Approaches used in theoretical physics

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(This paper is an extract of [11] listed in section Bibliography.)

Abstract

The intention of theoretical physics is to construct mathematical models so that experimental data can be predicted through calculation.

Models are based on approaches which define the nature of the models. The most common approaches used are of mythological, mathematical or physical nature.

Examples of mythological approaches are gluons, gravitons, dark matter, dark energy. Examples of mathematical approaches are the MOND theory for gravitation, special relativity and general relativity, the theory of quantum mechanics with the gauge principle. Examples of approaches of physical nature are the String, Vortex and Focal Point theories, the Emission theories, the theory of gravitation as the result of the reintegration of migrated electrons and positrons to their nuclei, the theory of Galilean relativity with the gamma factor.

1 Introduction.

To show the nature of each type of approach the resulting models are analysed emphasizing the idea behind it to explain experimental data.

Approaches can be classified as follows:

- mythological approaches
- mathematical approaches
- physical approaches
- combinations of the above mentioned approaches

1.1 Mythological approaches.

Mythological approaches postulate the existence of concepts, particles or entities with the characteristics required to explain experimental data that the prevailing theory cannot explain.

Mythological approaches are introduced every time an existing theoretical model cannot explain experimental data. It is the easiest way to solve the problem by introducing a new particle or a new entity to the existing model, defining particles with the required characteristics and integrate them to the existing model as good as possible, so that the result is a consistent theory. All remaining contradictions and deficiencies are camouflaged using denominations that sound well like wave-particle, duality, etc.

To explain how protons can coexist in atomic nuclei without repelling each other, the mythical particles called gluons were defined with the required forces to hold the protons together. That protons repel each other is experimentally detected for distances between protons that are much bigger than the radius of the protons, but not for distances tending to zero. The extrapolation of the Coulomb law to distances that tend to zero is the flaw of our SM which requires the introduction of mythical force carriers that hold protons together.

To explain how neutral bodies attract each other the mythical particles called gravitons were introduced and defined as the carriers of these forces. The mentality of the prevailing theory needs carriers for forces because particles and bodies are seen as isolated entities in space without the necessary means that allow the interaction between them, means (carriers) that are artificially added afterwards to explain interactions.

Dark matter was introduced because experimental data of the movement of galaxies don't match with the calculated data using exclusively bright matter. Dark matter is assumed to exist everywhere it is necessary to get the right calculated results. Nature is adapted to a mathematical equation to solve the problem instead of searching for the flaw in the theory.

Dark energy was introduced based on the same methodology of the approach of mythological entities. Dark matter is assumed to exist everywhere it is necessary to get the right calculated results to explain the expansion of galaxies.

1.2 Mathematical approaches.

Mathematical approaches modify the existing mathematically formulated laws of physics to match with experimental data, irrespective of the consequences the modifications have on other physical concepts. Mathematical approaches have no physical explanation to their solutions.

In the MOND approach proposed by Mordehai Milgrom, the Newton gravitation

law is mathematically modified to match with the experimental data of the motion of the galaxies. Why the movement of galaxies are governed by the additional introduced differential term to the Newton gravitation equation is not explained.

Special relativity is a mathematical approach where time is defined as different for relative moving coordinates. As relativity is a speed problem also length has to be defined as different for relative moving coordinates. With Special relativity, unphysical concepts are accepted only to match experimental with calculated data. The resulting contradiction are camouflaged calling them paradoxes.

General relativity introduces unphysical concepts like the bending of a theoretical space due to gravitational masses.

Quantum mechanics is heavily based on the gauge principle, which is a mathematical approach to get local symmetries.

1.3 Physical approaches.

Physical approaches are those that are based on proven physical laws and introduce new interpretations or images for existing particles. These theories represent particles as occupying an extension in space, contrary to those theories that represent particles as points in space. The most important theories are:

a) Vortex theory

b) String theory

c) Quantum mechanics

d) Focal Point theory

a) Vortex theory is based on the assumption of the existence of ether vortices that fill the whole space. The vortices are entities with an extension in space. The postulation of the existence of an ether classifies this theory also as based on mythological approaches.

b) String theory defines subatomic particles as composed of fundamental particles which are little strings that oscillate in different modes. The extension of the particles is given by the length of the strings. The characteristic length scale of strings is assumed to be in the order of the Planck length. The vibrational states of the strings define the characteristics of a particle. The idea of strings has its origin in the abstract mathematical Fourier decomposition of functions in sinusoidal oscillations, adding to each oscillation physical characteristics like momentum, energy, etc.

