CHAPTER 2

THE POSTULATE OF THE EMISSION OF INFORMATONS

The "theory of informatons" explains the gravitational (and the electromagnetic) interactions and phenomena by the hypothesis that "*information*" is the substance of gravitational (and of electromagnetic) fields.

The constituent element of that substance is called an "*informaton*". The theory starts from the idea that any material object manifests itself in space by the continuous emission - at a rate proportional to its rest mass - of informatons: granular mass and energy less entities rushing away with the speed of light and carrying information about the position ("*g-information*") and about the velocity ("*β-information*") of their emitter.

In this chapter the mechanism of the emission of informatons by a point mass at rest will be described, and the informaton will be defined by its attributes.

2.1 PRELIMINARY DEFINITIONS

A material body occupies space, its surface encloses matter. The amount of matter within its contours is called its *mass*. According to the field theory, any material body is the source of a gravitational field that at a sufficiently large distance is independent of the form of the body. This "far field" can be calculated by reducing the body to a mathematical point in which all the mass is accumulated. Such a point is called a "*particle*" or a "*point mass*" and it will be graphically represented by a little sphere. If we can calculate the gravitational field generated by a point mass, integral calculus delivers the methods to calculate the gravitational field generated by any material body. This justifies the fact that we in the first instance focus on the emission of informatons by a point mass.

The phenomena that are the subject of this book are situated in spacetime: they are located in "space" and dated in "time".

1. In the context of the theory of informatons *space* is conceived as a three-dimensional, homogeneous, isotropic, unlimited and empty continuum. This continuum is called the "Euclidean space" because that what there geometrically is possible is determined by the Euclidean geometry. By anchoring a standardized

Cartesian coordinate system to a reference body, an observer can - relative to that reference body - localize each point by three coordinates x, y, z.

2. In the same context we define *time* as the monotonically increasing real quantity t that is generated by a standard clock•. In a Cartesian coordinate system a standard clock links to each event a "moment" - this is a specific value of t - and to each duration a "period" or "time interval" - this is a specific increase of t. The introduction of time makes it possible for the observer to express, in an objective manner, the chronological order of events in a Cartesian coordinate system.

A Cartesian coordinate system together with a standard clock is called a "*reference frame*". We represent a reference frame as $OXYZ(T)$ or shortly as $\boldsymbol{O}$. A reference frame is called an "*inertial reference frame*" if light propagates rectilinear (in the sense of the Euclidean geometry) with constant speed everywhere in the empty space linked to that frame. This definition implies that the space linked to an inertial reference frame is an homogeneous, isotropic, unlimited and empty continuum in which the Euclidean geometry is valid. A reference frame $\boldsymbol{O'}$ moving relative to an inertial reference frame $\boldsymbol{O}$ is itself also an inertial reference frame. The coordinates of an event linked to the inertial frames $\boldsymbol{O}$ and $\boldsymbol{O'}$ are related by the Lorentz transformation.

2.2 THE CONCEPT OF GRAVITATIONAL INFORMATION

Newton's law of universal gravitation[1] may be expressed as follows:

The force between any two particles having masses m_1 and m_2 separated by a distance r is an attraction working along the line joining the particles and has a magnitude

$$F = G.\frac{m_1.m_2}{r^2}$$

where G is a universal constant having the same value for all pairs of particles.

This law expresses the basic fact of gravitation, namely that two masses are interacting "at-a-distance": they exert forces on one another even though they are not in contact.

According to Newton's law $\vec{F}_B$, the force exerted by a particle A - with mass m_1 - on a particle B - with mass m - is pointing to the position of A and has a magnitude:

• The operation of a standard clock is based on the counting of the successive cycles of a periodic process that is generated by a device inside the clock.

$$F_B = \left(G.\frac{m_1}{r^2}\right).m$$

The orientation of this force and the fact that it is directly proportional to the mass of A and inversely proportional to the square of the distance from A to B, implies that particle B must receive *information* about the presence in space of particle A: particle A must send information to B about its position and about its mass. This conclusion is independent of the position and the mass of B; so we can generalize it and posit that

A particle manifests itself in space by emitting information about its mass and about its position.

