14

+1e
2286.46 MeV/c²
2.0×10^{-13} s
1976

u
d c

Charmed Lambda ($\Lambda^{+}{}_{c}$)

($\bar{u}\bar{d}\bar{c}$)

The lightest baryon with a charm; could be detected using nuclear emulsion, a modified photographic plate where individual particle tracks are measured using a microscope.

12

0e
1115.683 MeV/c²
2.632×10^{-10} s
1950

u
d s

Lambda (Λ)

($\bar{u}\bar{d}\bar{s}$)

First detected as produced by cosmic rays in photographic emulsions flown in a balloon at 21,000 m, it's much longer lifetime than expected helped define "strangeness".

22

-1e
6046 MeV/c²
1.64×10^{-12} s
2008

s
s b

Bottom Omega ($\Omega^{-}{}_{b}$)

($\bar{s}\bar{s}\bar{b}$)

One of the heaviest baryons observed. Discovery was first claimed in 2008, but with a mass much higher than expected; detected in 2009 with the expected mass.

24

0e
unkown
Unknown
predicted

s
c b

Charmed Bottom Omega ($\Omega_{cb}{}^{0}$)

($\bar{s}\bar{c}\bar{b}$)

This predicted baryon would help physicists understand the interplay between charm, bottom, and strange quarks inside a single particle.

28

-1e
~10,000 MeV/c²
Unknown
predicted

c
b b

Charmed Double Bottom Omega

($\bar{c}\bar{b}\bar{b}$)

Exotic triply-heavy state. Predicted by quantum chromodynamics (QCD) but yet to be experimentally confirmed.

20

0e
2695.2 MeV/c²
6.9×10^{-14} s
1984

s
s c

Charmed Omega ($\Omega^{0}{}_{c}$)

($\bar{s}\bar{s}\bar{c}$)

Produced in high-energy collisions, its short lifetime and rare decays make it a valuable tool for testing the behavior of the weak force in baryons.

26

-1e
~10,200 MeV/c²
Unknown
predicted

s
b b

Double Bottom Omega ($\Omega_{bb}{}^{-}$)

($\bar{s}\bar{b}\bar{b}$)

With two bottom quarks and a strange quark, this baryon is predicted to be extremely stable against strong decays, decaying only via the weak force.

26

+1e
~8,000 MeV/c²
Unknown
predicted

c
c b

Double Charmed Bottom Omega

($\bar{c}\bar{c}\bar{b}$)

A baryon with two charm quarks and one bottom, its observation would be a milestone for multi-heavy-quark physics and QCD.

20

-1e
1672.45 MeV/c²
0.821×10^{-10} s
1964

s
s s

Omega (Ω^{-})

($\bar{s}\bar{s}\bar{s}$)

Its existence, mass and decay products confirmed the quark model before quarks were even widely accepted.

18

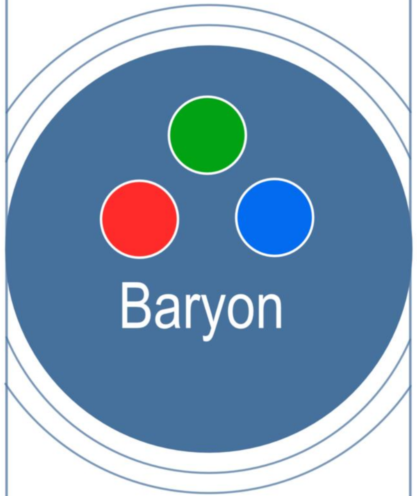
-1e
5816 MeV/c²
$\sim10^{-23}$ s
2006

d
d b

Bottom Sigma ($\Sigma^{-}{}_{b}$)

($\bar{d}\bar{d}\bar{b}$)

