n-Sphere Factoring of the Seven Charmed Lambda Baryons

D.G. Grossman
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Here's more evidence showing subatomic particles may be made of higher dimensional matter. The mass of the first charmed lambda baryon factors as a multiple of an 8-sphere surface volume that is the sum of *three* large powers of two: 16384, 8192, and 4096. Just a coincidence? Maybe, but the seventh charmed lambda baryon also factors similarly, as a multiple of an 8-sphere surface volume that is the sum of *two* large powers of two: 32768, and 4096. The multiplier found in the first factoring can be expressed as 32768-4096 and the second multiplier can be expressed as 32768+4096, which is quite a symmetrical relationship, and quite hard to explain if the factorings are each just random coincidences. Included with the factorings of the seven charmed lambda baryons are an explanation of how to do n-sphere factoring, and a tentative description of the higher dimensional structure of hadrons.

Contents

1.0 Introduction

According to the n-sphere theory of hadron structure, there are no point particles (quarks) orbiting around one another inside hadrons. As a matter of fact, according to this theory, there is *nothing* 'inside' the 3D interior of hadrons. 100% of the matter of which hadrons are composed is found in the n-dimensional space that is immediately adjacent to the 3D location of the hadron. The surface of hadrons is not the surface of a 3D object, as is commonly thought. It is where the hadron's matter, which is entirely in higher dimensional space, and has the shape of the *surface of an n-sphere*, intersects our 3D space (aka - the Higgs field, or surface of the universe's hypersphere). This architecture is possible because 3D space has zero thickness in the fourth and higher dimensional directions, so n-space is immediately adjacent to every point in our 3D space. It is assumed that half of a hadron's mass is on one side of the surface of the universe's hypersphere (the Higgs field), and half is on the other side. (You may be thinking at this point that if higher dimensional space is all around us, why can't we travel into higher dimensional space? It's because 'we' are made of hadrons, which are attached somehow to the surface of the universe's hypersphere (the Higgs field), so we cannot travel there. Only the matter of which hadrons are made - quark matter - can travel there, and for some reason it doesn't travel far into n-space - only one or two femtometers. Why that is, is currently unknown, but this is the picture n-sphere factoring is painting.)

2.0 How to Do n-Sphere Factoring

The n-sphere theory of hadron structure assumes all the matter of which hadrons are composed is higher dimensional matter, and occupies the surface volume of n-spheres of various dimensions, depending on the quark content of the hadron. Quarks are not considered particles, but volumes of n-sphere surfaces filled with matter. The *up quark* corresponds to matter filling the surface volume of a 2-sphere, the *down quark* corresponds to matter filling the surface volume of a 3-sphere, etc. Here's a list of the quarks and their corresponding n-sphere surface volume formulae.

Quarks	n-Sphere Surface Volume Formulae	
u	S2 =	$2\ \pi^1\ r^1$
d	S3 =	$4\ \pi^1\ r^2$
s	S4 =	$2\ \pi^2\ r^3$
c	S5 =	$(8/3)\ \pi^2\ r^4$
b	S6 =	$\pi^3\ r^5$
t	S7 =	$(16/15)\ \pi^3\ r^6$

Note that this quark model can be extended indefinitely. Using these quark definitions, how does one factor a hadron with n-sphere surface volumes? If the quark content of the hadron is known, multiply the n-sphere surface volume formula associated with each quark in the hadron together along with Planck's constant's coefficient (h=6.62607015). Also set r=1. The value derived is the unit of factorization needed to factor that hadron, and any other hadrons with the same quark content.

Here's an example. The charmed mesons (**D** mesons) have quark content **cd**. The first charmed meson, **D+**, has an experimental mass of 1870.0 +-0.5/ +-1.0 MeV. The *unit of factorization* needed to factor D+ is **cdh =** $(8/3\ \pi^2\ r^4)(4\pi^1\ r^2)h = (32/3\ \pi^3\ r^6)h$ = 2191.464153 MeV. (The value of 'r' was set equal to 1, when calculating the value of cdh.) Dividing that into 1870.0 one gets 0.853310787. Multiplying that by 900 you get 767.979, which probably should be 768, because the experimental mass is not exact. So, the D+ meson factors as:

