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An Exact Derivation of The Quark Coupling Constant Without QCD

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Abstract: *In this note we show that the quark coupling constant q=0.06583 yieldsthe lattice of E6 which has been shown to map the Standard Model. Thusthere is no appeal to QCD for binding the quarks.AMS Classification Code:14J247,14K25,14M25,22E70,81V05.*
Keywords:*Equiharmonics,Jacobi Theta Function,QCD,Coupling Constant,E6lattice,Standard Model.*

I. Introduction

Fig.1 is the lattice of E6 with quarks assigned to the vertices, based on a modelby Slansky[9],which has been shown to agree with the Standard Model in severalpapers summarised in[6]. The vertices are also labeled by 0, μ,ν according to anotation adopted by Coxeter [4],Section 12.3,where 0; μ,ν can assume the values0,2,3 indicating rotations ω through 120 and 240 degrees. In this way thevertices of each equilateral triangle are a rotation of 120 degrees so nucleons arebound by a rotation of quarks according to su3 color symmetry with no appealto a Strong Force. Fig.1 is not the same as that given in Ref[4] but is takenfrom an earlier reference[3] which is a torus with the leptons $\tau^{\pm},\nu_\tau$situated inthe center dictated by the infinitesimal structure of a cubic or elliptic surface.

In this note we will see how the lattice of Fig.1 is governed by a quarkCoupling Constant q=0.06583 which is close to the constant 0.118 found byDavies et al.[5] where a smaller rectangular QCD matrix is employed.

Specifically E6 = CP3,the complex projective 3-space,has 3 real and 3complex dimensions so we must consider rotations which are Jacobi ThetaFunctions with a nome q=exp(-iπK/K),where K and iK are quarter periods on the real and imaginary axes. If these are equiharmonic ,or multiplesof a fundamental frequency f,then q=0.06583 [1],which is shown in[8] to yieldiK/K=sqrt3/2=sin120=sinωor sin60 that is precisely the angle in Fig.1 of thetritangent that maps the quarks and anti-quarks in an equiharmonic lattice.In this way the E6 lattice carries the coupling constant q uniting the up anddown quarks and the fundamental frequency f could well be electromagneticoccupying all of space.

For example the Jacobi Theta Function given by [2] Ch.4 is

$$\theta_{E_6+[1]} = 27q^{4/3} + 216q^{10/3} + 459q^{16/3} + \dots \qquad (1)$$

when the origin is moved to a deep hole ,ie. a translation to include the leptons $\tau^{\pm},\nu_\tau$. Here 27 is the number of quarks and leptons of the Standard Model(alsothe number of vertices in Fig.1 together with the 3 leptons in the center) and216 is the order of the subalgebra $(su_3)_{rotation} + (su_3)_{isospin} + (su_3)_{color}$ ofE6(cf.[6]).

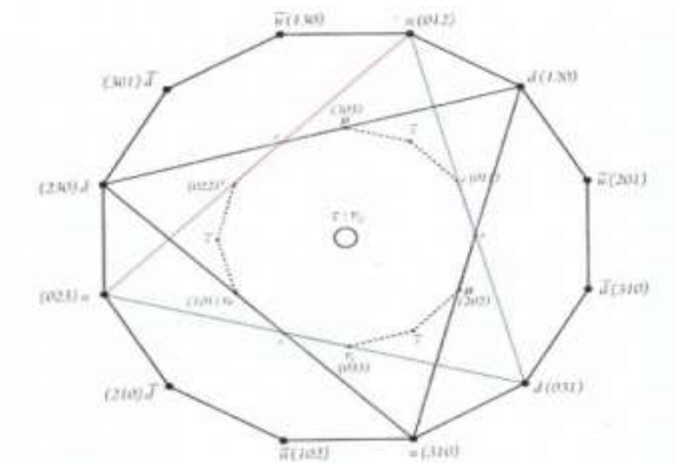

Figure 1: E6Polytope

II. The Equiharmonic Lattice

Here we will provide details of of the calculation of ω= 120degrees from thenome q=exp(-iπK/K) found in [1].Writing iK/K=sqrt3/2 we have the identity

$$ln(q^{-1}) = \pi\sqrt{3}/2 = 2.7207 \Rightarrow q = 0.06583 \quad (2)$$

for the quark coupling constant without any appeal to QCD.

III. Conclusion

The equiharmonic lattice of Fig.1 may also result from iK/K=sqrt 3 when ω=60degrees in which case we find a possible nuclear coupling constant of 0.00433which is the same order of magnitude as that suggested by Rees [9],Ch.4. E6 isalso the orbifold of Type II String Theory[6].

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