Among the heaviest Sigma baryons, about six times heavier than protons, while strange sigma baryons are only slightly heavier than protons.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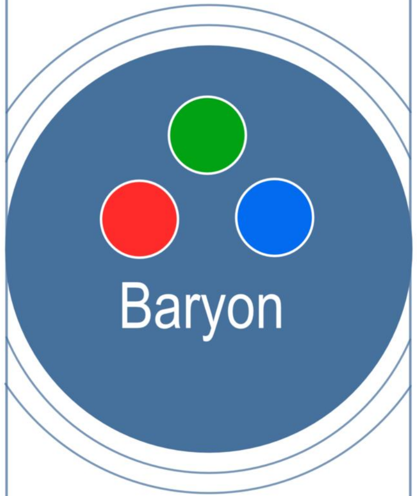
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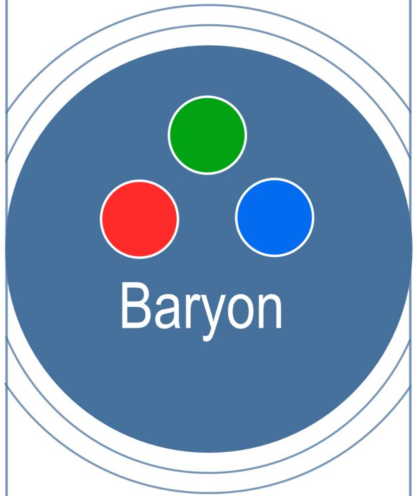
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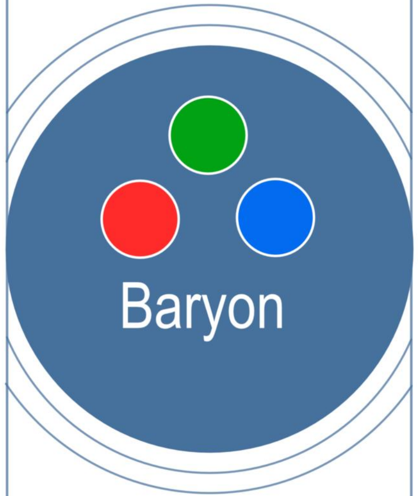
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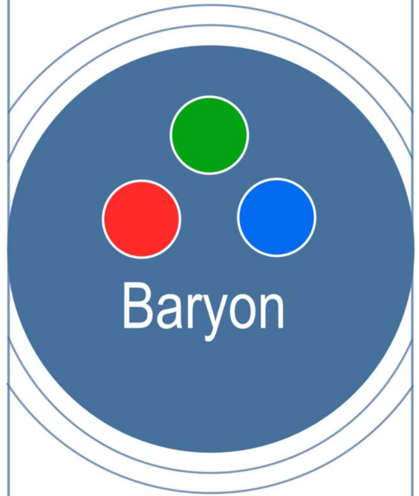
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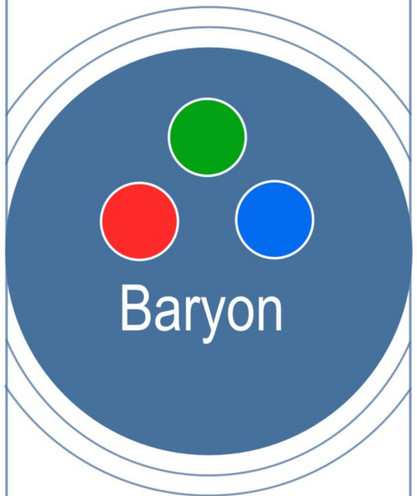
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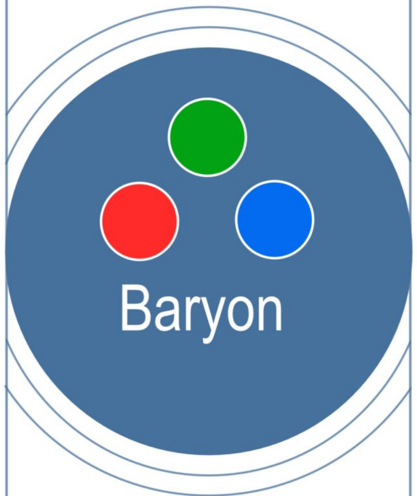
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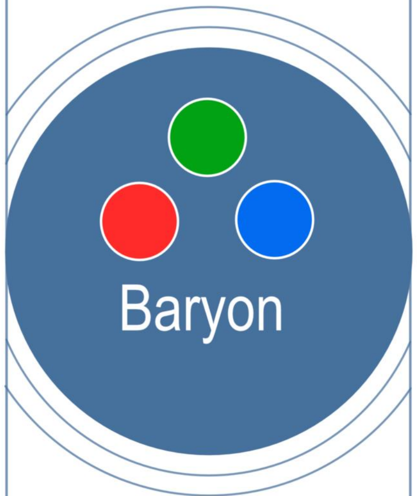
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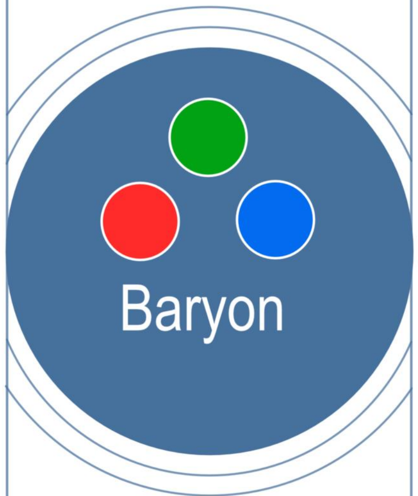
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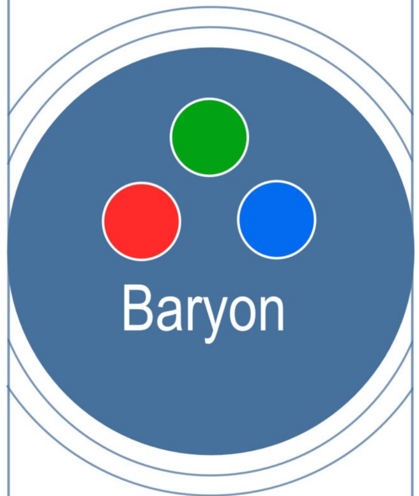
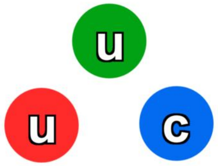