$$\frac{768}{900}\ \mathbf{cdh} = 1870.0494 \text{ MeV}$$

Notice that the factoring unit just derived for factoring **cd** mesons, **cdh** = $(32/3\ \pi^3\ r^6)h$, has the same powers of π and r in it as **S7h** = $(16/15\ \ \pi^3\ r^6)h$. Both have (π, r) powers of (3, 6). The **S7h** unit is just ten times smaller than the **cdh** unit. Except for that they are identical, so **S7h** can be used interchangeably with **cdh**. This is true of all units of factorization that are derived by multiplying the associated n-sphere surface volume formulae of quarks together. For any combination of quarks multiplied together (that results in π and r powers found in an n-sphere surface volume formula) a single n-sphere surface volume formula having the same π and r powers can be used instead. To find out which n-sphere surface volume formula can be used to factor which quark combinations see *Appendix A, Quark Content Possibilities by Factoring Unit Used.* Here is D+ factored with S7h:

$$\frac{7680}{900}\ \mathbf{S7h} = 1870.0494 \text{ MeV}$$

The numerator of the factoring fraction is the sum of four consecutive powers of two: 7680 = 4096 + 2048 + 1024 + 512, which adds to the credibility that this is the correct factoring for this meson.

Source of mass data: P.A. Zylaet al.(Particle Data Group), Prog. Theor. Exp. Phys.2020, 083C01 (2020) and 2021 update

3.0 n-Sphere Factoring Spectrum of the Charmed Lambda Baryons

S8h/2700 Factoring / **udc** Compatible
Spectrum Range = 652.7703 MeV/c^2
Step Size = 20.3990 MeV/c^2

	n	n S8h/2700	ExpMass	Error	Baryon
--- 7(4096) =	**112(256)**	**2284.6964**	**2284.7**	0.6/0.7	**Λc+**
|	113(256)	2305.0954			
|	114(256)	2325.4945			
|	115(256)	2345.8936			
|	116(256)	2366.2927			
|	117(256)	2386.6917			
|	118(256)	2407.0908			
|	119(256)	2427.4899			
4095	120(256)	2447.8890			
|	121(256)	2468.2880			
|	122(256)	2488.6871			
|	123(256)	2509.0862			
|	124(256)	2529.4853			
|	125(256)	2549.8843			
|	126(256)	2570.2834			
|	127(256)	2590.6825	**2590.49**	calc'd	**Λc(2595)+**
--- 8(4096) =	**128(256)**	**2611.0816**			
|	+192	2626.3808	**2626.6**	0.5/1.5	**Λc(2625)+**
|	129(256)	2631.4806			
|	130(256)	2651.8797			
|	131(256)	2672.2788			
|	132(256)	2692.6778			
|	133(256)	2713.0769			
|	134(256)	2733.4760			
|	135(256)	2753.8751			
4096	+160	2766.6244	**2766.6**	2.4	**Λc(2765)+**
|	136(256)	2774.2741			
|	137(256)	2794.6732			
|	138(256)	2815.0723			
|	139(256)	2835.4714			
|	140(256)	2855.8704	**2856.1**	2.0/1.7	**Λc(2860)+**
|	141(256)	2876.2695			
|	+ 64	2881.3692	**2881.2**	0.2/0.4	**Λc(2880)+**
|	142(256)	2896.6686			
|	143(256)	2917.0677			
--- 9(4096) =	**144(256)**	**2937.4667**	**2938.0**	1.3	**Λc(2940)+**

As can be seen from their locations at the top and bottom of the chart above, the experimental masses of the first and seventh charmed-lambda baryons factor with multipliers (n's) that are multiples of large powers of two. The *first*, **Λc+**, factors as 7(4096) S8h/2700 MeV, and the *seventh*, **Λc(2940)+**, factors as 9(4096) S8h/2700 MeV. The two multipliers - 7(4096) and 9(4096) – can also be expressed as (32768-4096) and (32768+4096). So, the experimentalists have found masses representing two of the three most significant factorings over the mass range shown above. Why haven't they found a mass representing the third - the 8(4096) S8h/2700 factoring - which is actually *the-most-significant-factoring* in the mass range, because its multiplier is one large power of two: 8(4096) = 32768 = 2^{15}? I don't know the answer to that, but two charmed lambda baryons have been found close by on either side of its location (2611.0816 MeV). One is about 20 MeV less massive (**Λc(2595)+**), and the other is about 15 MeV more massive (**Λc(2625)+**).

