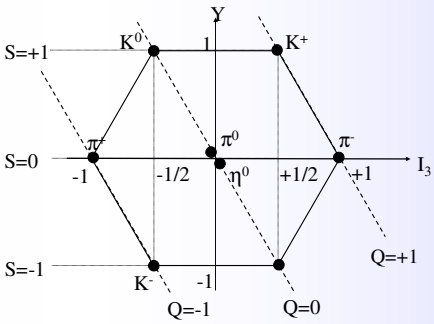
Super-multiplets

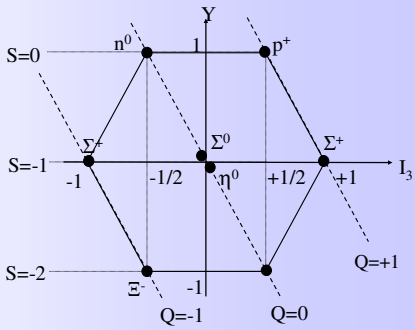
In the beginning of '60 of last century, Gell-Mann and Neewman independently noticed, that due to the same ***spin***, ***parity*** and ***strangeness***, and due to similar masses, hadrons can be grouped into so called **multiplets**, which than are grouped into **supermultiplets** consisting of singlets, octets and decuplets. Introducing values descibing the multiplicity – like **isospin** I=(N-1)/2 and **hypercharge** (Y=B+S, where B – baryon number, S – strangeness) – and after plotting the dependencies of these values (to be exact hypercharge vs. isospin's projection on "selected direction" I_3) characteristic geometrical figures can be obtained. That situation was similar to the first trials of classification of chemical elements into Mendeleev's table.

Classification of particles (which were known in 60-th of XXth century)

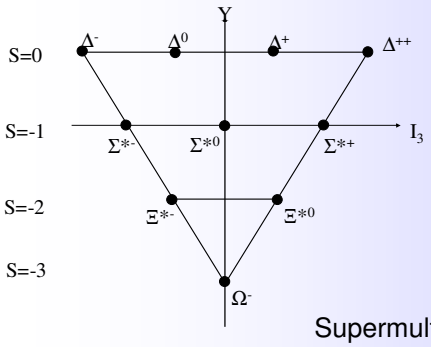
Class		Particle	Charge	Spin	Mass [MeV]
LEPTONS		ν_e	0	1/2	~0
		e^-	-1	1/2	0.51
		ν_μ	0	1/2	~0
		μ^-	-1	1/2	105.6
HADRONS	MESONS	π^+, π^-	+1, -1	0	139.5
		π^0	0	0	135.0
		K^+, K^-	+1, -1	0	493.7
		K^0	0	0	497.7
		η^0	0	0	549.0
		η'^0	0	0	550.0
	BARIONS	p^+	+1	1/2	938.2
		n^0	0	1/2	939.5
		Λ^0	0	1/2	1115.6
		Σ^+	+1	1/2	1189
		Σ^0	0	1/2	1192
		Σ^-	-1	1/2	1197
		Ξ^0	0	1/2	1315
		Ξ^-	-1	1/2	1321
		Ω^-	-1	3/2	1672



Octet of mesons
spin s = 0⁻



Octet of barions
spin s= (1/2)⁻



Decuplet of barions
spin s= (3/2)⁻

Supermultiplets allowed to predict existence of new particles.
Quark hypothesis was "on the way".

In fact it is not clear what James Joyce had in mind writing in "Finnegans Wake":

- **Three quarks** for Muster Mark!
Sure he hasn't got much of a bark
And sure any he has it's all beside the mark.

If that was "quarts", then Mark had to drink beer, a quite big amount, that's six pints!

Anyway the rest of the text is also unclear. Is it a tree? A dog somewhere? A scar or a lesson?

Now, a similar situation is with the quarks: there were only three when they were named by Gell-Mann in 1964. Now they are six quarks, but in three colors, and, additionally some negative ones, in pink, cyan and yellow.

And no one ever caught them in hand, like those of Muster Mark.

Prof. Arkadiusz Gòral, "Meandry Fizyki", Wydawnictwo MON, Warszawa (1988)

Explanations: (Oxford Dictionary of Contemporary English and us)
- **quart** =1/4 gallon
- **gallon** =3,785 dm^3
- **bark** - 1) sound emitted by a dog; 2) hard, external covering of the tree
- **mark** - 1) sign on face; 2) letter or digit to valuation
- **quark** - 1) assignment for Mark Muster in "Finnegan's Wake",
2) basic, beside the leptons, elements of matter: components of mesons (=2 quarks) and baryons (=3 quarks), unable to be isolated, but observable during in high energy collisions of elementary particles.