Baryon

12

+2e
2454 MeV/c²
~10^{-23} s
1976



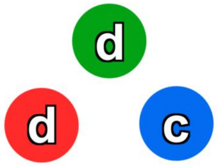
Charmed Sigma ($\Sigma^{++}{}_{c}$)

($\overline{uuc}$)

important for studying the dynamics of charm quarks inside baryons and for testing predictions of quantum chromodynamics (QCD) in the heavy quark sector.

16

0e
2454 MeV/c²
~10^{-23} s
1976



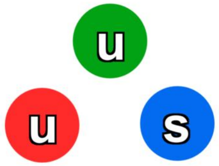
Charmed Sigma (Σ_c^0)

($\overline{ddc}$)

Its properties, such as mass and lifetime, help refine theoretical models of baryon structure and the strong interaction.

10

+1e
1189.37 MeV/c²
0.8018×10^{-10} s
1953

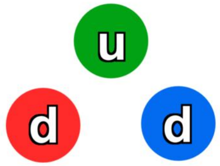


Sigma (Σ^+)

($\overline{uus}$)

The Σ^+ baryon played a key role in the development of the quark model and the understanding of strangeness in particle physics.

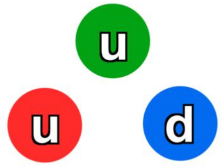
0e
939.565 MeV/c²
880 s
1932



Neutron (n)

Stable inside nuclei but decays with a half-life of about 15 minutes when free.

+1e
938.272 MeV/c²
Stable
1919

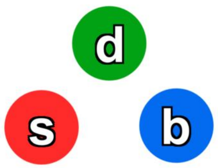


Proton (p)

Constitutes the nucleus of every atom and is stable under normal conditions.

20

-1e
5797 MeV/c²
1.56×10^{-12} s
2007



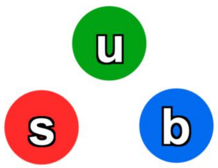
Bottom Xi ($\Xi^-{}_b$)

($\overline{dsb}$)

the first known particle made of quarks from all three quark generations.

18

0e
5791 MeV/c²
1.57×10^{-12} s
2007



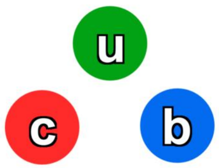
Bottom Xi ($\Xi^0{}_b$)

($\overline{usb}$)

The Ξ_b⁰ sits at the crossroads of three quark generations. It offers insight into how the strong force handles both strangeness and bottomness in a single particle.