Following along the lines of the question of why a representative mass of the most significant factoring - 8(4096) S8h/2700 = 2611.0816 MeV - hasn't been discovered yet is the bigger question of why only seven lambda baryons have been found over the explored range out of a possible 32 at the 256 S8h/2700 factoring level, 64 at the 128 S8h/2700 level, 128 at the 64 S8h/2700 level, or 256 at the 32 S8h/2700 factoring level? A limitation of experimental uncertainty (error) can't be the explanation for this because uncertainty can be as small as 0.2 MeV approximately, whereas the difference between masses that are multiples of 32 S8h/2700 equals 2.5498 MeV, so all 256 of the masses that factor as multiples of 32 S8h/2700 should have been found if the size of experimental uncertainty was the only obstacle to their discovery.

Details of the factorings of the *seven* charmed-lambda baryons that *have* been discovered so far are given in the next section. Also in the next section, the mass-differences that have been experimentally determined between the **Λc+** baryon and baryons #2, #3, and #4 are factored. That was done to get exact values for those mass-differences in order to check the consistency between baryon mass measurements. For some unexplained reason, PDG has determined the masses of the charmed lambda baryons #2 , #3, and #4 by adding the mass-difference between each of them and **Λc+'** s mass to **Λc+'** s mass. This works if the correct mass for **Λc+** is used in the calculation, but it may not have been.

Prior to 2006, PDG's best guess (FIT) as to **Λc+'** s mass was 2284.9 MeV. Starting in 2006, after a more accurate measurement from BABAR of the **Λc+'** s mass was reported, PDG changed their best guess (FIT) of **Λc+'** s mass to 2286.46 MeV. They probably shouldn't have changed their FIT, because 2286.46 factors better with S10h than with S8h, meaning the 2286.46 mass is likely the mass of a **dsc** (Xi) baryon rather than a **udc** (Lambda) baryon. (S10h factors hadrons of **dsc** quark content, while S8h factors hadrons of **udc** quark content.) As a check, one can take the mass-difference between charmed lambda baryon #2 and **Λc+,** and add that to the assumed **Λc+** mass, then check to see if that mass factors better with S8h or S10h. (Note: The mass-differences of baryons #2, #3, and #4 with **Λc+** all factor with S8h, so another mass that factors with S8h, when added to one of those mass-differences, should also factor with S8h.) If one assumes **Λc+** has a mass of 2286.46 MeV, and the #2 - #1 mass-difference (305.79 MeV) is added to it, one gets 2592.25 MeV, which *does not* factor well with S8h. However, if one assumes **Λc+** has a mass of 2284.9 MeV and the #2 - #1 mass-difference (305.79 MeV) is added to it, one gets 2590.69 MeV, which *does* factor well with S8h, which is more evidence that the 2286.46 MeV mass is not the mass of a charmed-lambda baryon. The same check can be performed with the #3 - #1 mass-difference, which also gives a result showing that the 2286.46 MeV mass is probably not the mass of a **Λc** baryon. Charmed baryon #4's FIT mass was also determined by PDG using its mass-difference from **Λc+**, but for unknown reasons that FIT mass is correct.

In summary, two of the three FIT masses that were determined by PDG by adding the baryon's mass-difference with **Λc+** back to **Λc+** are likely wrong, because PDG added the mass-differences to 2286.46 MeV instead of 2284.7 MeV. Here's a recap. Why one of the three is right is unknown. PDG does not explain their FIT calculations in detail.

Mass-Difference FITs

#	Baryon	2022 PDG FIT (MeV)	
2	**Λc(2595)+**	**2592.25**	wrong – should be **2590.69**
3	**Λc(2625)+**	**2628.11**	wrong – should be **2626.55**
4	**Λc(2765)+**	**2766.6**	right

4.0 Individual n-Sphere Factorings of the Charmed Lambda Baryons

The following seven pages show the n-sphere factorings of each charmed lambda baryon. The quark content of a charmed lambda baryon is **udc**. That quark content is **S8h** compatible, and all factorizations on the following pages have been done using **S8h/2700** as the unit of factorization, except for the factoring of the new Λc+ mass – 2286.46 MeV – which has been factored with **S10h** to prove it is more likely a charmed **Xi** baryon, rather than a charmed **Lambda** baryon.

