I. T H E O R Y

I.1 Preliminaries

I.1.1 The Universe

Foundations :

Definitions :

1) ***The Universe*** consists of everything that exists independently of human consciousness.
2) ***The natural order*** is the set of rules that governs the organisation of the Universe.
3) ***Absolute vacuum*** is the absence of any form of energy.

Comment :

A vacuum, in the usual sense, is a place that is devoid of matter and of a strong field. As we understand it, a vacuum is the region of space that has minimal intensity (to be determined) of energy.

Postulates :

(P1) The human faculty of abstraction is limited to combinations of tangible objects.

Corollary :

The elementary mathematical concepts are, in essence, physical.

(P2) The direction of abstraction is from the simple to the complex. Simplicity is natural, complexity needs to be justified.

Statements :

(E1) The subject of physics is the study of the observable and measurable structure of the universe.

(E2) Infinity is an indeterminate mathematical term ($a \pm \infty = \infty$, $a \times \infty = \infty$ for $a \neq 0$). It is consequently excluded from physics.

Postulates :

(P3) The universe is unique, continuous (without an absolute vacuum), limitless (boundless), finite and ordered. Its order is noumenal.

(P4) Man – body and mind – constitutes an infinitesimal part of the universe. He is consequently devoid of faculties of an absolute or comprehensive nature.

Comment :

Physics is the science of perception, both rational and empirical. No theoretician, regardless of the opportunity presented by his ideas, can impose anything (a rule, behaviour or property) upon Nature. Nature is totally independent of our world of thought. A credible physicist always seeks to understand the natural order in terms of logic.

Primary natures :

Postulate :

(P5) The universe is the combination of a finite, supposedly unknown, number of natures known as "primary", that are noumenal, incomparable, independent and inseparable. Each consists of an equally unknown number of independent but comparable components.

Currently, only three natures have been revealed :

- **Energy** consisting of a single component ;
- **Triple visual space** consisting of : the horizon, altitude and depth ;
- **The** single **time** component.

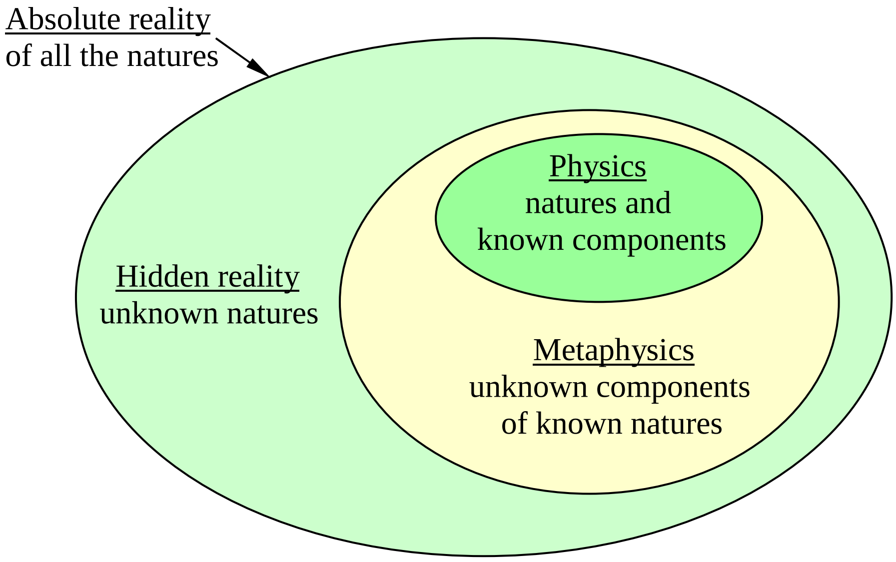
Areas of knowledge :

Four areas of knowledge have been defined :

- **Absolute reality** involving the whole universe, its natures and their constituents ;

- **Hidden reality** concerning unknown natures ;
- **Metaphysics** concerning the unknown components of known natures ;
- **Physics** consisting of the known components of known natures.