20

+1e
6051 MeV/c²
Unknown
predicted

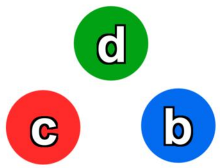


Charmed Bottom Xi ($\Xi^+{}_{cb}$)

($\overline{ucb}$)

The existence of this baryon would allow new tests of heavy quark symmetry and flavor interactions.

22



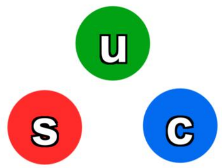
Charmed Bottom Xi ($\Xi^0{}_{cb}$)

($\overline{dcb}$)

A heavy hybrid of charm and bottom flavors, this baryon helps physicists probe the boundary between the known and unknown.

16

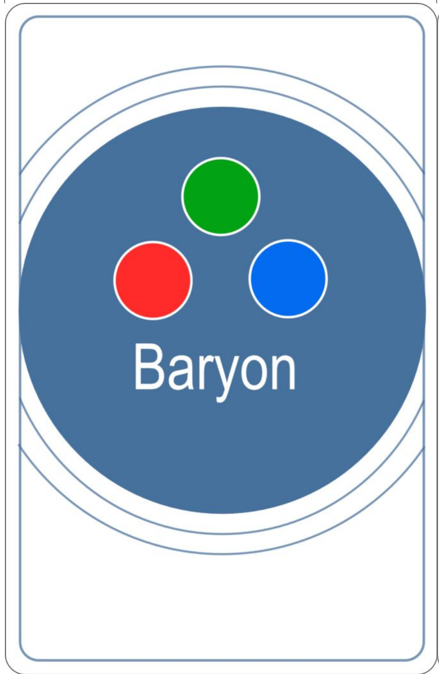
+1e
2468 MeV/c²
4.42×10^{-13} s
1983



Charmed Xi ($\Xi^+{}_c$)

($\overline{usc}$)

