BARYON MAGNETIC MOMENTS

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The figure below shows the measured magnetic moments of the stable baryons. It also shows the predictions of the simplest quark model, using the measured p, n, and Λ moments as input. In this model, the moments are [1]

$$\begin{aligned} \mu_p &= (4\mu_u - \mu_d)/3 & \mu_n &= (4\mu_d - \mu_u)/3 \\ \mu_{\Sigma^+} &= (4\mu_u - \mu_s)/3 & \mu_{\Sigma^-} &= (4\mu_d - \mu_s)/3 \\ \mu_{\Xi^0} &= (4\mu_s - \mu_u)/3 & \mu_{\Xi^-} &= (4\mu_s - \mu_d)/3 \\ \mu_\Lambda &= \mu_s & \mu_{\Sigma^0} &= (2\mu_u + 2\mu_d - \mu_s)/3 \end{aligned}$$

$$\mu_{\Omega^-} = 3\mu_s$$

and the $\Sigma^0 \to \Lambda$ transition moment is

$$\mu_{\Sigma^0\Lambda} = (\mu_d - \mu_u)/\sqrt{3}\ .$$

The quark moments that result from this model are $\mu_u = +1.852\,\mu_N$, $\mu_d = -0.972\,\mu_N$, and $\mu_s = -0.613\,\mu_N$. The corresponding effective quark masses, taking the quarks to be Dirac point particles, where $\mu = q\hbar/2m$, are 338, 322, and 510 MeV. As the figure shows, the model gives a good first approximation to the experimental moments. For efforts to make a better model, we refer to the literature [2].

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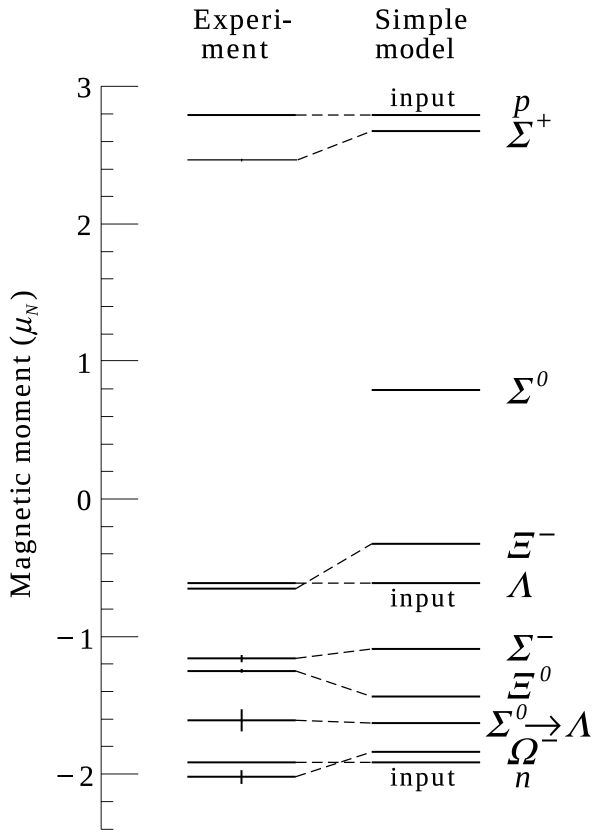

References

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