These areas are nested one within the other, in the following manner :



(Fig. I.1)

Comment :

Human knowledge belongs in the two inner rings (physics and metaphysics).

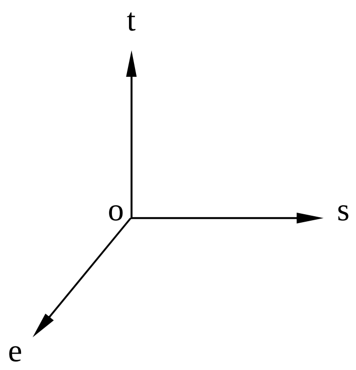
Thought :

The magnificent architecture of the universe, life and human intellect could not have occurred accidentally or as the result of a chaotic process. Another nature, currently unintelligible, manifests itself through this strange signature. This theory in no way supports theological theory or its metaphysical correlations.

I.1.2 Universal space

Structure :

By assigning a dimension to each of the primary natures, three-dimensional universal affined space (without the concept of distance) is evoked, illustrated by :



(Fig. I.2)

In this space, the measurements of the coordinates are not comparable and the geometrical structures are inalienable. By substituting s for its habitual components (x, y, z), one attains five-dimensional space (e; x, y, z; t), the subject of this account.

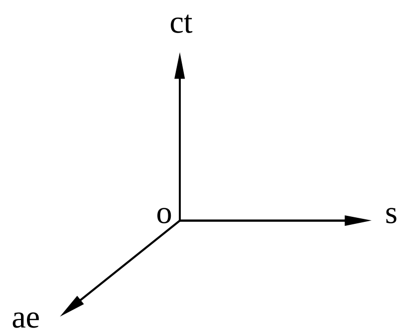
To convert affine space (e; s; t) into metric space (s, s, s) consisting of geometry and distance, the abstract unification of natures becomes indispensable. The appropriate nature for unification is visual space. Time and energy are subsequently expressed in terms of length.

The conversion formulae are the direct result of the ratios between the indivisible measurements of natures : Δt, Δs and Δe, known as a tribute as "PLANCK's natural units". The first two of these units are known literally whereas the third remains to be revealed (see § I.2.2).

The corresponding ratios and formulae are written :

$$\frac{\Delta s}{\Delta e} \triangleq a \quad ; \quad \frac{\Delta s}{\Delta t} = c \quad \Rightarrow \quad s = ae \quad ; \quad s = ct \qquad \text{(I.1)}$$

The triplet of (Fig. I.2) thus becomes :



(Fig. I.3)

It should be remembered that this (metric) space is only a conventional image of original space. In any case, it should be stated that the dimensions (or the variables of a function transposed in space) of any space must be absolutely independent of each other.

Geometry :

The first elements of so-called "classical" Euclidian geometry are the point and the straight line. A succession of points traces a line, a series of lines traces an area and so on. As to the shape, the curve is defined by variation in the straightness[1] and divided into two classes :

- a constant (circular) curve described by a point and a straight line ;
- a variable curve (regular or irregular) consisting of several points and straight lines.

Furthermore, it is accepted without need for a demonstration that every curve consists of a finite number of connected arcs.

Properties :

1) Curve geometry cannot accept straight lines. It is only tangible on the basis of an order of straight line geometry that is higher than its own.
2) Straight line geometry accepts any curve of a lesser order than its own.

In this context, and by virtue of the postulate (**P3**), universal space can only be curved and closed (limitless and finite). Its curve, according to the first of the above properties, is imperceptible. Furthermore, the principles of independence (**P5**) and simplicity (**P2**) imply the homogeneity of primary natures and the uniformity of their growth. In mathematical terms, the geodesics (see A.4.4) of natures are circular (perfectly symmetrical). This fundamental property of spatial geometry is more easily understood through the following example :

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(1) The corollary of the postulate (**P1**) suggests several definitions of the straight line. For example, the straight line is a luminous line crossing an empty region or the radial support of an electric field in an elementary charge placed in an empty environment, etc …

Let there be a closed surface (a two-dimensional space) containing a physical state that is initially freely distributed such as heat or an electrical charge. The only geometry capable of satisfying the requirement for homogeneity of this distribution is the constant curve.