These particles provide valuable insight into heavy-quark dynamics and the structure of matter.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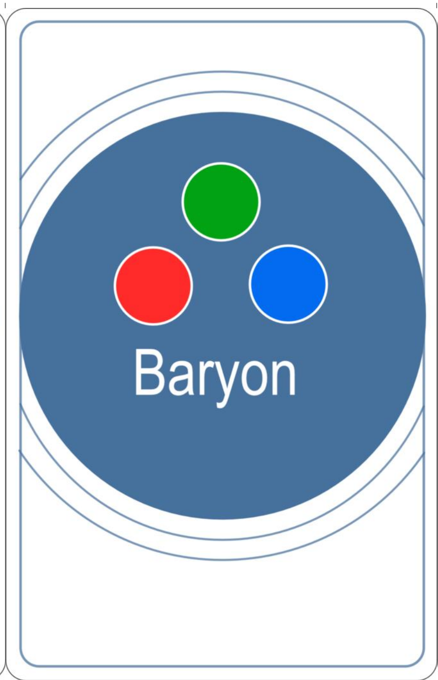
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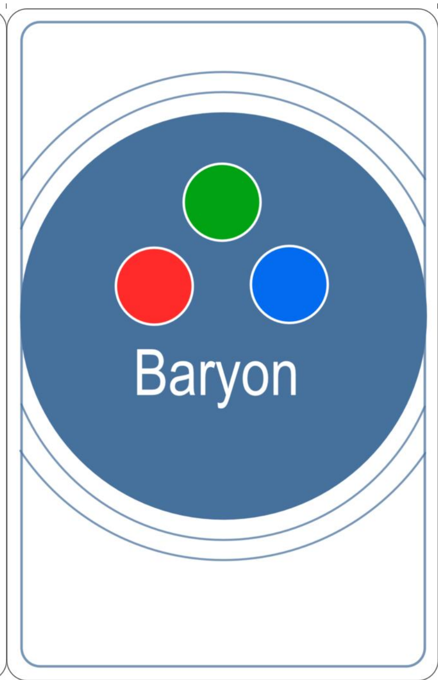
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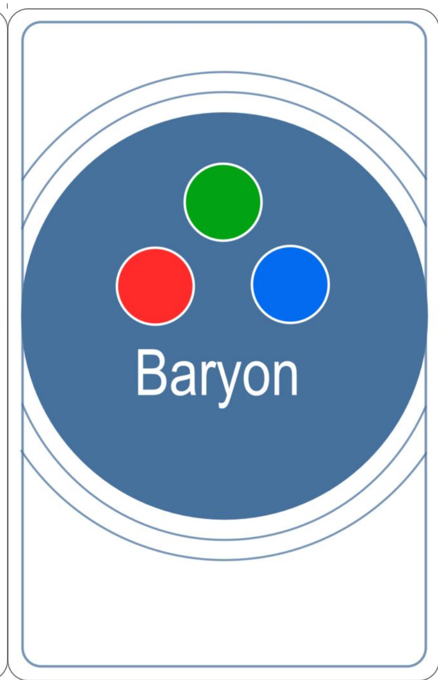
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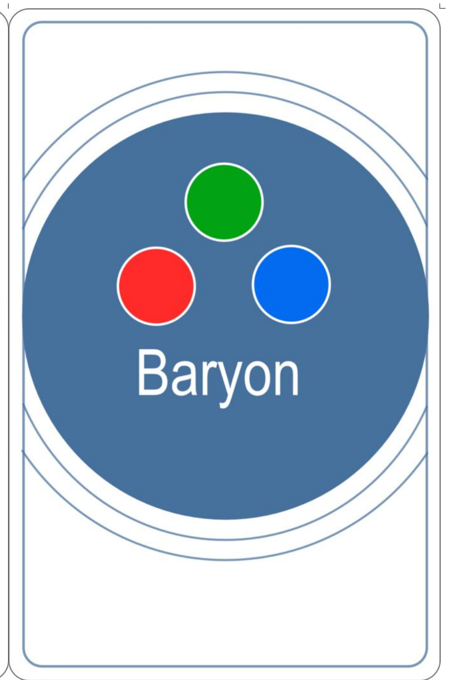
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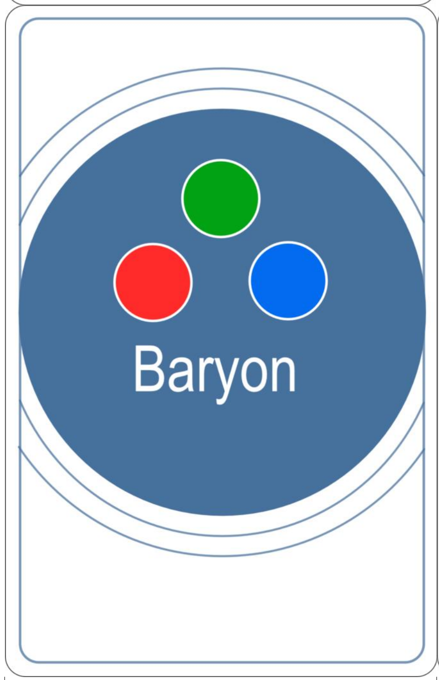
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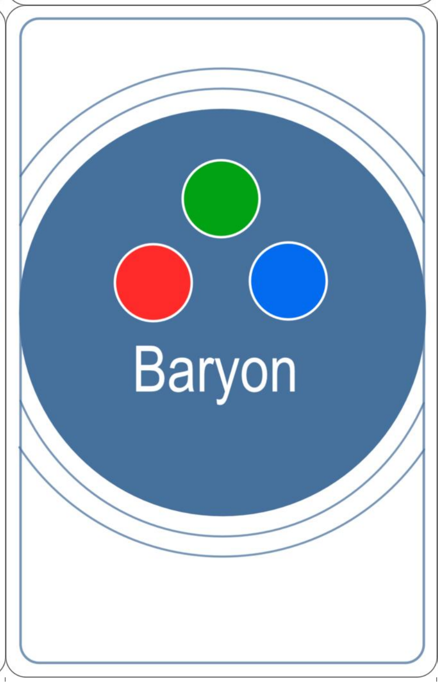
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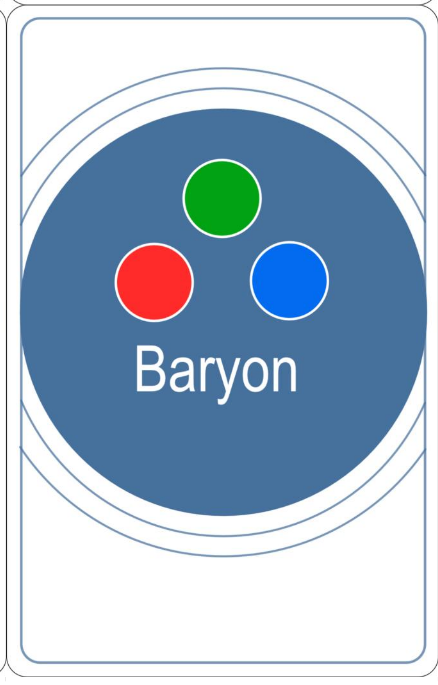
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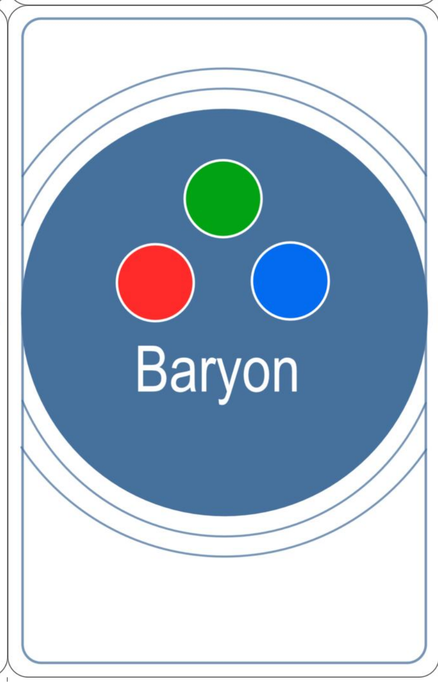
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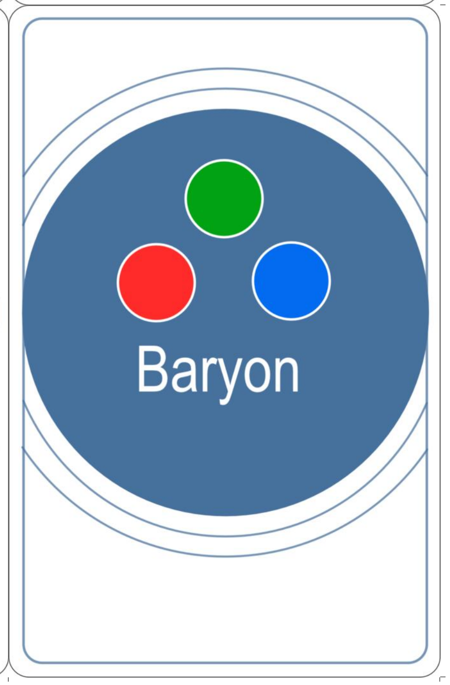
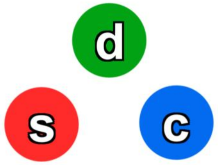