Source of mass data: P.A. Zylaet al.(Particle Data Group), Prog. Theor. Exp. Phys.2020, 083C01 (2020) and 2021 update

1. Λ_c^+ **MASS**

VALUE (MeV)		
2284.9	**0.6**	**PDG FIT** before 2006
2286.46	**0.14**	**PDG FIT** 2006 - 2023
2284.7	**0.6/0.7**	best EXPMASS before 2006

FACTORING of 2284.9 (Old FIT)

S8h Factoring Implies a **udc** (Lambda) Baryon

FACTORING	*W/ PARSED NUMERATOR*	*THRMASS (MeV)*
$\frac{28672}{2700}$ **S8h** =	$\frac{(16384 + 8192 + 4096)}{2700}$ **S8h**	= **2284.6963**
$\frac{28672}{2700}$ **S8h** =	$\frac{(2^{14} + 2^{13} + 2^{12})}{2700}$ **S8h**	= **2284.6963**

FACTORING of 2286.46 (New FIT)

S10h Factoring Implies a **dsc** (Xi) Baryon

FACTORING	*W/ PARSED NUMERATOR*	*THRMASS (MeV)*
$\frac{9472}{700}$ **S10h** =	$\frac{(8192 + 1024 + 256)}{700}$ **S8h**	= **2286.4820**
$\frac{9472}{700}$ **S10h** =	$\frac{(2^{13} + 2^{10} + 2^{8})}{700}$ **S8h**	= **2286.4820**

Prior to 2006, PDG's FIT for this baryon's mass was 2284.9 MeV. In 2006 PDG changed their FIT to 2286.46 because of a new measurement from BABAR. As can be seen from the factorings above, the earlier 2284.9 MeV mass estimate factors convincingly with S8h, which is compatible with **udc** (charmed lambda baryon) quark content, whereas the 2286.46 MeV mass factors convincingly with S10h, which is compatible with **dsc** (charmed xi baryon) quark content. In light of this, the correct mass of the Λc+ is most likely 2284.696 MeV, not 2286.46 MeV.

The factoring of 2284.7 MeV can also be expressed as **(32768 - 4096) S8h/2700**, which is symmetrical to the factoring of the seventh charmed lambda baryon **(32768 + 4096) S8h/2700.** The charmed lambda baryon exactly midway between them, the one that factors as **32768 S8h/2700,** with mass 2611.0815 MeV, has not been discovered yet. According to n-sphere factoring logic, masses with factorings involving large powers of two should be formed, and therefore observed more often than masses with factorings involving smaller powers of two. Why a mass of this factoring, **32768 S8h/2700,** which involves a very large power of two (32768 = 2^{15}) , hasn't been observed yet is unknown.

Source of mass data: P.A. Zylaet al.(Particle Data Group), Prog. Theor. Exp. Phys.2020, 083C01 (2020) and 2021 update

2. $\Lambda_c(2595)^+$ MASS

The mass is obtained from the Λc(2595)+ - Λc+ mass-difference measurements.

VALUE (MeV)			
2592.25	**0.28**	**PDG FIT**	Result from adding the mass-difference (305.79 MeV) to 2286.46
2590.49			Result from adding the mass-difference (305.79 MeV) to 2284.7

FACTORING of 2590.49 MeV

FACTORING		*W/ PARSED NUMERATOR*		*THRMASS (MeV)*
$\frac{32512}{2700}$ **S8h**	=	$\frac{(32768 - 256)}{2700}$ **S8h**	=	**2590.6824**
$\frac{32512}{2700}$ **S8h**	=	$\frac{(2^{15} - 2^{8})}{2700}$ **S8h**	=	**2590.6824**

Λc(2595)+ - Λc+ MASS-DIFFERENCE

VALUE (MeV)	
305.79	**0.14/0.20**

FACTORING of 305.79 MeV

FACTORING		*W/ PARSED NUMERATOR*		*THRMASS (MeV)*
$\frac{3840}{2700}$ **S8h**	=	$\frac{(2048 + 1024 + 512 + 256)}{2700}$ **S8h**	=	**305.9861**

The mass that PDG currently reports for this baryon is very likely too big by the difference between the new and old values of the Λc+'s mass. In 2006 PDG increased its FIT (its best guess) of the mass of the Λc+ by 1.56 Mev, from 2284.9 MeV to 2286.46 MeV, because of a new better measurement by BABAR. The new measurement was more accurate, (2286.46 +- 0.14 MeV), but unknown to PDG it factors as a charmed-Xi baryon, not a charmed-Lambda baryon.