Furthermore, the correspondence (unity and convertibility) between natures imposes the equality of their geodesic circles. This produces the sphericity of universal space as transcribed into the above statement.

Statement :

(E3) The geometrical properties of universal space are identical in every respect.

Comment :

1) Universal space is empty, any physical state or action being merely a geometric structure combining three projections relative to the primary natures, a *spatial* projection analogous to the "container", an *energetic* projection similar to the "content" and a *temporal* projection recalling the age.
2) On a human scale of observation and measurement, universal space is Euclidian.

I.2 Quantity and measurements

I.2.1 Base quantities

"Physical quantity" is the term applied to any object that is quantifiable in nature. These quantities are divided into two categories :

- ***base quantities*** that are irreducible and defined in themselves ;
- ***derivative quantities*** are composed of base quantities and defined by their initial formulae.

The constants produce a particular case : they are the ultimate values of ratios or experimental data.

Dimensions and modes :

Each fundamental quantity is assigned a capital letter known as the "dimension". The dimensional attribute of a derivative quantity indicates its physical composition. The constants resulting from the experiment are given weighted dimensions.

For reasons of consistency and subtlety, it is a good idea to introduce a new criterion for quantities. The "mode", denoted M^n, is the extensive ($n > 0$), intensive ($n < 0$) or neutral ($n = 0$) nature[(1)] of a quantity; n being the sum of the powers of the dimensional attribute (see A.1.2). Note that a quantitative quantity (with a non-selective dimension) is by definition extensive, the primary natures thereof constituting the example.

Statement :

(E4) The way in which the laws of physics are formulated must satisfy modal equality minus the constants.

(1) When this terminology is applied to thermodynamics, it changes its meaning.

Current quantities :

"Non-relativist" physics contains seven base quantities (see A.1.1) :

- three of mechanical origin : length (s), mass (m) and time (t), dimensioned [S], [M] and [T] respectively ;
- four of them originating from a particular branch[(1)] of physics : the electrical charge (q dimensioned as Q) for electricity, temperature (θ dim. Θ) for heat, etc ...

Quantities proposed : (see A.1.2)

The central idea of this account is the unification of primary natures and fundamental quantities, in other words, the merger of spatial dimensions and of measurement. This process leads to the harmonisation of the vital concepts of physics and consequently reduces the number of base quantities to three : encoded (e) and dimensioned [E] energy, length and time, and this applies to all of the branches together.

This idea emerged as follows :

Energy being the quantity shared by all areas of physics, it becomes a suitable substitute for the specific base quantity in each discipline. In order to use it in this way, the quantities must be expressed as a function of (e; s; t) in the form of equality, identity or equivalence. The quantities mentioned in this account are mass, electrical charge and temperature. Note in passing that temperature, like all other intensive quantities[(2)], cannot be fundamental.

The following stage consists in re-dimensioning all of the derivative quantities in terms of EST. For this purpose, the following Statement has been postulated.

Statement :

(E5) Two sizes having the same action are measured in the same way.

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(1) Each branch is distinguished by its own fundamental quantity.
(2) This type of size is derivative by definition.

Mass : m

Mass is defined by EINSTEIN's Theory of Relativity as :

$$E = mc^2 \Rightarrow [m] = ES^{-2}\,T^2 \qquad \text{(I.2)}$$

Electrical charge : q

Definition formula :

To quote NEWTON's law : $F_N = \dfrac{m_1\,m_2}{4\pi\,\gamma_o\,s^2}$ (I.3a)

and that of COULOMB : $F_C = \dfrac{q_1\,q_2}{4\pi\,\varepsilon_o\,s^2}$ (I.3b)

so let us consider two identical masses (m, m), separated by distance (s) and having two equal electrical charges (q, q). What is the ratio in which $\frac{m}{q}$, the forces F_N and F_C, cancel each other out ?

