An Integrated Vision in Fundamental Physics

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Abstract. Physics explains almost all properties and behaviours of everything in the universe; starting from the smallest size, microscopic, to the largest, macrocosms. As a natural science, Physics tries to answer any question about ‘what’, ‘why’ and ‘how’ from all of the properties, the behaviours, the interaction and the event of everything. The behaviour and the effect of influencing one to another, giving one to the other, making all things formed and also destruction or annihilation. In another side, Physics show the role as a communicating tool between human and everything in the universe. Physics has a role as a language among men and other things or how human should have to interacting with all of things in the universe. Physics gives advices how to exploit the inhabitants of the nature in the best way possible. It is known, in the conventional way, that basic physics approached the large topics such as: mechanic, electricity, and magnetic as separate rules. The problems on mechanic, electricity, and magnetic was comprehended as a separate subject event in one object. Moreover, the formulations in each topic are seen different between one and other. A new vision has been proposed as an integrated approach in fundamental of Physics. It explained physics simpler, more adaptive in any fields and domain of sciences. The integration that was shown is not only break down the boundaries of difference formulation of mechanic, electricity and magnetic that became one concept and one formulation, but also have to add a new concept completed what we knew before. Thus, the process of the Physics study we have nowadays could be reviewed, or restructured.

1. Introduction
Rules are not only a series of judgement to measure right or wrong, correct or false for everything. They also mark and guide our road to the right track or false toward our need. Commonly known, people made commitments for many aspect of lives. They formulated as a justice for better life and have to be obeyed by everybody. Many subjectivity and relativity has occurred in most decision, that sometimes revealed conflict among them.

The universe, logically as a unity, gave the unique rule that was obeyed by everything. The nature gave the rules , that namely the sciences for mankind, both natural and social sciences. The interpretation by science was dynamics , depend on the dimension and the depth of human being. All of thing , starting from very small to macrocosmos models [1]. The sciences were developed, changed, and accelerated by lot of inventions. The sustainability in developing sciences have to be maintained for the continuing of the civilization. Scientists always maintain and revise the sciences when a conflict is found. Starting from initial condition and boundary condition of validity and continuing developed as dynamic process from one equilibrium to the next equilibrium.

Physics is a good model of basic science, developed sciences from statistics method to analitical rules. Physics consist many fields that has been revised and restructurised from conventional way to the modern ones, such as Thermodynamic, Statistical Physic, Relativity and Quantum Physics [2 – 5,6]. Everything has a roles , in behaviors, how to contact and interacts among them [7-9].
An integrated Physics rules could be break the wall that separated each substance, such as Mechanic, electric, and magnetic. Firstly, let we consider of momentum revealed a field, such as a magnetic behaviour [10]. Secondly, everything could be looked at had pair.

As a whole, as a basic principle, we could formulate the character and process in the universe in six steps as below [11]:

i. Everything is known by their own characters and exist in a pair

ii. The character should be a scattered field of influence in the space

iii. The influence should be continued by an interaction among another

iv. The effects of interaction have developed a different new condition, as a dynamic situation.

v. The new situations probably create a new member but also can destroy the existing one or annihilate the member.

vi. Every situation is constructed by an equilibrium boundary condition.

This equilibrium could be considered as sustain developed from one condition to the other condition. The existing regulation in the universe could be considered as “The Golden Rules” that were obeyed by everything. They took place in everything, at any time and everywhere, as a property and behavior on interaction among them. Basically, the existing, identity, properties, process and progress followed the rules. The power of the rules absolutely forced everything followed the sciences. According to this rule we should be implementing in Physics as the Basic rules of science.

2. The Basic Rule of Physics

The first step of the Basic rule in physics was interpreted as the existing of magnitude. Magnitude was a symbol of character, property or behaviour of everything. Each kind of magnitude builds a unique dimension that has levels inside. Each level in all of the dimension area was stated by a value. The accuracy and objectivity of a level generally stated in a decimal value. Beside that, everything is existed in pairs and mostly a couple as an absolute provision. Pairs in a basic comprehension are two or more creatures that are not the same. Pairs are built by two or more entities different one another, but also they have similarities or at least equivalence. Each element of the pairs needs one another, not only who have less one needs the one who have more. Thus, in fact those who have more need the ones who have less.

Pair is not only a form, but could also a process of giving and receiving from each other. Pair is not only having a larger size from each component, but also having more properties, having broader function and role than each of previous components. The Extermination process is the opposite from the formation process, meaning that each of the components is no longer able to share with one another.

