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Intrinsic quantum mechanics behind the Standard Model?

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We suggest the gauge groups SU(3), SU(2) and U(1) to share a common origin in U(3).

We take the Lie group U(3) to serve as an intrinsic configuration space for baryons. A spontaneous symmetry break in the baryonic state selects a U(2) subgroup for the Higgs mechanism. The Higgs field enter the symmetry break to relate the strong and electroweak energy scales by exchange of one quantum of action between the two sectors. This shapes the Higgs potential to fourth order.

Recently intrinsic quantum mechanics has given a suggestion for the Cabibbo angle from theory (EPL124-2018) and a prediction for the Higgs couplings to gauge bosons (EPL125-2019). Previously it has given the nucleon mass and the parton distribution functions for u and d quarks in the proton (EPL102-2013). It has given a quite accurate equation for the Higgs mass in closed form (IJMPA30-2015) and an N and Delta spectrum essentially without missing resonances (arXiv:1109.4732).

The intrinsic space is to be distinguished from an interior space. The intrinsic space is non-spatial, i.e. no gravity in intrinsic space. The configuration variable is like a generalized spin variable excited from laboratory space by kinematic generators: momentum, spin and Laplace-Runge-Lenz operators.

The baryon dynamics resides in a Hamiltonian on U(3) and projects to laboratory space by the momentum form of the wavefunction. The momentum form generates conjugate quark and gluon fields. Local gauge invariance in laboratory space follows from unitarity of the configuration variable and left-invariance of the coordinate fields in the intrinsic space.

Future work should aim to invoke leptons in the second and third generations and quarks in the third.

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