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Neutron to proton mass difference, parton distribution functions and baryon resonances from dynamics on the Lie group $u(3)$

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Abstract

We present a hamiltonian structure on the Lie group $u(3)$ to describe the baryon spectrum. The ground state is identified with the proton. From this single fit we calculate approximately the relative neutron to proton mass shift to within half a percentage of the experimental value. From the same fit we calculate the nucleon and delta resonance spectrum. For specific spin eigenfunctions we calculate the delta to nucleon mass ratio to within one percent.

Periodic potential and reduced zone scheme

The allostrophic hypothesis

The Lie group $u(3)$ contains both $su(3)$ and $u(1)$. Thus we choose the Lie group $u(3)$ as configuration where

$$\theta \theta \theta \pi \theta \pi = + + - \leq \leq$$

are the eigenvalues of $\Delta$.

The theory unfolded

It is the hypothesis of the present work, that the eigenstates of the above variable of a sole baryonic entity and more radically describe interior dynamics implying quarks and gluons as projections from $u(3)$ which we then call allospace.

References

We interpret the period doublings as related to the creation of resonances. Two even labels give possibilities of double charges which we interpret as $\Lambda$ resonances. For three even labels the complex phases factor out and the neutron to proton mass shift $0.138$ % follows from approximate solutions to the Schrödinger equation. A projection of states to space is given via the exterior derivative. This projection has shown to yield predicted above the free charm threshold of $1.231MeV$.

Acknowledgments

A quite accurate prediction of the relative neutron to proton mass shift $0.138$ % follows from approximate solutions to the Schrödinger equation. A projection of states to space is given via the exterior derivative. This prediction has shown to yield predicted above the free charm threshold of $1.231MeV$.

Conclusions

The allostrophic hamiltonian in (1) or (2) may be seen as an effective phenomenology or interpreted more radically in a conceptual interpretation where we see resonances - from space: The impact momentum as strangeness operators generate the maximal torus of $u(3)$

$$\pi \pi \pi \pi = + + - \leq \leq$$

Decay, fragmentation, confinement – from allospace: The momentum form quark on gluons.

The resonance has no fitting parameters except the coupling $A = h = 1 \pm 213MeV$.

For three even labels the complex phases factor out and the neutron to proton mass shift $0.138$ % follows from approximate solutions to the Schrödinger equation. A projection of states to space is given via the exterior derivative. This prediction has shown to yield predicted above the free charm threshold of $1.231MeV$.