In accordance to the meaning of magnitude, all pairs were created from the basic element, continued the sustained forming the universe. How is the physics interpreting the meaning of the property and pairs? What are the forms of basic elements that are pairs from the Physics point of view?

The most basic properties in the universe has interpreted by Physics are space and time that stated by movement. The formation of moving pairs is straight forward (translation) that was paired with round move (rotation). It is impossible to create a body when there was only a translation, and vice versa, nothing can be formed (collapse) when there was only a rotation. Besides the property of space and time, the other properties that has the form of pair is matter (mass) and electricity (charged); meaning that property of mass was paired with property of electrical charged.

Something new will be formed through a process that was built by pairs. The basic study of Fundamental Physics starting from kinds of particles, or groups of properties, included emphasized on the formation of the mind structure. This Physics mind structure was built by the existence of a consistent unity from the basic properties. Later on, the basic property gradually will form a new bigger group, as physics studies have known nowadays, all of the properties or magnitude, behaviour, phenomena, or events grouping into field mechanic, electricity, and magnetism. Through these methods, it is possible that all of the study for properties, behaviour, phenomena, or events, presented in an integrated way.

3. The order of integrated Physics

Space and time dimension toward every property (magnitude) formed behaviour of movement that has an extreme situation as a static condition and kinetic condition. Each property is a potential to scatter the influence toward the whole space, in Physics, it is called the field. So that we know gravitational field as the influence of mass, momentum field as the influence of momentum, electrical field as the influence of electricity and magnetic field as the influence of magnetism. As described in part 2, all things are created
in pairs. This concept has not yet filled by the Physics concept we had before. As a complement, Suparno proposed a momentum as a main magnitude in kinetic form. In a static condition, mass magnitude paired with the electrical magnitude (charge); then in a kinetic condition, magnetic magnitude should also have to a pair that is a momentum magnitude which also spread a field. A complete basic concept on Physics is summarized in the Table 1.

| Properties | Static Magnitude | Static Field | Kinetic Magnitude | Kinetic Field |
|------------|-----------------|--------------|-------------------|--------------|
| 1 Space    | Straight distance | Cartesian Path | Translation       |
|            | Angular Angle    | Polar system | Rotation          |
| 2 Substance| Matter Mass \((m)\) | Gravity \((g)\) | Momentum \((p = mv)\) |
|            | Electric Charge\((q)\) | Electric \((E)\) | Magnetization \((\mu = qv)\) |

4. Influences in Space
The term of influences in physics was declared as fields. The Formulation of fields stated by:

\[
\Psi = \kappa \frac{\xi}{r^2} \hat{r}
\]  

(1)

With \(\xi\) is a proper magnitude, \(r\) is a distance, and \(\kappa\) is a constant on each magnitude. They are stated as:

a. universal constant for the gravitational field,
\[ G = 6.67 \times 10^{-11} \text{[N.m}^2/\text{kg}^2]\],

b. Coulomb’s constant for electrical field
\[ k = 9.0 \times 10^9 \text{[N.m}^2/\text{C}^2]\],

c. Suparno’s constant for the momentum field
\[ \alpha = 6.07 \times 10^{-16} \text{[N.s}^2/\text{kg}^2]\],

d. constant for the magnetic field
\[ \gamma = 10^{-7} \text{[N.s}^2/\text{C}^2]\].

Thus, we know four kinds of fields with a same formulation:

i. Gravitational field, written as :
\[
\vec{g} = G \frac{m}{r} \hat{r}
\]

ii. Electrical field written as :
\[
\vec{E} = k \frac{q}{r^2} \hat{r}
\]

iii. Momentum field written as :
\[
\vec{S} = \alpha \frac{mv}{r} \times \hat{r}
\]

iv. Magnetic field written as :
\[
\vec{B} = \gamma \frac{qv}{r} \times \hat{r}
\]

With \(\hat{r}\) is the unit vector in the radial direction. As shown above there are indication mathematical symbol that for kinetic condition (for momentum and magnetic) promote rotation phenomenon, that formulated by mathematical operator as cross product.

5. Flux
Every kind of the fields has magnitude that stated by flux with a formulation: \(\Phi = \Psi A\). The total flux around that depends on physical magnitude exist in the center. Relation between flux and the appropriate magnitude is shown by the formulation:

\[
\int \Psi \, dA = \delta \sum \xi
\]  

(2)

With \(A\) is the width of the area that is passed by the field, and \(\delta\) is a constant that shown the role of the media to the stated field. A reason of space condition that related straight and rotation process, then
mathematical formulation of space integral of equation (2) (in case of Gauss Law) become line integral in case for momentum and magnetism as describe by Ampere law.