3. $\Lambda_c(2625)^+$ **MASS**

The mass is obtained from the Λc(2625)+ - Λc+ mass-difference measurements.

VALUE (MeV)			
2628.11	**0.19**	**PDG FIT**	Result from adding the mass-difference (341.65 MeV) to 2286.46
2626.55			Result from adding the mass-difference (341.65 MeV) to 2284.9

FACTORING of 2626.55 MeV

FACTORING	*W/ PARSED NUMERATOR*	*THRMASS (MeV)*
$\frac{32960}{2700}$ **S8h** =	$\frac{(32768 + 128 + 64)}{2700}$ **S8h**	= **2626.3808**
$\frac{32960}{2700}$ **S8h** =	$\frac{(2^{15} + 2^{7} + 2^{6})}{2700}$ **S8h**	= **2626.380**

Λc(2625)+ - Λc+ MASS-DIFFERENCE

VALUE (MeV)		
341.65	**0.13**	**PDG FIT**

FACTORING of 341.65 MeV

FACTORING	*W/ PARSED NUMERATOR*	*THRMASS (MeV)*
$\frac{4288}{2700}$ **S8h** =	$\frac{(4096 + 128 + 64)}{2700}$ **S8h**	= **341.6844**

PDG states in its listing for this baryon that its FIT mass (2628.11 MeV) was obtained from the Λc(2625)+ - Λc+ mass-difference measurements, which means the mass-difference (341.65 MeV) had to be added to 2286.46 MeV.

New Mass of Λc+		MassDiff		
2286.46 MeV	+	341.65 MeV	=	2628.11 MeV

That result (2628.11 MeV) doesn't factor as well with S8h as the mass which results from adding the mass-difference to the old value of Λc+'s mass: 2284.9 MeV.

Old Mass of Λc+		MassDiff		
2284.9 MeV	+	341.65 MeV	=	2626.55 MeV

This value for Λc(2625)+'s mass (2626.55 MeV) factors very convincingly with S8h, which is more evidence that the true value of Λc+'s mass is close to the old PDG value (2284.9 MeV), not the new value, 2286.46 MeV, currently maintained by PDG.

Source of mass data: P.A. Zylaet al.(Particle Data Group), Prog. Theor. Exp. Phys.2020, 083C01 (2020) and 2021 update

4. $\Lambda_c(2765)^+$ MASS

The mass is obtained from the Λc(2765)+ - Λc+ mass-difference measurement.

VALUE (MeV)			
2766.6	**2.4**	**PDG FIT**	
2766.56			Result from adding the mass-difference (480.1 MeV) to 2286.46
2764.8			Result from adding the mass-difference (480.1 MeV) to 2284.7

FACTORING of 2266.56 MeV

FACTORING — *W/ PARSED NUMERATOR* — *THRMASS (MeV)*

$$\frac{34720}{2700}\,\mathbf{S8h} = \frac{(32768 + 1024 + 512 + 256 + 128 + 32)}{2700}\,\mathbf{S8h} = 2766.6244$$

$$\frac{34720}{2700}\,\mathbf{S8h} = \frac{(2^{15} + 2^{10} + 2^{9} + 2^{8} + 2^{7} + 2^{5})}{2700}\,\mathbf{S8h} = 2766.6244$$

Λc(2765)+ - Λc+ MASS-DIFFERENCE

VALUE (MeV)	
480.1	**2.4**

FACTORING of 480.1 MeV

FACTORING — *W/ PARSED NUMERATOR* — *THRMASS (MeV)*

$$\frac{6016}{2700}\,\mathbf{S8h} = \frac{(4096 + 1024 + 512 + 256 + 128)}{2700}\,\mathbf{S8h} = 479.3782$$

The FIT mass of this baryon was also calculated from the mass-difference between itself and **Λc+,** and if PDG added its mass-difference to the new value of **Λc+,** one would expect it to be off from the n-sphere calculated mass by 1.56 MeV, but it isn't. PDG's fit mass (2766.6 MeV) is very close to the n-sphere factored mass (2766.6244 MeV). Why this FIT mass is right and the previous two, which were calculated the same way supposedly - using mass-differences - are wrong, is unknown. PDG does not explain its FIT procedure in detail.