Baryon

18

0e
2470 MeV/c²
1.12×10^{-13} s
1983



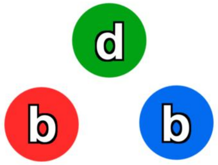
Charmed Xi (Ξ^0_c)

$(\overline{d}\,\overline{sc})$

Their decays via the weak interaction often produce lighter charmed baryons such as the Λ_c^+ and various mesons.

24

-1e
~10,100 MeV/c²
Unknown
predicted



Double Bottom Xi

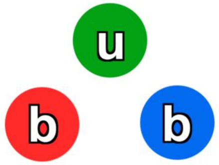
(Ξ_{bb}^{-})

$(\overline{dbb})$

Creating two bottom quarks in close proximity is rare; high-luminosity colliders like the LHC are required for potential discovery.

22

0e
~10,100 MeV/c²
Unknown
predicted



Double Bottom Xi

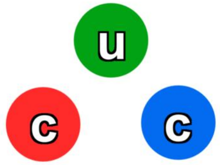
(Ξ_{bb}^{0})

$(\overline{u}\,\overline{bb})$

Expected to decay via the weak interaction, likely producing a cascade of lighter baryons and mesons. Its decay patterns would provide new tests for weak interaction theories.

18

+2e
3621.4 MeV/c²
2.0×10^{-13} s
2017



Double Charmed Xi

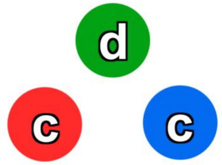
(Ξ_{cc}^{++})

$(\overline{u}\,\overline{cc})$

The first baryon discovered with two charm quarks, offering unique insights into heavy quark dynamics.

