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Source of Stability of New Particles (1)

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i) Composite particle model
high angular momentum
angular correlation, associated production
+/− ratio of K-particles
2 Λ° production

ii) assumption of strong and weak interactions

a) slow reactions

$\pi + N \to Y + \pi$
$N + N \to Y + N$
$\pi + N \to B + N$
$N + N \to B + N + N$

b) fast reactions

$\pi + N \to Y + B$ ($\pi^- + p \to \Lambda^\circ + \theta^\circ$ or $\Sigma^- + \theta^+$)
$B + N \to Y + \pi$ ($K^- + p \to \Lambda^\circ + \pi^\circ$)
never seen so far
$N + N \to Y + Y$
$N + N \to Y + B + N$
$B + N \to B + N$ scattering
$Y + N \to Y + N$ $\Sigma^+ + p \to \Lambda^\circ + N$

(1) Conservation of ~~mass~~ number of Baryons (including nucleons)
(2) Conservation of charge
(3) Charge independence (relative)
(4) stability (relative)

Σ^-	Σ°		I = ½	$Q = I_3 - ½$
Σ^-	Σ°	Σ^+	1	I_3
	$\gamma \downarrow \Lambda^\circ$		0	I_3
n	p		½	$I_3 + ½$

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(2)

$\overline{B^-}$ $\overline{B^0}$ $\overline{B^+}$ ∴ $I = 1/2$

$Q = I_3 \pm 1/2$

$I = 1/2$: $\overline{B^0}$

$Q = I_3 - 1/2$

$\overline{\pi^-}$ $\overline{\pi^0}$ $\overline{\pi^+}$ $I = 1$, $Q = I_3$

$Q = I_3 + \tau_3 + 1/2$

$L_2 = 1/2 (L_{23} + L_{14})$ ∴

$K_1 = 1/2 (L_{23} - L_{14})$ ∴

$L_{ij} = i\left(x_i \frac{\partial}{\partial x_j} - x_j \frac{\partial}{\partial x_i}\right)$

four dimensional rotation