c) Quantum mechanics defines subatomic particles as wave packages. The movement of the wave package is defined by a differential equation of a wave function. The

idea of quantum mechanics is similar to string theory, to add to the abstract mathematical Fourier representation of a wave package physical characteristics like momentum, energy, etc. The uncertainty principle $\Delta p\ \Delta x \geq \hbar/2$ gives the extension of the particle. As quantum mechanics is heavily based on the gauge principle it can be also classified as a theory which is based on a mathematical approach.

d) Focal Point theory defines subatomic particles as focal points of rays of FPs that move from infinite to infinite. FPs store the energy of the particle (electron, positron) as rotations defining longitudinal and transversal angular momenta. Subatomic particles interact through the angular momenta of their FPs. The extension of a particle goes from infinite to infinite and fills the whole space. The model does not require the addition of carriers of forces and is not based on an abstract mathematical entity like wave which needs the addition of physical characteristics like momentum, energy, etc.

The theory based on Focal points is called Emission & Regeneration UFT and is presented shortly in section 2.

2 Emission & Regeneration UFT.

Our "Standard Model" describes a particle as a point-like entity with the energy concentrated on one point in space. The mechanism how forces between charged particles are generated is not explained. This limitation of our Standard Model results in the introduction of a series of artificial particles and constructions like Gluons, Gravitons, particle's wave, dark matter, dark energy, etc., to explain the mechanism of interaction between particles.

The proposed approach postulates that a subatomic particle (SP) is formed by rays of Fundamental Particles (FPs) that move through a focal point in space. The relativistic energy of the SP is stored by the FPs as rotations defining longitudinal and transversal angular momenta. The interaction between two SPs is now the result of the interactions of the angular momenta of their FPs.

The steps followed to describe mathematically the new model are:

1. Decomposition of the total relativistic energy of a subatomic particle in two terms.

2. Definition of a distribution function $d\kappa$ that assigns to each volume dV in space (FP) a differential energy dE for each term of the total relativistic energy of the subatomic particle.

3. Definition of a field magnitude $d\bar{H}$ for each angular moment J associated with the differential energy $dE = \nu\ J$.

4. Definition of interaction laws between $d\bar{H}$ fields of FPs in that way, that all forces between subatomic particles can be mathematically derived.

In what follows electrons and positrons are called "Basic Subatomic Particles" (BSPs).

The total relativistic energy of a BSP is

$$E_e = \sqrt{E_o^2 + E_p^2} = E_s + E_n \quad with \quad E_s = \frac{E_o^2}{\sqrt{E_o^2 \ + \ E_p^2}} \qquad E_n = \frac{E_p^2}{\sqrt{E_o^2 \ + \ E_p^2}} \tag{1}$$

The differential energies for each differential volume are:

$$dE_e = E_e \, d\kappa = \nu \ J_e \qquad dE_s = E_s \, d\kappa = \nu \ J_s \qquad dE_n = E_n \, d\kappa = \nu \ J_n \tag{2}$$

with $d\kappa$ the distribution function, ν the angular frequency and J the angular momenta.

$$d\kappa = \ \frac{1}{2} \ \frac{r_o}{r_r^2} \ dr \ \sin\varphi \ d\varphi \ \frac{d\gamma}{2\pi} \qquad\qquad dV = dr \ r \ d\varphi \ r \ \sin\varphi \ d\gamma \tag{3}$$

$d\kappa$ is inverse proportional to the square distance to the focal point and gives the fraction of the relativistic energy for the volume dV of the FP.

FPs leaving the focal point (emitted FPs) have only longitudinal angular momenta J_e and associated to it a longitudinal emitted field $d\bar{H}_e$ defined as

$$d\bar{H}_e = H_e \, d\kappa \ \bar{s}_e = \sqrt{\nu \ J_e \, d\kappa} \ \bar{s}_e \qquad with \qquad H_e^2 = E_e \tag{4}$$

FPs moving to the focal point (regenerating FPs) have longitudinal J_s and transversal J_n angular momenta and associated to them respectively a longitudinal emitted field $d\bar{H}_s$ defined as

$$d\bar{H}_s = H_s \, d\kappa \ \bar{s} = \sqrt{\nu \ J_s \, d\kappa} \ \bar{s} \qquad with \qquad H_s^2 = E_s \tag{5}$$

and a transversal emitted field $d\bar{H}_n$ defined as

$$d\bar{H}_n = H_n \, d\kappa \ \bar{n} = \sqrt{\nu \ J_n \, d\kappa} \ \bar{n} \qquad with \qquad H_n^2 = E_n \tag{6}$$

For the total field magnitude H_e it is $H_e^2 = H_s^2 \ + \ H_n^2$.

