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## QUANTUM PHYSICS, CONSCIOUSNESS AND LIFE<sup>†</sup>

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### Abstract

The paper analyses a model, based on quantum physics and Einstein's famous relation  $E = mc^2$ , which tries to explain the connection between brain functioning and the consciousness manifestation. The model predicts the presence of a new human consciousness in the mother's body from the first weeks of pregnancy. The moral implications of these results and a Christian perspective on the subject are also considered.

*Keywords:* uncertainty principle, brain activity, abortion, Christian perspective

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The most powerful scientific publisher in Europe, Elsevier Science, launched in the last decade a new series of journals that present the last trends appeared in different branches of science [1]. Obviously, the interdisciplinary directions are privileged, with the aim of opening new and inciting research directions.

Thus, one can find in the series 'Trends in cognitive sciences' the following title: "Fundamental-Mentality: is the conscious mind subtly linked to a basic level of the universe?" by S.R. Hameroff, professor at Arizona University, USA [2]. The trend presented by this article concerns the possible existing link between the quantum physics and the conscience; a problem debated more and more frequently both in international meetings (like that organised by the Interdisciplinary University of Paris – 'Quantum physics and the human values', May 2000 [3]) and in quite recent books (e.g. 'The Physics Of Consciousness. The Quantum Mind And The Meaning Of Life' by E.H. Walker [4]).

We must to mention from the very beginning that the problems risen by this article are extremely complex, their complete analysis being unable to make the subject of a simple communication, but the interesting manner of explaining the brain functioning by means of quantum physics and the deep implications of such an hypothesis, we consider that deserves the reader's interest.

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An essential feature of the quantum physics concerns the probabilistic treatment of the particles behaviour. For example, the description of the electrons trajectory by means of Schrödinger's equation can't determine their exact position at a certain moment. One of the questions that rack the physicists regards the manner in which is made the passage from the probabilistic microscopic state to the macroscopic world that we perceive, where the objects have well defined positions. A possible explanation considers that a certain objective factor produces the 'collapse' of the wave function and together with it the passing from probability to certitude, the process being named objective reduction. Some authors consider that this objective factor is an intrinsic feature of space-time itself: the quantum gravity [5].

Hameroff starts from these elements and questions if the objective reduction might occur in the brain. He uses two mathematically simple relations: Heisenberg's uncertainty principle  $E = h\nu/2\pi$  (1) and Einstein's famous equation of energy  $E = mc^2$  (2). Here  $E$  is the energy corresponding to the reduced mass,  $c$  is the speed of light,  $h$  is the Planck constant and  $\nu$  is the frequency with which occurs the objective reduction process.

Another premise used by the author concerns the synchronously oscillating feedback loops of the thalamo-cortical neurons, usually known as the coherent frequency of 40 Hz. The presence of this frequency is associated with the normal functioning of the brain and implicitly with the existence of consciousness.

The interior of neurons and glia cells is functionally organised in polymeric proteins networks – the cytoskeleton – whose major components are the microtubules [6]. Hameroff and co-workers consider that these microtubules are responsible for the existence of the 'coherent 40 Hz' [7]. By the use of this value of frequency in relation (1), one may determine, equalising the two equations, a corresponding reduced mass of about  $3 \cdot 10^{-9}$  grams of brain, which is the equivalent of  $2 \cdot 10^{10}$  tubulins (i.e. almost 20 000 neurons). If one makes the same calculus for lower frequency values, of units order, evidenced on the encephalograms as slow waves [8], the model predicts a minimum limit for sustaining the consciousness at a level of about 300 neurons.

In his reply to some critics of his theory, Stuart Hameroff assigns this low level of neurons to small worms and urchins questioning, "What is it like to be a worm?" [9]. But if we look at this value from the perspective of the human being intrauterine development, it corresponds, according to literature, to the gastrulating phenomenon [10]. During this phase of development, is formed the neural tube and respectively the first neurons, event occurring after the second week of pregnancy. We must add here that at that period, most of the women do not have yet the certitude that they are pregnant. On the other hand, is relevant to remember that from the eight week of pregnancy, when are usually made the abortions, in the head of the new human creature are formed about 200 000 neurons every minute!

Therefore, the model described by Hameroff predicts the presence of a new human person in the mother's body from the first weeks of pregnancy, fact that is in agreement with the Christian Church precepts [11]. Consequently, if the above proposed model is correct, even an early abortion or the use of human embryonic cells for research purposes can't be considered, from both scientific and moral perspective, otherwise than a crime.

Obviously, the model and its interpretation have already and will raise furthermore questions and scientific disputes [12, 13]. Above all these, it is our belief that receiving life in one's own body *is a God's gift* and renouncing to such a gift, instead of enjoying it, creates nothing but irreparable losses. From this Christian perspective, we consider appropriate to end our short paper with the following fragment from the Gospel of Luke: "As he said these things, a woman in the crowd raised her voice and said to him, 'Blessed is the womb that bore you, and the breasts at which you nursed!' But he said, 'Blessed rather are those who hear the word of God and keep it!'" (Luke 11.27, 28)

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