Source of mass data: P.A. Zylaet al.(Particle Data Group), Prog. Theor. Exp. Phys.2020, 083C01 (2020) and 2021 update

5. $\Lambda_c(2860)^+$ MASS

VALUE (MeV)

2856.1 **2.0/1.7 PDG FIT**

FACTORING of 2856.1 MeV

FACTORING	*W/ PARSED NUMERATOR*	*THRMASS (MeV)*
$\frac{35840}{2700}$ **S8h** =	$\frac{(32768 + 2048 + 1024)}{2700}$ **S8h**	= **2855.8704**
$\frac{35840}{2700}$ **S8h** =	$\frac{(2^{15} + 2^{11} + 2^{10})}{2700}$ **S8h**	= **2855.8704**

$\Lambda_c(2860)^+$ - Λ_c^+ MASS-DIFFERENCE (Theoretical)

MASS OF $\Lambda_c(2860)$+	=	**35840 S8h/2700**	=	**2855.8704** MeV
MASS OF Λ_c+	=	**- 28672 S8h/2700**	=	**- 2284.6963** MeV
MASS-DIFFERENCE	**=**	**7168 S8h/2700**	**=**	**571.1741** MeV

7168 = 4096 + 2048 + 1024

7168 = $2^{12} + 2^{11} + 2^{10}$

7168 = 7(1024)

This baryon factors at the 1024 S8h/2700, or 2^{10} S8h/2700 blocksize, which is quite a significant factoring. Only two other charmed lambda baryons factor with a larger blocksize. They are the first and seventh baryons, both of which factor with the 4096 S8h/2700, or 2^{12} S8h/2700 blocksize.

No experimental mass-difference between itself and Λc+ was reported by PDG for this baryon, but its theoretical mass-difference is easily calculated to be 7168 S8h/2700, or 7(1024) S8h/2700.

Source of mass data: P.A. Zylaet al.(Particle Data Group), Prog. Theor. Exp. Phys.2020, 083C01 (2020) and 2021 update

6. $\Lambda_c(2880)^+$ **MASS**

VALUE (MeV)			
2881.63	0.24	PDG FIT	
2882.46			Result from adding the mass-difference (596 MeV) to 2286.46
2880.7			Result from adding the mass-difference (596 MeV) to 2284.7

FACTORING of 2881.63 MeV

FACTORING	*W/ PARSED NUMERATOR*	*THRMASS (MeV)*
$\frac{36160}{2700}$ **S8h** =	$\frac{(32768 + 2048 + 1024 + 256 + 64)}{2700}$ **S8h**	= 2881.3692
$\frac{36160}{2700}$ **S8h** =	$\frac{(2^{15} + 2^{11} + 2^{10} + 2^{8} + 2^{6})}{2700}$ **S8h**	= 2881.3692

Λc(2880)+ - Λc+ MASS-DIFFERENCE

VALUE (MeV)	
596	1/2

FACTORING of 596 MeV

FACTORING	*W/ PARSED NUMERATOR*	*THRMASS (MeV)*
$\frac{7488}{2700}$ **S8h** =	$\frac{(4096 + 2048 + 1024 + 256 + 64)}{2700}$ **S8h**	= 596.6729

This baryon factors to a **64 S8h/2700** blocksize, which is moderately significant. The value of 64 S8h/2700 is **5.0997** MeV approximately.

