain the ratios of these parameters to those of the masses of the quark complement, (see [3]). This applies to both quarks that change flavour and those that do not in any decay.

(ii) The exchange of quark confinement and matter energy allows a quark to gain/lose mass and change flavour to a higher/lower mass quark.

(iii) Enabling quark flavour changes down but with increased intrinsic angular momentum so increasing the intrinsic angular momentum of the decayed particle.

As a result it is believed that, as stated in [3], this process actually maintains conservation of intrinsic angular momentum rather that contravening it. This is based upon the concept that, as shown in [3], at the quark level, intrinsic angular momentum obeys a function related to inverse quark mass.

The concept of exchange of quark confinement and resonance energy will be instrumental in the decay of Baryons with an intrinsic angular momentum of $J=3/2\hbar$ and above.

Appendix A.

Configuration and Energy Details of the Balance of the X_i particles.

Particle	Intrinsic Angular Momentum Configurations				Energy Distributions				
Ξ^0	Ξ^0(#)	u_1	s_1	s_2	Energy	u_1	s_1	s_2	Total
	1	↑	↑	↓	Matter	2.40	100.00	100.00	202.4
	2	↑	↓	↑	Resonance	103.50	2.48	2.48	108.46
					Confinement	11.91	496.04	496.04	1003.99
					Total	117.81	598.52	598.52	1314.85
Ξ^-	Ξ^-(#)	d_1	s_1	s_2	Energy	d_1	s_1	s_2	Total
	1	↑	↑	↓	Matter	4.75	100.00	100.00	204.75
	2	↑	↓	↑	Resonance	97.40	4.63	4.63	106.66
					Confinement	23.44	493.44	493.44	1010.32
					Total	125.59	598.07	598.07	1321.73
Ξ^0_c	Ξ^0_c(#)	d_1	s_1	c_1	Energy	d_1	s_1	c_1	Total
	1	↑	↑	↓	Matter	4.75	100.00	1250	1354.75
	2	↑	↓	↑	Resonance	84.84	4.03	0.32	89.19
	3	↓	↑	↑	Confinement	3.6	75.80	947.55	1026.95
					Total	93.19	179.83	2197.87	2470.89
$\Xi^{/+}_c$	$\Xi^{/+}_c$(#)	u_1	s_1	c_1	Energy	u_1	s_1	c_1	Total
	1	↑	↑	↓	Matter	2.40	100.00	1250	1352.4
	2	↑	↓	↑	Resonance	86.80	2.08	0.17	89.05
	3	↓	↑	↑	Confinement	2.01	83.86	1008.28	1094.15
					Total	91.21	185.94	2258.45	2535.60
$\Xi^{/0}_c$	$\Xi^{/0}_c$(#)	d_1	s_1	c_1	Energy	d_1	s_1	c_1	Total
	1	↑	↑	↓	Matter	4.75	100.00	1250	1354.75
	2	↑	↓	↑	Resonance	84.84	4.03	0.32	89.19
	3	↓	↑	↑	Confinement	3.98	83.70	1046.28	1133.96
					Total	93.57	187.73	2296.6	2577.9
Ξ^{++}_{cc}	Ξ^{++}_{cc}(#)	u_1	c_1	c_2	Energy	u_1	c_1	c_2	Total
	1	↑	↑	↓	Matter	2.40	1250	1250	2502.4
	2	↑	↓	↑	Resonance	43.11	0.08	0.08	43.27
					Confinement	1.06	552.00	552.00	1105.06
					Total	46.57	1802.08	1802.08	3650.73
Ξ^{+}_{cc}	Ξ^{+}_{cc}(#)	d_1	c_1	c_2	Energy	d_1	c_1	c_2	Total
	1	↑	↑	↓	Matter	4.75	1250	1250	2504.75
	2	↑	↓	↑	Resonance	42.92	0.16	0.16	43.24
					Confinement	2.1	551.53	551.53	1105.16
					Total	49.77	1801.69	1801.69	3653.15