From the laws (I.3), the following can be extrapolated :

$$Q \equiv \sqrt{\frac{\varepsilon_o}{\gamma_o}}\ m \qquad \text{(I.4a)}$$

Since : $\dfrac{1}{4\pi\,\gamma_o} \simeq 6.67256 \times 10^{-11}$ [m³/kg s²] and

$\dfrac{1}{4\pi\,\varepsilon_o} \simeq 8.987 \times 10^{9}$ [m³ kg/C² s²], resulting in :

$$q \equiv 8.610425 \times 10^{-11}\ m \qquad \text{(I.4b)}$$

Dimension :

Dimensional equality and the perfect analogy (term to term) between the laws (I.3) implies : $[m] = [q]$ and $[\gamma_0] = [\varepsilon_0]$.

Corollary :

The formulae (I.2) and (I.4b) link electrical charge to energy through :

$$E = \zeta q \ ; \ [\zeta] = S^2\,T^{-2} \ ; \ \zeta \simeq 1.0452446 \times 10^{27}\ \text{[j/C]} \qquad \text{(I.5)}$$

making it possible to deduce therefrom that :

- the indivisible[1] electrical charge in nature is :

$$\Delta q \simeq 1.321 \times 10^{-50} \text{ [C] ;}$$

- the electrostatic energy of the electron amounts to :

$$1.6746796 \times 10^{8} \text{ [j] .}$$

It is instructive to note that the electrical charge is the most concentrated form of energy known hitherto.

Temperature : θ

The analogy between PLANCK's formula :

$$E_P = h\, f = \hbar\omega \qquad \text{(I.6a)}$$

and that of BOLTZMANN : $E_B = k\,\theta$ (I.6b)

induces : [k] = [h] = ET and [θ] = [f] = T^{-1}. This last equality also results from WIEN's law : $f_m = 1.034552 \times 10^{11}\, \theta$.

I.2.2 Units of measurement

The literature covers two series of units :

- a conventional series adapted for human usage ;
- another so-called "natural" series consisting of PLANCK's measurements.

Conventional units :

The majority of authors use the International System of Units that covers the seven fundamental quantities quoted in (A.1.1). Our model (see A.1.2), which refers to new fundamental quantities, comprises three units : [jms] for joules, metres and seconds. Consequently, the unitary equivalents of the old fundamental quantities are printed as :

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1) This charge comes from the unit of heat ($\mathbb{k}$), see the next paragraph. Likewise, the elementary mass can be deducted : $\Delta m \simeq 1.5341 \times 10^{-40}$ [kg] .

$1\ kg \equiv 9 \times 10^{16}$ [js²/m²] for mass, $1\ C \equiv 1.04256 \times 10^{27}$ [js²/m²] for electrical charge and $1\ °K \equiv 2.08365 \times 10^{10}$ [1/s] for temperature[(1)].

Proposition :

Starting from an intrinsically defined "second", it is advisable to have a "metre" that corresponds very precisely to $c = 3 \times 10^{8}$ [m/s]. This having been done, it can continue to be stated with certainty that :

$$\varepsilon_0 = \frac{10^{-9}}{36\pi} \text{ [F/m] for a value of } \mu_0 \triangleq 4\pi \times 10^{-7} \text{ [H/m] already agreed.}$$

This measurement appears to be simultaneously convenient, accurate and consistent.