7. $\Lambda_c(2940)^+$ **MASS**

VALUE (MeV)		
2939.6	**1.3/1.5**	**PDG AVG**
2938.0	**1.3**	
2939.8	**1.3/1.0**	
2944.8	**3.5/2.5**	

FACTORING of 2938.0, 2939.8, 2944.8 MeV

COMPARISON THR & EXP

FACTORING		*W/ PARSED NUMERATOR*		*THRMASS*	*EXPMASS*	*ERROR*
36864/**2700** **S8h**	=	(**32768 + 4096**)/**2700**	**S8h**	= **2937.4667**	**2938.0**	1.3
36896/**2700** **S8h**	=	(**32768 + 4096 + 32**)/**2700**	**S8h**	= **2940.0166**	**2939.8**	1.3/1.0
36960/**2700** **S8h**	**=**	(**32768 + 4096 + 64 + 32**)/**2700**	**S8h**	= **2945.1163**	**2944.8**	3.5/2.5

One of the experimental masses reported by PDG for this baryon (2938.0 MeV) is very close to the theoretical value (**32768+4096**) S8h/2700 = 2937.4667 MeV. The other two experimental masses reported for this baryon factor as being close to **32** S8h/2700 MeV, and **96** S8h/2700 MeV more massive.

5.0 Conclusion

Two of the seven charmed lambda baryons factor with a very large power of two blocksize: **4096 S8h/2700**.
The first factors as **7** times that, and the seventh charmed lambda baryon factors as **9** times that.

1st	Λc+	=	**7**(4096 S8h/2700) MeV
7th	Λc(2940)+	=	9(4096 S8h/2700) MeV

These two factorings especially, but also the five other factorings that factor convincingly with smaller blocksizes, give credibility to the belief that hadrons are made of higher dimensional matter.

6.0 References

[1] P.A. Zylaet al.(Particle Data Group), Prog. Theor. Exp. Phys.2020, 083C01 (2020) and 2021 update

APPENDIX A

Quark Content Possibilities by Factoring Unit Used

Factoring Unit If……. Mass factors with			Quark Content Possibilities Then……. Hadron has one of these Quark Contents								
u	S2h =	(1, 1)									
d	S3h =	(1 ,2)									
s	S4h =	(2, 3)	du								
c	S5h =	(2, 4)	dd								
b	S6h =	(3, 5)	ddu	ds, uc							
t	S7h =	(3, 6)	ddd	dc							
v	S8h =	(4, 7)	dddu	dds, udc	sc, db, ut						
w	S9h =	(4, 8)	dddd	ddc	cc, dt						
x	S10h =	(5, 9)	ddddu	ddds	dsc, ddb	cb, st					
y	S11h =	(5, 10)	ddddd	dddc	dcc	ct					
z	S12h =	(6, 11)	dddddu	dddds	ddcs	ccs, dcb	bt, cv				
	S13h =	(6, 12)	dddddd	ddddc	ddcc	ccc	t t				
	S14h =	(7, 13)	ddddddu	ddddds	dddcs	dccs	ccb	tv			
	S15h =	(7, 14)	ddddddd	dddddc	dddcc	dccc	cct	tw			
	S16h =	(8, 15)	dddddddu	dddddds	ddddcs	ddccs	cccs	btc	vw		
	S17h =	(8, 16)	dddddddd	ddddddc	ddddcc	ddccc	cccc	t t s	ww		
	S18h =	(9, 17)	ddddddddu	ddddddds	dddddcs	dddccs	dcccs	cccb	t t b	wx	
	S19h =	(9, 18)	ddddddddd	dddddddc	dddddcc	dddccc	dcccc	ccct	t t t	wy	
	S20h =	(10, 19)	dddddddddu	dddddddds	ddddddcs	ddddccs	ddcccs	ccccs	cccv	t t w	xy
	S21h =	(10, 20)	dddddddddd	ddddddddc	ddddddcc	ddddccc	ddcccc	ccccc	cccw	t t x	yy

Note: s=du c=dd b=ds=cu t=cd

All quark combinations for the factoring units from S4h to S9h are shown. For the factoring units from S10h to S21h not all possible quark combinations are shown, especially for the triquarks (qqq, baryons) and the diquarks (qq, mesons). This was done so the table wouldn't look too complex and potentially confusing.

The parentheses enclosing two integers separated by a comma that is just to the right of the factoring units, such as the (1,2) in the line S3h = (1,2), means the surface volume formula of that factoring unit has the powers 1 and 2 for 'π' and 'r'. In the case of S3h, $S3 = 4\pi^1 r^2$. 'π' is raised to the power 1, and 'r' is raised to the power 2, that's why it's written S3h = (1,2). Using this parentheses notation for surface volume formula representation makes it easy to determine which factoring unit will factor which quark combinations, or vice versa, which quark combinations can be factored by which factorung unit.

