SOME FUNDAMENTALS OF PARTICLE PHYSICS IN THE LIGHT OF HYPERPHYSIS

J.R. Croca[i] and M.M. Silva[ii]

Abstract: Some key concepts of particle physics like mass, charge, forces and fundamental interactions are here seen not as basic but as mere useful derived concepts. It will be shown that these derived concepts can be understood in a unitary way in light of the New global physics, the Hyperphysis, rooted onto the organizing principle of eurhythmy.

Keywords. Hyperphysis, particle physics, principle of eurhythmy, complex particle, basic physical interactions, concepts of mass and charge.

1. Introduction

In the present work we intent to show that some basic concepts of particle physics like mass, charge, fundamental forces, fundamental interactions and so can all be understood in a unitary way as particular cases, or better saying as branches of the New global causal and nonlinear approach to better comprehend Nature, the Hyperphysis[1].

Hyperphysis, in its fundamentals is being developed by one of us[2] is mainly based upon the concept of complex particle and on the organizational principle of eurhythmy[3]. In this approach any particle is understood as a very complex entity. This complex entity being a more or less stable organization of the basic chaotic physical medium, the subquantum medium, is compose of an extended part, the wave, and inside there is a well-localized and in general indivisible structure relatively very small compared to its wave. The wave is named theta wave and the small localized structure the acron. Mathematically we could write

$$\phi = \phi(\theta, \xi) \tag{1.1}$$

or, assuming the simplest linear approach, as de Broglie did[4],

$$\phi = \theta + \xi \ , \tag{1.2}$$

where ξ stands for the acron and θ, naturally for the theta wave.

In previous works, following de Broglie, this very small high energetic region of the complex particle was called, singularity or even corpuscle. Still due to the confusion with the concept of mathematical singularity and from the fact that this region of the

[i] Departamento de Física, Faculdade de Ciências; Centro de Filosofia das Ciências Universidade de Lisboa Campo Grande Ed. C8, 1749-016 Lisboa Portugal, email: croca@fc.ul.pt

[ii] Centro de Filosofia das Ciências Universidade de Lisboa Campo Grande Ed. C8, 1749-016 Lisboa Portugal, email: manuelasilva@horus.pt

particle has an inner very complex structure it is now named by the Greek word acron[5]. This word comes from the Greek άκρον meaning the higher pike like in acropolis, the higher city.

The following drawing, Fig.1.1, tries, roughly, to picture the complex particle.

Fig.1.1 – Graphic sketch of a complex particle.

Now the acron moves in a random way inside the theta wave field according to the organizing principle of eurhythmy[6]. This principle states that the acron inside the theta wave field follows a stochastic path that in average leads it to the regions were the intensity of the theta wave field is greater. The relative energy of the acron is much greater than the one of the theta wave, $E_\xi/E_\theta \gg 1$, therefore in the most common detection processes what really is measured is the acron. Only in very special conditions and by indirect methods we can access to the theta wave.

2. Motion of the complex particle

When dealing with the complex particle we need to consider two kinds of motions. The global motion that is, the velocity of the extended theta wave v_θ and the motion of the acron v_ξ. The motion of the acron is always relative to the surrounding theta wave field. The acron moves in a chaotic way in the theta wave field with an instantaneous huge velocity its natural velocity $v_\xi = v_N \ggg c$. This natural velocity would be the velocity the acron would acquire when the probability of going in one direction would approach one. Still the observed velocity, the average velocity, the one that is observed may be zero or may, in very particular cases, like in tunneling conditions, approach the natural velocity $0 \leq \bar{v}_\xi \leq v_N$. In any case this average velocity of the acron, relative to the surrounding theta wave field for each medium and for particular physical conditions like temperature and so, has a maximal allowed average velocity such that,

$0 \leq \bar{v}_{\xi} = v_M \leq v_N$ being independent of the emitting source.

2.1. Motion of the complex particle in other theta wave fields

Suppose now that the a complex particle, a photon for instance, enters another different theta wave field, a gravitic field or other, as shown in Fig.2.1.

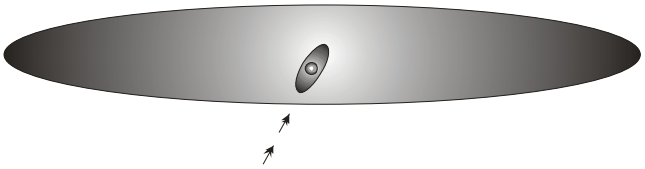

Fig.2.1 – The particle, a small theta wave with an acron enters a large theta wave field

We know that the motion of the acron is always relative to surrounding theta wave field. So, in these conditions it is clear that before entering the large theta wave θ_L only sees its own theta field θ_0. Now what happens when the particle enters the large theta wave field θ_L? Two extreme situations may occur:

1 – The relative intensity of the entering theta wave is much greater than the one of the extended theta wave field

$$|\theta_0|^2/|\theta_L|^2 \gg 1. \tag{2.1}$$

In this situation the acron ignores completely the extended theta wave field θ_L and sees only its initial own theta wave θ_0. In the case of a photon entering a gravitic theta wave field this same very phenomenon may be interpreted saying that the photon is massless. Meaning that in this situation the photon is not subject to gravitic interaction. The same conclusion could be drawn if the same photon enters an electromagnetic field. Either in this case we would be lead to say that the photon is a chargeless particle in the sense that it does not respond, interacts that is, depends on the electromagnetic field.