Fig. 1 shows at the origin of the Cartesian coordinates the focus of a BSP moving with speed $\bar{v}$. The vector $\bar{s}_e$ is an unit vector in the moving direction of the emitted fundamental particle (FP). The vector $\bar{s}$ is an unit vector in the moving direction of the regenerating FP. The vector $\bar{n}$ is an unit vector transversal to the moving direction of

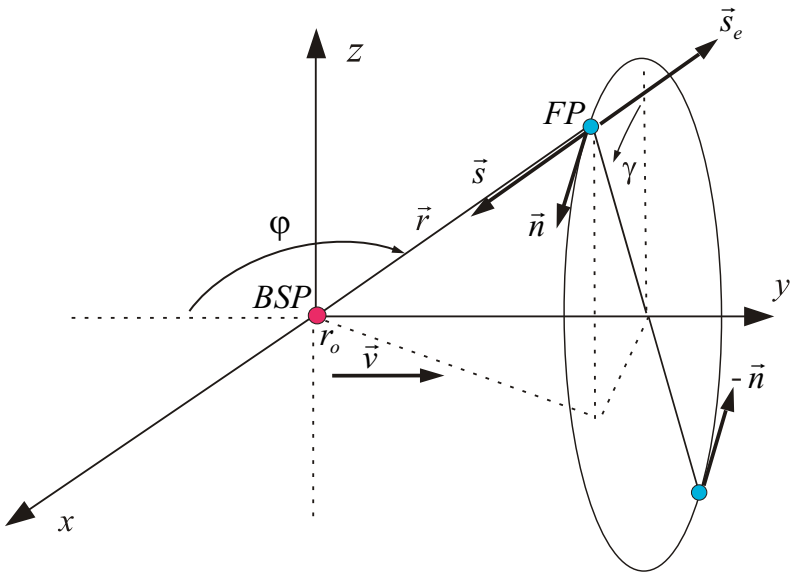

Figure 1: Unit vector $\bar{s}_e$ for an emitted FP and unit vectors $\bar{s}$ and $\bar{n}$ for a regenerating FP of a BSP moving with $v \neq c$

the regenerating FP and oriented according the right screw rule relative to the velocity $\bar{v}$ of the BSP.

The differential linear momentum dp of a moving BSP is generated out of pairs of opposed transversal fields $d\bar{H}_n$ at the regenerating FPs of the BSP. Opposed pairs of transversal fields $d\bar{H}_n$ are generated because of the axial symmetry relative to the velocity $\bar{v}$ of the BSP as shown in Fig. 1.

Conclusion: Basic subatomic particles (BSPs) are structured particles with longitudinal and transversal angular momenta. The sign of the angular momenta of emitted FPs define the sign of the BSP (electron or positron). The transversal field $d\bar{H}_n$ gives the kinetic linear moment.

Interaction laws between FPs of two BSPs are defined as products between their $d\bar{H}$ fields.

- **Coulomb law**: The close path integration of the cross product between longitudinal $d\bar{H}_s$ fields gives the Coulomb equation.
- **Ampere law**: The close path integration of the cross product between transversal $d\bar{H}_n$ fields gives the Lorentz, Ampere and Bragg equations.
- **Induction law**: The close path integration of the product between the transversal field $d\bar{H}_n$ and the absolute value of the longitudinal $d\bar{H}_s$ field of a static BSP gives the Maxwell equations and the gravitation equations.

The fundamental equation to calculate the differential force between two BSPs is

$$dF = \frac{dp}{\Delta t} = \frac{1}{c\Delta t}\, dE_p = \frac{1}{c\Delta t}\, |d\bar{H}_1 \times d\bar{H}_2| \tag{7}$$

The model explains the generation and allows the calculations of all four forces (electro-magnetic, strong, weak and gravitation) out of one field, namely the dH field which unifies them all.