For instance, if you want to know which factoring unit will factor 'ddd', since 'd' = S3 = (1,2), just add the corresponding integers together of the product (1,2)(1,2)(1,2). You are multiplying numbers together ('π′ and 'r') that are raised to integer powers, and, powers add, so you get (3, 6). Now find the line with (3, 6) in it. It is S7h = (3, 6). So the factoring unit needed to factor 'ddd' is S7h.

APPENDIX B

n-Sphere Surface Volume Formulae

(Dimension 2 - Dimension 21)

Sphere Dimension	Sn	Surface Volume Formula	(π, r) Powers
2	S2 =	2 $\pi^1 r^1$	(1, 1)
3	S3 =	4 $\pi^1 r^2$	(1, 2)
4	S4 =	2 $\pi^2 r^3$	(2, 3)
5	S5 =	8/3 $\pi^2 r^4$	(2, 4)
6	S6 =	$\pi^3 r^5$	(3, 5)
7	S7 =	16/15 $\pi^3 r^6$	(3, 6)
8	S8 =	1/3 $\pi^4 r^7$	(4, 7)
9	S9 =	32/105 $\pi^4 r^8$	(4, 8)
10	S10 =	1/12 $\pi^5 r^9$	(5, 9)
11	S11 =	64 / 945 $\pi^5 r^{10}$	(5, 10)
12	S12 =	1 / 60 $\pi^6 r^{11}$	(6, 11)
13	S13 =	128 / 10395 $\pi^6 r^{12}$	(6, 12)
14	S14 =	1 / 360 $\pi^7 r^{13}$	(7, 13)
15	S15 =	256 / 135135 $\pi^7 r^{14}$	(7, 14)
16	S16 =	1 / 2520 $\pi^8 r^{15}$	(8, 15)
17	S17 =	512 / 2027025 $\pi^8 r^{16}$	(8, 16)
18	S18 =	1 / 20160 $\pi^9 r^{17}$	(9, 17)
19	S19 =	1024 / 34459425 $\pi^9 r^{18}$	(9, 18)
20	S20 =	1 / 181440 $\pi^{10} r^{19}$	(10, 19)
21	S21 =	2048 / 654729075 $\pi^{10} r^{20}$	(10, 20)

APPENDIX C

Values of n-Sphere Surface Volume Units of Factorization

(Dimension 2 - Dimension 21)

Sphere Dimension	Unit of Factorization		Formula		Value (MeV/c^2)
2	S2h	=	$2\ \pi^1 r^1 h$	=	41.63282661
3	S3h	=	$4\ \pi^1 r^2 h$	=	83.26565322
4	S4h	=	$2\ \pi^2 r^3 h$	=	130.7933822
5	S5h	=	$8/3\ \pi^2 r^4 h$	=	174.3911763
6	S6h	=	$\pi^3 r^5 h$	=	205.4497644
7	S7h	=	$16/15\ \pi^3 r^6 h$	=	219.1464153
8	S8h	=	$1/3\ \pi^4 r^7 h$	=	215.1464901
9	S9h	=	$32/105\ \pi^4 r^8 h$	=	196.7053624
10	S10h	=	$1/12\ \pi^5 r^9 h$	=	168.9756582
11	S11h	=	$64 / 945\ \pi^5 r^{10} h$	=	137.3262492
12	S12h	=	$1 / 60\ \pi^6 r^{11} h$	=	106.1705373
13	S13h	=	$128 / 10395\ \pi^6 r^{12} h$	=	78.44057013
14	S14h	=	$1 / 360\ \pi^7 r^{13} h$	=	55.59076334
15	S15h	=	$256 / 135135\ \pi^7 r^{14} h$	=	37.91204905
16	S16h	=	$1 / 2520\ \pi^8 r^{15} h$	=	24.94907624
17	S17h	=	$512 / 2027025\ \pi^8 r^{16} h$	=	15.88056197
18	S18h	=	$1 / 20160\ \pi^9 r^{17} h$	=	9.797479330
19	S19h	=	$1024 / 34459425\ \pi^9 r^{18} h$	=	5.869441980
20	S20h	=	$1 / 181440\ \pi^{10} r^{19} h$	=	3.419965454
21	S21h	=	$2048 / 654729075\ \pi^{10} r^{20} h$	=	1.940989032