

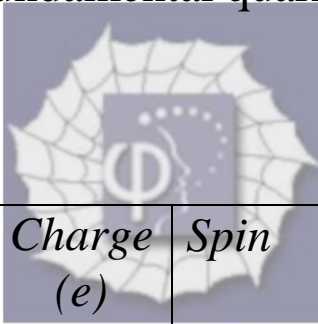
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**Problem 56.20 (RHK)**

Using the up, down, and strange quarks only, we have to construct, if possible, a baryon (a) with  $Q = +1$  and  $S = -2$ ; (b) with  $Q = +2$  and  $S = 0$ .

**Solution:**

Properties of the fundamental quarks are as given in the following table:



Quark	Symbol	Charge ( $e$ )	Spin	Baryon Number	Strangeness
Up	u	$+\frac{2}{3}$	$\frac{1}{2}$	$\frac{1}{3}$	0
Down	d	$-\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{3}$	0
Strange	s	$-\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{3}$	-1

(a)

A baryon will comprise of three quarks. We note that a baryon with strangeness  $S = -2$  has to necessarily have

out of the three quarks two  $s$ , which will have charge  $-\frac{2}{3}$ .

Therefore, a baryon with  $Q = +1$  and  $S = -2$  is not possible.

(b)

A baryon with  $Q = +2$  and  $S = 0$  will be the three quark combination  $uuu$ .