If we compare it with the SM, we have that the classical field theory defines a different field for each force, while quantum mechanics needs four different gauge theories, one for each force, namely QED, QCD, the Electroweak interaction and Gauge/Gravity Duality. These are still four different fields, each for one force and cannot therefore be seen as a unification theory.

Note: The complete deduction of the Emission & Regeneration UFT is available at www.odomann.com [11].

3 Interpretation of Data in a theoretical frame.

A theory like our Standard Model was improved over time to match with experimental data introducing fictitious entities (particle-wave, gluons, gravitons, dark matter, dark energy, time dilation, length contraction, Higgs particle, Quarks, Axions, etc.) and helpmates (duality principle, equivalent principle, uncertainty principle, violation of energy conservation, etc.) taking care that the theory is as consistent and free of contradictions as possible. The concept is shown in Fig. 2.

These improvements were integrated to the existing model trying to modify it as less as possible what led, with the time, to a model that resembles a monumental patchwork. To return to a mathematical consistent theory without paradoxes (contradictions) a completely new approach is required that starts from a different picture of a particle. "E & R" UFT is such an approach representing particles as focal points in space of rays of FPs. This representation contains from the start the possibility to describe interactions between particles through their FPs, interactions that the SM with its particle representation attempts to explain with fictitious carriers of forces.

Fig. 2 is a flaw diagram where the main steps of the integration of fictitious entities to the prevailing SM are shown. All experiments where the previously defined fictitious entities are indirectly detected (point 7. of Fig. 2) are not a confirmation of the existence of the fictitious entities (point 8. of Fig. 2), they are simply the confirmation that the model was made consistent with the fictitious entities (point 3. of Fig. 2).

If we apply the flaw diagram for the case of time dilation as the fictitious entity, we have first the experimental data that light speed is measured equal in all relative moving reference systems independent of the relative speeds of the systems.