2 – The relative intensity of the entering theta wave is much smaller than the wave field

$$|\theta_0|^2/|\theta_L|^2 \ll 1. \tag{2.2}$$

In this case the acron, for all practical purposes, sees only the large theta wave field θ_L. Therefore its motion is now not relative to its initial theta wave field θ_0 but to the large extended theta wave field θ_L. Keeping in mind the same case of the photon entering a gravitic field, but now a very intense gravitic field, verifying condition (2.2), we would be lead to say that the acron, the part of the photon we can directly detect, is now sensitive to the gravitic field. In this conditions, as experimental evidence tell us, it will be deflected by the very intense gravitic field, meaning that the photon has, in this case, mass.

For the intermediary cases, between these two extreme situations, the motion of the acron would depend on the composite action of the global field being a composition of the two fields $\theta = \theta(\theta_0, \theta_L)$.

3. Coalescence and anti-coalescence

Two well separated complex particles, such that their respective theta waves do not superpose do not interact, see Fig. 3.1.

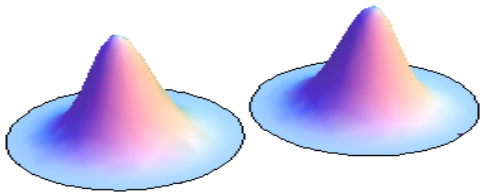

Fig.3.1. Two well separated particles do not interact

Still when they approach, see Fig.3.2 the respective theta waves may overlap and then the acrons

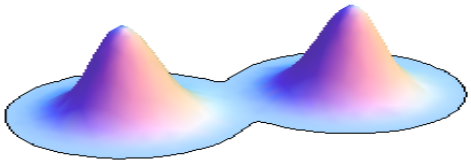

Fig.3.2. The two theta waves overlap

start being receptive the joint action of the two theta wave fields. In this situation the nonlinear interaction between the particles may be such that after a certain initial complex process the phase of the theta waves stablize[7] maintaining a relative phase difference constant. When this phase difference is equal it can be shown[8] that the intensity of the connecting region starts increasing till the waves coalescence into a single wave as shown in Fig. 3.3.

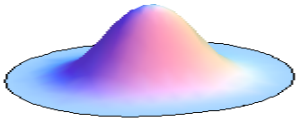

Fig.3.2. The two theta waves coalesce into a single wave

In this situation the acrons tend to move to the central region according to the principle of eurhythmy. In more common language we would say that the particles, the acrons attract themselves. Everything can be described saying that a pushing force attracts the particles. It is relatively easy to show[2] that relatively far from the origin, due to the spherical radial symmetry of the theta wave field, this pushing force can be described by the inverse square law of their distance $F \propto 1/r^2$.

For certain kinds of complex particles, fermions for instance, the nonlinear complex stabilizing process is such that the constant phase difference between the two theta waves assume the value of π. That is, the waves are then in phase opposition and in the region of overlapping it gives a wave of less or even null intensity. In this conditions and following the principle of eurhythmy the acrons are lead to move apart of each other, so we have anti-coalescence. Everything happens as if a kind of repulsive force leads the acrons to move apart. Also in this situation it can be shown that this average tendency, this repulsive force, has the same $F \propto 1/r^2$ variation.

In these conditions we can see that what is commonly called force, gravitic, electromagnetic and so, are nothing more than useful concepts at a certain level of description of the physical reality for the average motion of the acron in a composite theta wave field. The concept of mass or charge being a function of the number of interacting acrons depends basically, as we have seen, on the relative intensity of the overlapping theta waves. Meaning that in the regions where the theta wave field intensity is greater the number of acrons is also greater.

4. Conclusion

In the light of the global unifying nonlinear physics, the hyperphysis, the concepts of mass, charge, gravitic interaction, electromagnetic interaction and so are nothing more than derived concepts and not, as have been till now asserted, fundamental concepts. Naturally they are very useful at certain levels of description of the physical reality. Therefore such concepts must be used with some caution and above all do not pretend that they have a general validity at the diverse scales of description of reality.

In this new more general approach to understand physical reality many somehow incomprehensible things like for instance the strange properties of the neutrinos that are said to be devoid of charge and of mass and furthermore very difficult to detect are now properly understood. If the neutrino has no mass and no charge this simply means that the relative intensity of its own theta wave is much greater than the electromagnetic and gravitic fields we deal with. In this case the acron of the neutrino does not see the relative feeble electric and gravitic fields and consequently is insensitive to them. In the common language this natural situation, that has nothing strange in it, is described by saying that the neutrino is a chargeless and massless particle.

References

1 - The Greek name HyperPhysis for the new global physics that promotes the true unification of physics was suggested by M.M. Silva.

2 – J.R. Croca, *Hyperphysis, The Unification of Physics*, Chapter in the present work.

3 - The Greek name Eurhythmy for the basic principle of Nature was suggested by Professor Gildo Magalhães Santos.

4 - L. de Broglie, *The Current Interpretation of Wave Mechanics: A Critical Study,* (Elsevier, Amsterdam, 1969).

5 - The Greek word acron was suggested the Portuguese Philosopher Professor Eduardo Chitas.

6 - J.R. Croca, *The principle of eurhythmy a key to the unity of physics*, Unity of Science, Non traditional Approaches, Lisbon, October, 25-28, 2006. In print.

7 - D. Doubochinski and J. Tennenbaum, *On the General Nature of Physical Objects and their Interactions, as Suggested by the Properties of Argumentally-Coupled Oscillating Systems*, http://arxiv.org/ftp/arxiv/papers/0808/0808.1205.pdf

8 - M. Gatta, *Preliminary results from computer simulations of elementary particle interactions as an application of the principle of eurhythmy*, Chapter in the present work.