Natural units

These are the measurements Δe, Δs and Δt defined as follows :

$$\Delta t \triangleq \sqrt{\frac{\hbar G}{c^5}} \simeq 5.39 \times 10^{-44} \text{ [s] ; } \Delta s \triangleq c\Delta t \simeq 1.616 \times 10^{-35} \text{ [m]} \quad \text{(I.7a)}$$

As for Δe, which is currently unknown, it is perceived as follows :

A process is known as "periodical" if it is repeated at regular intervals in the direction of its development. Such a process must consist of at least two successive periods and is defined over a technically whole period known as the "principal period". The frequency (f) thus designates the number of periods contained in the unit of measurement (a second, in the case of time).

In this context, PLANCK’s formula (I.6a) would appear to show the following :

1) The energy of a period corresponds to :

$$f = 1 \text{ [Hz]} \ \Rightarrow \ E(1) = |h| \text{ [j]}$$

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(1) The round figures of $1\ C \simeq 10^{27}$ [js²/m²] and $1\ °K \simeq 2 \times 10^{10}$ [1/s] are tolerable.

2) This energy is independent of the frequency and is indivisible and thus unitary :

$$\Delta e \simeq 6.626 \times 10^{-34} \text{ [j]} \qquad \text{(I.7b)}$$

3) The "quantum" of an electromagnetic wave (or any wave that propagates itself at the speed of light) constitutes the sum of the energy of f periods; f obviously represents a whole number.

In order to release f from the constraint of being a whole number and rendering PLANCK's formula (I.6a) more consistent, the following equation is proposed :

$$\mathscr{I}_P = \mathbb{h}\, f \text{ [j/s]} \quad ; \quad \mathbb{h} \triangleq \Delta e \;; \qquad \text{(I.8a)}$$

$\mathscr{I}_P$ being PLANCK's radiation intensity.

By analogy, BOLTZMANN's radiation intensity is :

$$\mathscr{I}_B = \mathbb{k}\, \theta \text{ [j/s]} \quad ; \quad \mathbb{k} \triangleq |\, k \,| \text{ [j]} \;\; \text{(unit of heat)} \qquad \text{(I.8b)}$$

This unit characterizes the least action defined by :

$$\mathbb{k}\, \Delta t \simeq 7.442 \times 10^{-67} \text{ [js]}$$

Corollary :

An electromagnetic (or gravitational) wave is not propagated in space (e; s; t) except as a multiple of its period.

Comment :

1) Discrete measurement (in PLANCK units) of spatial lines does not contradict their continuity. These units are like sliding segments on the geodesics.
2) Quanta and photons, as perceived by PLANCK and EINSTEIN, do not exist. Any radiation, whether intense or otherwise, follows in the wake of Δe.

I.2.3 Constants

Constants are only superficially expressed in the literature. Out of a concern for accuracy, here are the redefinitions :

number, any constant having no dimension (value independent of the scale of measurement) ;

absolute constant, any constant without a mode ;

fundamental constant, any absolute, irreducible and experimental constant ;

measurement, any other constant ;

measurement limit, any extreme measurement in nature ;

fundamental measurement, any irreducible and experimental measurement.

In accordance with this terminology, current physics only counts three fundamental constants corresponding to a vacuum :

$\boldsymbol{\gamma_o}$ gravitational property (NEWTON's constant) ;

$\boldsymbol{\varepsilon_o}$ electrical property (absolute permittivity) ;

$\boldsymbol{\mu_o}$ magnetic property (absolute permeability).

The fundamental measurements consist of :

$\mathbb{h}$ unit of energy (PLANCK's modified measure) ;

H_o minimum frequency (HUBBLE's measurement).

Comment :

Certain derived constants, such as c and k, are poorly expressed in the documentation. It is useful to recall that :

$$c = \frac{1}{\sqrt{\varepsilon_o \mu_o}} \; ; \; k = \frac{R}{N_A}$$

with : $R \simeq 8.3144$ [j/(mol.°K)], as the molar constant of perfect gases ;

$N_A \simeq 6.02204 \times 10^{23}$ [1/mol], the AVOGADRO number.