We consider that type of information as a substantial element of nature and call it "*gravitational information*" or "*g-information*". We assume that g-information is transported by mass and energy less granular entities that rush through space with the speed of light (c). These grains of g-information are called *informatons*.

2.3 THE POSTULATE OF THE EMISSION OF INFORMATONS

A material object manifests its presence in space by continuously emitting informatons. The emission of informatons by a material object anchored in an inertial reference frame $\boldsymbol{O}$, is governed by the "*postulate of the emission of informatons*".

A. *The emission* of informatons by a particle at rest is governed by the following rules:

1. The emission is uniform in all directions of space, and the informatons diverge with the speed of light ($c = 3.10^8$ m/s) along radial trajectories relative to the position of the emitter.

2. $\dot{N} = \frac{dN}{dt}$, the rate at which a particle emits informatons, is time independent and proportional to the rest mass m_0 of the emitter. So there is a constant K so that:*

$$\dot{N} = K.m_0$$

3. The constant K is equal to the ratio of the square of the speed of light (c) to the Planck constant (h):

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* We neglect the possible stochastic nature of the emission, that is responsible for noise on the quantities that characterize the gravitational field. So, $\dot{N}$ is the average emission rate.

$$K = \frac{c^2}{h} = 1{,}36.10^{50} kg^{-1}.s^{-1}$$

B. We call the essential attribute of an informaton its *g-index*. The g-index of an informaton refers to information about the position of its emitter and equals the *elementary quantity of g-information*. It is represented by a vectoral quantity $\vec{s}_g$:

1. $\vec{s}_g$ *points to the position of the emitter.*

2. The elementary quantity of g-information is:

$$s_g = \frac{1}{K.\eta_0} = 6{,}18.10^{-60} m^3.s^{-1}$$

where $\eta_0 = \frac{1}{4.\pi.G} = 1{,}19.10^9 kg.s^2.m^{-3}$, G being the gravitational constant.

Rule A.1 is the expression of the hypothesis that the space is an homogenous and isotropic continuum in which the gravitational phenomena are travelling with the speed of light. Rule A.2 posits that the rate at which a particle emits informatons is a measure for its rest mass and rule A.3 implies the fact that, when a particle absorbs (emits) a photon $h.\nu$, its rest mass is increasing (decreasing) with an amount $\frac{h.\nu}{c^2}$ while its emission rate is increasing (decreasing) with an amount ν. Rule B.1 and rule B.2 respectively express the facts that the gravitational field of a particle always points to the position of the source of that field and that the gravitational force between any two particles depends on a universal constant G.

To summarize, each material object manifests itself in space by the emission of informatons, it is a source of informatons. Informatons are grains of g-information and, as such, the constituent elements of gravitational fields. In the context of the postulate of the emission of informatons they are completely defined by their g-index $\vec{s}_g$. We will *represent* an informaton as a quasi-infinitely small spinning sphere, moving with velocity $\vec{c}$ and carrying a vector $\vec{s}_g$.

In what follows we will show that informatons macroscopically manifest themselves in $\vec{E}_g$ and $\vec{B}_g$ - the vectoral quantities that mathematically characterize gravitational fields - and in the laws of GEM that are manifestations of their kinematics. We will also show that informatons emitted by an accelerated point mass can be carriers of a quantum of energy. The combination of an informaton with a packet of energy appears to the observer as a "graviton".

It also is possible to explain electromagnetism by the theory of informatons[2],[3]. In that context they macroscopically manifest themselves as $\vec{E}$ and $\vec{B}$, the vectoral quantities that characterize an EM field, and in Maxwell's laws that are manifestations of their kinematics. In the context of EM a "photon" can be interpreted as a combination of an informaton (the carrier) and a quantum of energy.

References

1.Resnick, David and Halliday, Robert. *Fundamentals of Physics*. New York - London - Sydney - Toronto : John Wiley & Sons, 1970.

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3.Acke, Antoine. *Electromagnetism explained by the theory of informatons*. Hadronic Journal, Vol. 36, Number 6, December 2013