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A Higgs at 125 GeV and baryon mass spectra derived from a common U(3) framework

Baryons are described by a Hamiltonian on an intrinsic U(3) Lie group configuration space with electroweak degrees of freedom originating in specific Bloch wave factors. By opening the Bloch degrees of freedom pairwise via a U(2) Higgs mechanism, the strong and electroweak energy scales become related to yield the Higgs mass and the usual gauge boson masses. From the same Hamiltonian we derive both the relative neutron to proton mass ratio and the N and Delta mass spectra. All compare rather well with the experimental values. We predict neutral flavour baryon singlets to be sought for in negative pions scattering on protons or in photoproduction on neutrons and in invariant pion-proton mass in various decays. The fundamental predictions are based on just one length scale and the fine structure constant. The interpretation is to consider baryons as entire entities excited from laboratory space by three impact momentum generators and six Lorentz generators to internalize as nine degrees of freedom covering colour, spin and flavour. Quark and gluon fields come about when the intrinsic structure is projected back into laboratory space depending on which exterior derivative one is taking. With such derivatives on the measure-scaled wavefunction, we derive approximate parton distribution functions for the u and d valence quarks of the proton that compare well with established experimental analysis.

Author: Mr TRINHAMMER, Ole (Technical University of Denmark, Dept. of Physics)

Co-authors: Dr BOHR, Henrik (Technical University of Denmark, Dept. of Physics); Dr JENSEN, Mogens Stibius (Technical University of Denmark, Dept. of Physics)

Presenter: Mr TRINHAMMER, Ole (Technical University of Denmark, Dept. of Physics)

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