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The Klein-Gordon Equation

James W Goodman
Louisiana State University
Baton Rouge, Louisiana

Abstract

Two solutions to the Klein-Gordon equation are found. The existence of a maximum relativistic correction of 2 is thus indicated. The normal relativistic correction is given by the usual solution. A certain Hilbert Space is used to find the solutions using a group theory taught at LSU and the Texas Method of Math also taught at LSU. The usefulness of group theoretical manipulations in Hilbert Space is indicated. A lemma is proved using this group theory that predicts a charge of +/-1 is the only values of charge possible. The usefulness of the second solution to the Klein-Gordon equation of a maximum of 2 for the relativistic correction is basic to the mass predictions in [3]. The fact that the energy reaches mc^2 indicates a dipole spinning at velocity c. The dipole is spinning in a magnetic field created by other particles so it creates charge.

Keywords

Quantum Physics; Energy States; Hilbert Space; Multibody Solution; Relativistic Correction; Hilbert Space Group Theory; Charge; Magnetic Solution.

Academic Discipline

Physics

Subject Classification

Quantum Mechanics

Approach

Theoretical

Introduction

Using the Texas Method of Math and working with a not necessarily commuting arithmetic field where operators do not necessarily commute and constants and variables do commute (as an example a Hilbert Space used here) certain conclusions can be derived. This is a form of group theory as taught at LSU in Quantum Mechanics in the Spring semester of 1967. A different solution to the Klein-Gordon equation is obtained from the group operations. The common solution is also found. The value of group theoretical manipulations is shown and is recommended for derivations involving energy states. In an unpublished homework paper the solution of E=-13.6/n^2 ev energy states of the hydrogen atom was found using the Schrodinger equation and one assumption on a Hilbert Space using this group theoretical approach.

An application of this approach is found in [3] deriving the sole values of charge as +/-1. To review with E constant and V=qq/r:

2E=qq/r r=n^2. The derivative of this equation DV=D2E=qq'+q'q where E is stepwise constant DE=0 gives 2qq'=0 Integrating c=q^2 or where one solution is one: q=+/-1 the sole value of charge. This is important in measuring the mass of HEP and clarifies the derivation of particles. Care should be taken when dealing with more than two particles or continuous theories such as thermodynamic properties.

Derivation

The Klein-Gordon equation[4] is:

c^2p'^2 + (mc^2)^2 =E^2

Where (p'^2)=(-ih$^{\delta}$)^2[5]

Let p=h$^{\delta}$

Note the minus sign introduced by (-i)^2

m^2c^4-c^2p^2=E^2

Because mc^2 commutes with cp because mc^2 is a constant, the following is true:

(cp+mc^2)(-cp+mc^2)=E^2

Two energies are found:

-cp+mc^2=-E and cp+mc^2=E

dividing by mc^2 and solving for E

-E=mc^2(1-cp/mc^2) and E=mc^2(1+cp/mc^2)

Where T, E and V are taken to be positive.

And for constant E and a potential energy V recalling E=+/-13.6/n^2 [1]:

The Relativistic correction is +/-cp/mc^2 so that:

+/-E'=E(1+/-T/mc^2)

The Schrödinger Equation is:

T-V=-E

Where E'=E(1+E/mc^2), E is the non-relativistic QM solution standing on the particle and E' is the energy as viewed from a distance.

Where -E'=E(1-E'/mc^2), E' is the non-relativistic QM solution standing on the particle and E is the energy as viewed from a distance: E=-E'/(1-E'/mc^2). This is the common solution.

Therefore the maximum relativistic correction is 2 or ∞.

Results

A use for the relativistic correction of 2 is found in the calculation of the electron mass and imbedded in the masses of all other particle masses.

13.6ev137(137)=255258ev[3]

255258(2)=510516ev(electron)

2 is the relativistic correction

510516ev(137)137/(10)=958mev(proton)

10 is the conversion from nm to A for r: E=13.6/r

The rest of the particles are 0.958Gev n^2 n=1,2,3,....1/1,1/2,1/3,....

It can be seen from the electron mass that the maximum relativistic correction of 2 has a use and that when the energy of the particle becomes mc^2 a new particle is formed. The deviation of predicted masses for the proton and the electron by 2% and 0.1% may be significant.

At E/mc^2=1/2 the energy is doubled for the common solution and at mc^2 the energy is doubled for the solution E=E'(1+E/mc^2) which is valuable when calculating the masses of common particles as seen above. The masses of all the other known particles and some not found in experiment [3] depend on the factor of 2. The fact that the energy reaches mc^2 indicates the probability of a dipole spinning at velocity c. The dipole is spinning in a magnetic field created by other particles so it creates charge.

References

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James W Goodman biography

Over 50 hours of graduate physics and math courses.

BS physics

Followed the solution of the hydrogen Schroedinger equation.

Solved the hydrogen equation using group theory.

Studied Hilbert Space and QM group theory.

Graded Hilbert Space group theory theorems.

89 percentile physics GRE

Member of Mensa

1971 The design of this digital cell phone is proprietary information for the Bell System.

1972 The Schoedinger equation was studied with the idea of writing down the potential energy between each pair of particles and adding them up.

1972 Two new assumptions were written down and from this the Schoedinger equation was solved. The electron electron interaction was solved exactly. The ground state energy of the first 10 elements was found exactly correct. New physics was found for the rest of the elements. The nuclear spin had been omitted.

1979 Bell needed a power forecasting and record keeping system. The secret was to use an exponential growth curve fitted to the three high values of the amperage. The statistical theory says that more users cause more mips cause more amps.

1980's described the DSL to Bell and asked them to provide for students to hook up to the Internet. At that time the high-speed available was 2400 bits per second. DSL provided 1 million bits per second.

1980's from study of the Aluminum gallium arsenide laser showed Cox cable how to turn around the repeaters. It shows that with the voltage below lasing the laser is a receiver.

1980's from study of calculus of statistics and study of traffic engineering with the Bell System pointed out the problem with too many users on one T1 Line. At high usage after supper 10 users on one T-1 line would get about 100,000 bits per second. This increased the demand for DSL's.

1990's Suggested from a sawf study to Lockheed Martin the alloy LiAl for the skin of the shuttle tank. They used the Super Lightweight Tank for years. Each pound saved would put a pound added to the load in orbit.

2013 most reactions go through many energy states. Each difference in energy state represents gain or loss of a photon. The highest gain is the activation energy. The sum of the losses is the heat of formation. The greatest loss is the bond strength.