***New constants* :**

The ratios $a = \frac{\Delta s}{\Delta e} \simeq 2.4386333 \times 10^{-2}$ [m/j] and $b \triangleq \frac{\Delta e}{\Delta t} \simeq 1.22934619666 \times 10^{10}$ [j/s] represent two maxima of radiation : the first is the inverse of the longitudinal density of radiation whereas the second indicates its intensity.

I.3 Five-dimensional Space

Original version :

Description :

Space (ae, s, ct) is five-dimensional and it is real, continuous, universally spherical and locally Euclidian. Its metric is expressed on the universal scale :

$$ds^2 = g_{pq}(x^1, x^2, x^3, x^4, x^5)\, dx^p\, dx^q \quad ; \quad x^1 = ae \quad ; \quad x^5 = ct \qquad \text{(I.9a)}$$

and $ds^2 = a^2de^2 + dx^2 + dy^2 + dz^2 + c^2dt^2$ on the local scale. (I.9b)

Geometrical figures :

Each physical object can be identified by a unique geometrical body in space (ae, s, ct). Most authors confuse corporeal geometry with spatial geometry. They are in the habit of using the geometry of the body they are considering as "measurement space" to describe "configuration space"[(1)] or merely space[(2)] on its own.

Functions :

Any function originating from physics is of the $\Xi(e; s; t)$ type. Its value at a given point $(e_o; s_o; t_o)$ in space is unique[(3)].

Discrete version :

In terms of infinitesimal measurement (on the PLANCK scale), spatial lines are shown to be discrete.

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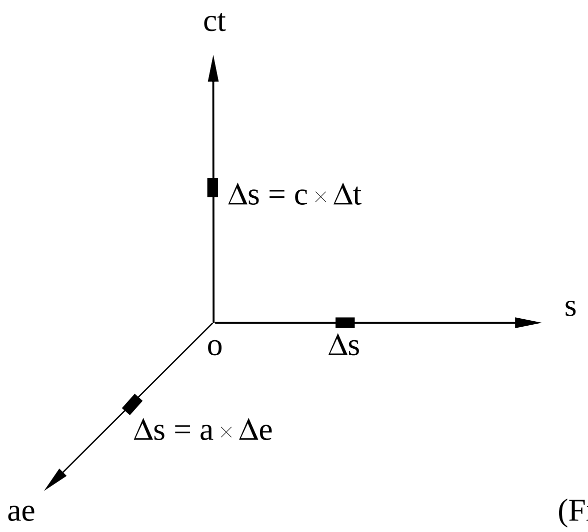
(1) Let there be a dynamic system with n degrees of freedom or $q^1, q^2, \ldots, q^n$, all of these parameters describing the way such a system develops. By assigning a coordinate to each of these parameters, a configuration space of n dimensions is created.

(2) This is the case with general relativity that transposes the geometry of gravitational action into spatial geometry.

(3) This is not the case for a function of (s; t).



(Fig. I.4)

taking the elementary steps :

$\Delta s \simeq 1.62 \times 10^{-35}$ [m] ; $\Delta t \simeq 5.39 \times 10^{-44}$ [s] ; $\Delta e \simeq 6.63 \times 10^{-34}$ [j]

and the constants : $c = 3 \times 10^{8}$ [m/s] ; $a \simeq 2.44 \times 10^{-2}$ [m/j]

It should be borne in mind that the indivisible units of derivative extensive quantities are deduced directly from their definition formulae.

From another point of view, the digitisation of spatial coordinates on an infinitesimal scale is only palpable in the tenuous world (at very low energy). Beyond this world, one resorts to the sampling technique (see III.1.1).

Differential equations :

Equations in physics are generally differential, local (functions of spatial coordinates), non-linear and only resolvable in very special cases. The introduction of energy as an independent variable in these equations renders them linear. Consequently, the digitisation expanded upon in chapter (III), combined with FOURIER's analysis (A.6), leads to the solving of such equations as a general principle.