This concept creates a magnitude that characterized behaviour of media for the field, those are:

i. \( \delta \) as a magnitude that shown a property of space toward the gravitational field. The value for a room with air is:

\[
\delta_o = 1.19 \times 10^9 \text{ [kg}/\text{N.m}^2]\]

ii. \( \varepsilon \) is dielectric that is a magnitude that stating the property of space toward the electrical field. The value for a room with air or vacuum is \( \varepsilon_o = 8.85 \times 10^{-12} \text{ [C}^2\text{/N.m}^2\text{]} \)

iii. \( \eta \) is a magnitude that stating the property of space toward the momentum field. The value for the room with air is:

\[
\eta_o = 7.63 \times 10^{-15} \text{ [N.s}^2\text{/kg}^2\text{]} \]

iv. \( \mu \) is called magnetic permeability that is a magnitude that stating the property of space toward the magnetic field. The value for a room with air or vacuum is \( \mu_o = 1.26 \times 10^{-6} \text{ [N.s}^2\text{/C}^2\text{]} \)

6. Interaction as Force

By the existence of field in the space, there is an interaction between magnitudes started by the one with the same kind. In Physics, the magnitude that stating this interaction is called forces \( (F) \). The formulation of Force is stated by:

\[
\vec{F} = \gamma \xi \vec{\Psi} \quad (3)
\]

The \( \gamma \) constant known as a Lorentz transformation formula , \( \gamma = \frac{1}{\sqrt{1-v^2}} \). As the comprehension in the equation 1, we know four forces such as:

i. Gravitational force \( (F = m.g) \),

ii. Electric force \( (F = q.E) \),

iii. Momentum force \( (F = mv \times S) \),

iv. Magnetic force \( (F = qv \times B) \).

Therefore, Force is a magnitude that builds equivalence between main magnitudes stated in a same dimension, Newton. With force, it is possible to have interaction to all kinds of magnitudes. The force magnitude can cause the change in the system or the body. The kind of change that happens in a system or a body shown as: change of condition, change of motion, and change of form. These changes will create new magnitude, generally stated as Work – Energy, and or momentum, and or chemical reaction, etc. The nature of existence is built in the equilibrium with boundary condition one and another. In other case that was failed and destruction or annihilation occurred.

The interaction between proper magnitudes happen in a space with a determine distance. The process of the interaction propagation inside a space was known as wave. From two kinds of the main magnitudes, that known as mass and electricity, each will create, in order, a mechanical wave and electro-magnetic wave.

The wave equation was only known in the form of the Maxwell equation. This equation tool just stated the behaviour of the electro-magnetic wave. With the new concept, the Maxwell equation become complete, were paired with the Suparno equation for mechanical wave, as stated in the Table 2.

| Tabel 2 equation for mechanical wave | Suparno Equation |
|-------------------------------|------------------|
| \( \nabla \cdot E = \frac{1}{\varepsilon} \rho \) | \( \nabla \cdot g = \frac{1}{\delta_o} \lambda \) |
| \( \nabla \cdot B = 0 \) | \( \nabla \cdot S = 0 \) |
| \( \nabla \times E = -\frac{\partial B}{\partial t} \) | \( \nabla \times g = -\frac{\partial S}{\partial t} \) |
| \( \nabla \times B = \mu_o J + \mu_o \varepsilon_o \frac{\partial E}{\partial t} \) | \( \nabla \times S = \eta_o D + \delta_o \eta_o \frac{\partial g}{\partial t} \) |

The mechanical wave propagates in the air with speed of sound, and the electro magnet propagates in space with the speed of light, just as stated by the constants below:
\[ v = \frac{1}{\sqrt{g_{\eta g_0}}} = 331.5 \text{ [m/s]}, \text{ and} \]
\[ c = \frac{1}{\sqrt{\mu_0 E_0}} = 3 \times 10^8 \text{ [m/s]} \]

7. Conclusion
The Golden Rules developed Physics by introducing that the momentum field has broad relation in all of their topics. Although physics have been restructured in the new integrated concept, the integration is due to accommodate a concept of pair or couple. Improving this concept will break out the wall that separate the topics of mechanics, electricity, magnetism and wave propagation. This concept has challenges to improve the other domain of physics, such as Statistical mechanics, Quantum mechanics, special relativity and the others.

Philosophically of the golden rules was not only valid for physics formulation but also so reached all of the aspects of science and cultures of mankind. Physics can be a guide to restructure frame of mind, such as in the communication sciences, economical sciences, psychology, political sciences, etc [12,13]. It had been proved by implementation to the rule of economical policy and produces the Nobel laureate awards in this field [14,15].

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