20

1e
3520 MeV/c²
4–16 × 10^{-14} s
2002



Double Charmed Xi

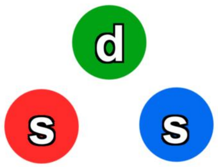
(Ξ_{cc}^{+})

$(\overline{d}\,\overline{cc})$

Evidence for this baryon was reported by SELEX in 2002, but not confirmed by other experiments; it took until 2017 before a double heavy baryon (the ucc version) was confirmed.

16

-1e
1321.71 MeV/c²
1.639×10^{-10} s
1959



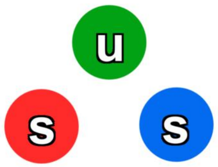
Xi (Ξ^-)

$(\overline{d}\,\overline{ss})$

Its discovery helped establish the existence of strange quarks in baryons.

14

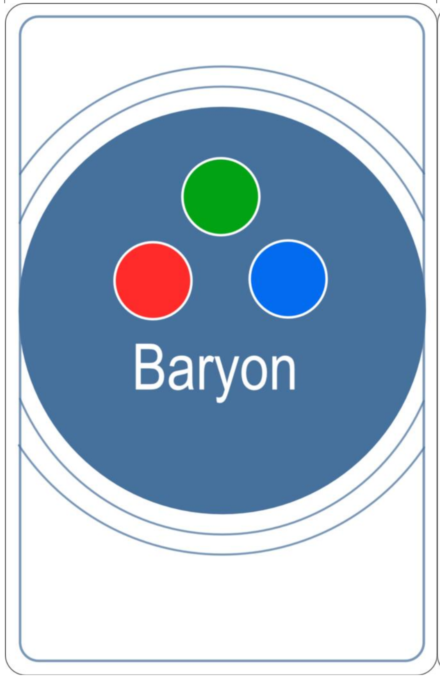
0e
1314.86 MeV/c²
2.90×10^{-10} s
1959



Xi (Ξ^0)