Particle	Intrinsic Angular Momentum Configurations				Energy Distributions				
Ξ^{-}_{b}	$\Xi^{-}_{b}(\#)$	d_1	s_1	b_1	Energy	d_1	s_1	b_1	Total
	1	↑	↑	↓	Matter	4.75	100.00	4300	4404.75
	2	↑	↓	↑	Resonance	75.75	3.60	0.084	79.434
	3	↓	↑	↑	Confinement	1.41	29.67	1275.85	1306.93
					Total	81.91	133.27	5575.34	5791.114
Ξ'^{0}_{b}	$\Xi'^{0}_{b}(\#)$	u_1	s_1	b_1	Energy	u_1	s_1	b_1	Total
	1	↑	↑	↓	Matter	2.40	100.00	4300	4402.4
	2	↑	↓	↑	Resonance	76.96	1.85	0.043	78.853
	3	↓	↑	↑	Confinement	0.79	32.91	1415.33	1449.03
					Total	80.15	134.76	5715.373	5930.283
Ξ'^{-}_{b}	$\Xi'^{-}_{b}(\#)$	d_1	s_1	b_1	Energy	d_1	s_1	b_1	Total
	1	↑	↑	↓	Matter	4.75	100.00	4300	4404.75
	2	↑	↓	↑	Resonance	75.75	3.6	0.084	79.434
	3	↓	↑	↑	Confinement	1.56	32.88	1413.63	1448.07
					Total	82.06	136.48	5713.714	5932.254
Ξ^{+}_{cb}	$\Xi^{+}_{cb}(\#)$	u_1	c_1	b_1	Energy	u_1	c_1	b_1	Total
	1	↑	↑	↓	Matter	2.40	1250	4300	5552.4
	2	↑	↓	↑	Resonance	76.06	0.15	0.04	76.25
	3	↓	↑	↑	Confinement	0.80	418.39	1439.27	1858.46
					Total	79.26	1668.54	5739.31	7487.11
Ξ^{0}_{cb}	$\Xi^{0}_{cb}(\#)$	d_1	c_1	b_1	Energy	d_1	c_1	b_1	Total
	1	↑	↑	↓	Matter	4.75	1250	4300	5554.75
	2	↑	↓	↑	Resonance	75.98	0.29	0.08	76.35
	3	↓	↑	↑	Confinement	1.59	418.48	1439.56	1859.63
					Total	82.32	1668.77	5739.64	7490.73
Ξ'^{+}_{cb}	$\Xi'^{+}_{cb}(\#)$	u_1	c_1	b_1	Energy	u_1	c_1	b_1	Total
	1	↑	↑	↓	Matter	2.40	1250	4300	5552.4
	2	↑	↓	↑	Resonance	76.06	0.15	0.04	76.25
	3	↓	↑	↑	Confinement	0.87	451.65	1553.68	2006.2
					Total	79.33	1701.80	5853.72	7634.85
Ξ'^{0}_{cb}	$\Xi'^{0}_{cb}(\#)$	d_1	c_1	b_1	Energy	d_1	c_1	b_1	Total
	1	↑	↑	↓	Matter	4.75	1250	4300	5554.75
	2	↑	↓	↑	Resonance	75.98	0.29	0.08	76.35
	3	↓	↑	↑	Confinement	1.72	451.68	1553.79	2007.19
					Total	82.45	1701.97	5853.87	7638.29
Ξ^{0}_{bb}	$\Xi^{0}_{bb}(\#)$	u_1	b_1	b_2	Energy	u_1	b_1	b_2	Total
	1	↑	↑	↓	Matter	2.40	4300	4300	8602.4
	2	↑	↓	↑	Resonance	374.25	0.21	0.21	374.67
					Confinement	1.23	2201.47	2201.47	4404.17
					Total	377.88	6501.68	6501.68	13381.24

Particle	Intrinsic Angular Momentum Configurations				Energy Distributions				
Ξ^-_{bb}	Ξ^-_{bb}(#)	d_1	b_1	b_2	Energy	d_1	b_1	b_2	Total
	1	↑	↑	↓	Matter	4.75	4300	4300	8604.75
	2	↑	↓	↑	Resonance	374.28	0.41	0.41	375.1
					Confinement	2.43	2202.28	2202.28	4406.99
					Total	381.46	6502.69	6502.69	13386.84

Table A.1 - Configurations and Energy Distributions of the balance of the X_i Particles.

The arrows in Table A.1 represent the direction of intrinsic angular momentum.

As stated in the Introduction, the decay of the majority of the particles in Table A.1 is unknown. For those that are, their Interim Energy Distributions can be determined from the basic theory in [3] and their decay products as shown in [1] and /or [2].

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