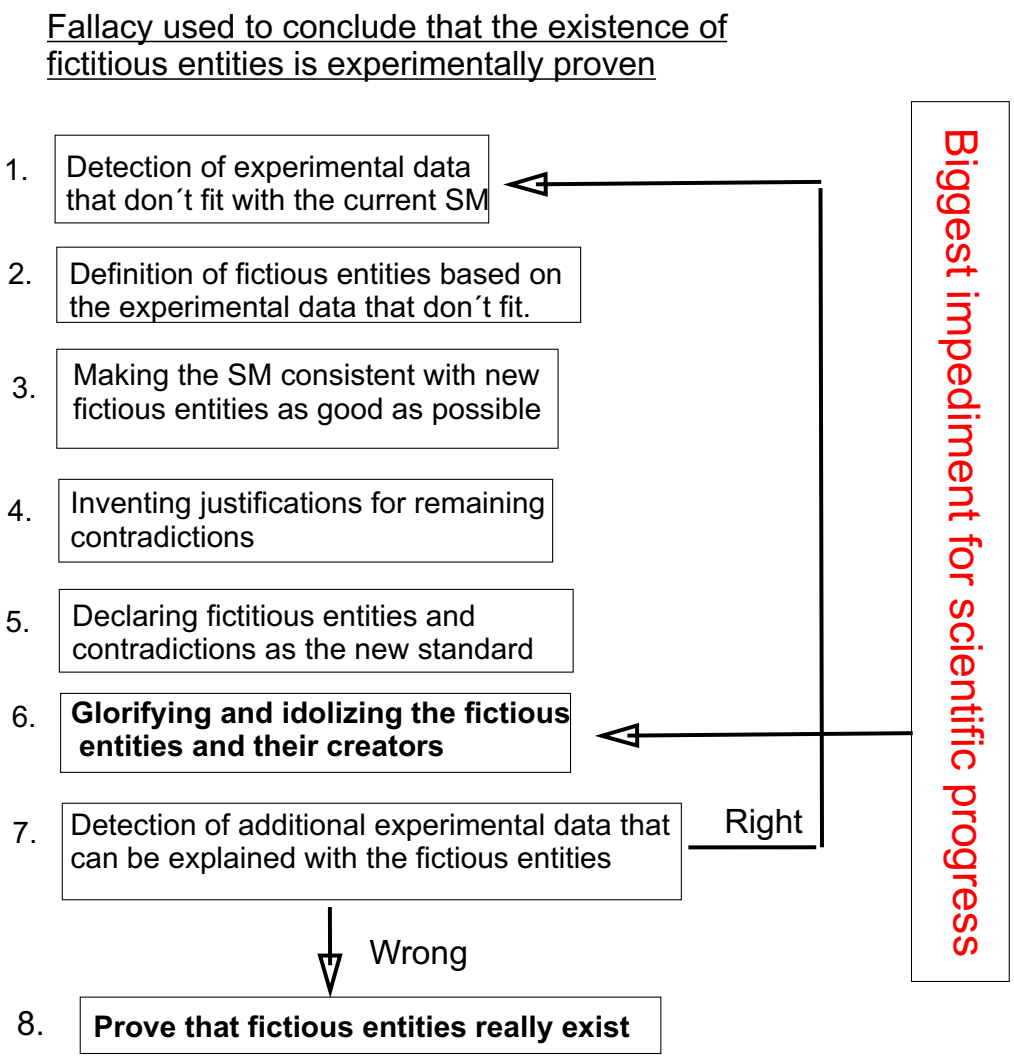

Figure 2: Fallacy used to conclude that fictious entities really exist

Then the model is made consistent introducing length contraction and defining that emission theories are wrong because they were not compatible with the new model which is called special relativity. Then remaining contradictions are called paradoxes to camouflage that there are contradictions. Then it is found that the higher number of muons at sea level can be explained with time dilation and immediately the conclusion is drawn, that this is the experimental prove that time dilation really exists, and not that it is simply the result of the previously constructed consistency of the model. To explain the higher number of muons with time dilation only avoids that scientists search for the real physical origin of the increase of the life time of moving muons.

4 Elementary particles.

The elementary particles of the SM are quarks, leptons, gauge and scalar bosons. It is a mixture of stable and unstable physical particles like the leptons and photons, of mythological particles like the quarks and gluons and of particles which are the product of mathematical approaches like the gauge and scalar bosons. Elementary particles are defined as the basic components of all other particles and it is noticeable that in the SM very energetic unstable particles that decay into other particles are seen as elementary particles.

In the "E & R" UFT elementary particles are only the stable particles electron, positron and neutrino. All other particles, stable or unstable are composed of these stable particles. The photon is a sequence of neutrinos with opposed angular momenta. The proton and the neutron are composed of electrons and positrons where the binding energy is composed of the energy of photons and neutrinos. The difference between the SM and the "E & R" UFT is that the latter is based on a physical approach where the total energy of a particle is stored in angular momenta of FPs that move from infinite to infinite through a focal point in space, focal point where the SM places its point-like particle.

All the mythological quarks (up, down, charm, top, strange, bottom), z and w bosons, gluons and Higgs particles are unified by the physical interactions of the longitudinal and transversal angular momenta of the FPs, momenta where the energy of the subatomic particles is stored.

5 Characteristics of a good theory.

The primordial objective of a physical theory or a scientific model is to allow calculations that match with experimental data obtained with measurements. A second objective is to allow theoretical predictions that still must be corroborated through

experimental data.

To decide in physics between two theoretical models where underdetermination exists, prevalence should be given to the model that

- describes mathematically the biggest number of physical interactions based on the fewest postulates.
- has mathematical descriptions that give calculated data that best match experimental data.
- needs the less number of fictitious entities (gluons, gravitons, dark matter, dark energy, time dilation, length contraction, etc.)
- needs the less number of helpmates (particle-wave duality, equivalent principle, violation of energy conservation (Faynman), etc.)
- is consistent with the less number of paradoxes and contradictions.
- has the biggest potential to predict new interactions and particles.

6 Conclusion.

Our SM starts from physical laws that give the relations between forces and static charges, forces and moving charges, forces and neutral masses, strong forces in atomic nuclei and weak forces responsible for atomic decay. For each case a special field is defined resulting the electric, magnetic, gravitation, strong and weak fields. To explain the interactions between subatomic particles mythological carriers are introduced.

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energy is composed of the energy of photons and neutrinos. Quarks are only unstable components of protons and neutrons.

If we compare it with the SM, we have that the classical field theory defines a different field for each force, while quantum mechanics needs four different gauge theories, one for each force, namely QED, QCD, the Electroweak interaction and Gauge/Gravity Duality. These are still four different fields, each for one force and cannot therefore be seen as a unification theory.

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Note: The present approach is based on the concept that fundamental particles are constantly emitted by electrons and positrons and constantly regenerate them. As the concept is not found in mainstream theory, no existing paper can be used as reference.

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