$(\overline{u}\,\overline{ss})$

Known as the "cascade" particle, it was critical in confirming the quark model.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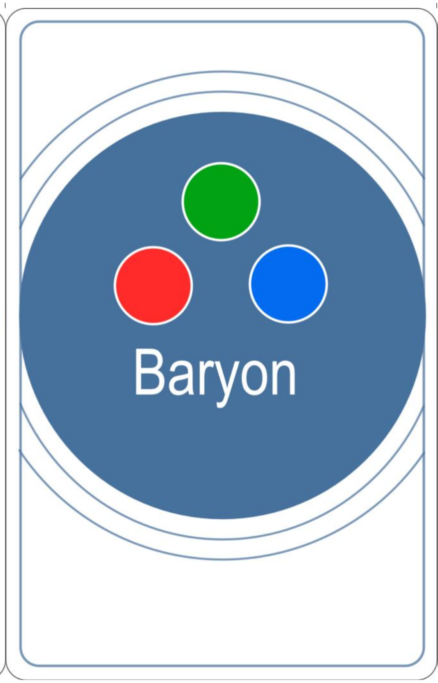
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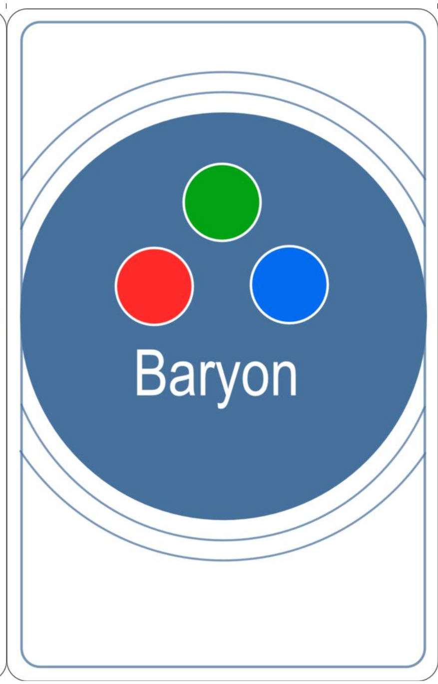
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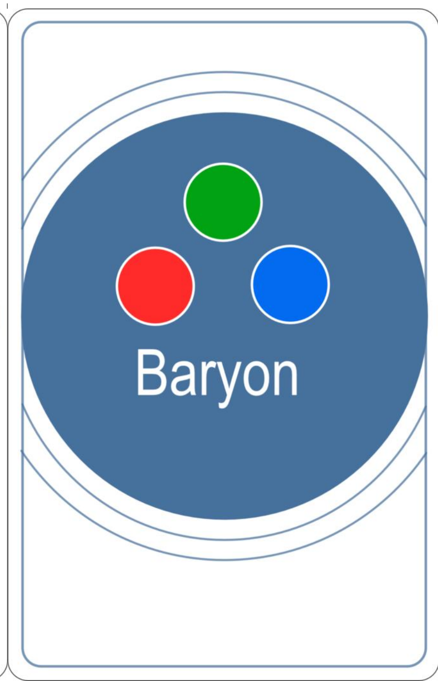
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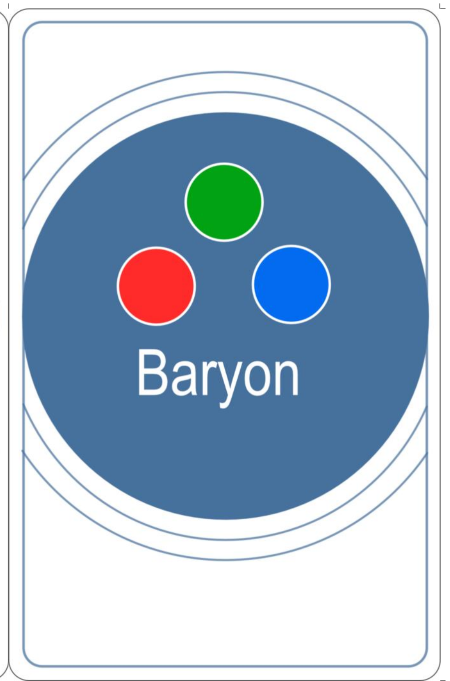
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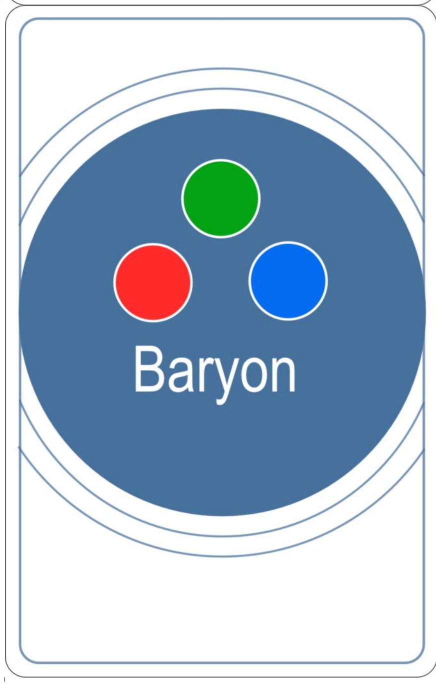
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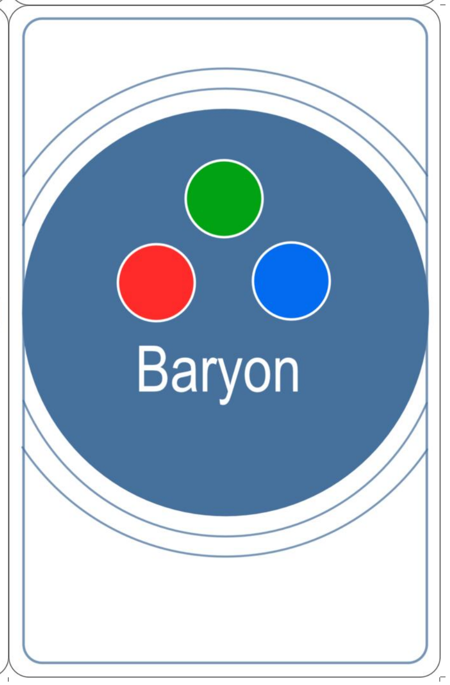
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