

elevator and the beam of light: through a hole on the left wall, a beam of light enters into the accelerating elevator. For the person inside the elevator, the beam of light will strike the right wall in a point closer to the floor of the elevator. Einstein noticed that the light-path is curved and thought that, if acceleration bends the light-path, then according to the principle of equivalence, the gravitation also curves the light-path. More exactly, gravitation wraps the space (“gravitation does not act on photons” since photons have no mass).

#### 7.4 Few words about quantum mechanics<sup>1</sup>

Even if this part is dedicated to one of the most important theories in physics (Einstein’s theory of relativity), I have also the opportunity to introduce a few words about quantum mechanics. From the EDWs perspective, I showed in Vacariu (2008) and Vacariu and Vacariu (2010) that quantum mechanics is quite wrong (the main error: it was constructed through a mixture of phenomena/entities that belong to

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relativity, Eddington and Weyl, within a few years of the advent of general relativity, presented both the mathematical formalism and the physical content of the theory, in the first perspicuous and comprehensive texts on the theory (Weyl, 1918; Eddington, 1920)... In this way they revealed general relativity as a theory, not of relativity, but of ‘world-structure’ – the dynamical structure that unified the physics of gravitation with the geometry of space and time.” (DiSalle 2006, p. 138) According to Weyl, the progress from Newton to Einstein reflects “a deepening understanding of world-geometry and its relations with the dynamical properties of matter”. (DiSalle 2006, p. 139)

<sup>1</sup> About the problems from physics (the relationship between Einstein’s theory of relativity and quantum mechanics or the problems of quantum mechanics (Wheeler’s delayed experiment included) and the EDWs perspective, see Vacariu (2008), Vacariu and Vacariu (2010). In those books, I showed that the problems of quantum mechanics are in fact pseudo-problems constructed by human thinkers in the unicorn world. At first glance, the EDWs perspective seems to be quite a simple approach. However, after acquiring more knowledge about the EDWs perspective, it becomes more and more difficult to be understood by people working in philosophy, cognitive science, biology or physics. I believe that David Hume was right: *habituation* (thinking in a wrong framework, the unicorn world, in this case) is main reason for such difficulties! Imagine a person living in the first millennium, coming from nowhere, and trying to convince great intellectuals that the Earth round is like a sphere but not flat. Inevitable, the intellectuals from that period would consider that person being weird and ridiculous!

EDWs) and therefore it is necessary many essential notions to be rejected or replaced with much better notions. More exactly, the entire framework in which quantum mechanics was elaborated, the unicorn world, has to be replaced with what really exist, i. e., the EDWs.

In this part, I would like to analyze only the paper written by Ionicioiu and Terno (2011) on Wheeler's delay experiment in quantum mechanics. In this article, these two physicists consider – as everybody - that the classical concepts of 'particle' or 'wave' (as in 'wave-particle duality') do not translate perfectly into the quantum language." (Ionicioiu and Terno 2011, p. 1) More exactly,

"photons" show an inconsistent behavior: in an open interferometer waves obey a particle statistics and in a closed interferometer particles behave like waves, showing interference. Consequently, the properties "wave" and particle" become meaningless. (Ionicioiu and Terno 2011, p. 3)

Therefore, they introduce a *Gedanken experiment* related to Wheeler's delayed-choice experiment for redefining Bohr's notion of complementarity in terms of quantum mechanics framework. As I showed in Vacariu (2008) and Vacariu and Vacariu (2010), within the unicorn world, many things in quantum mechanics become meaningless. Avoiding technical details, I emphasize another phrase written one page later: "from a classical perspective there is still an ontological tension between the observed interference and the detection of individual photons, one by one, by clicks in the detectors." (p. 4) The expression "ontological tension" seems to be taken from my first two books (2008, 2010)!<sup>1</sup> As I showed in my books many times, since the particle and the wave both exist but belong to the EDWs, then there is indeed an "ontological tension": the particle and the wave cannot exist both in the same world, the unicorn world.<sup>2</sup> However, their conclusion is contrary

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<sup>1</sup> It is quite strange two physicists to use this philosophical expression "ontological tension". I read many books written by physicists but I have never read this philosophical expression in any book written by a physicist. Quite strange! I used similar expressions in my books to show the ontological problems between the wave and the particles in quantum mechanics.

<sup>2</sup> Anyway, this is an old problem since all scientists have tried to solve it since the quantum mechanics appeared in 1920's until today. "As mentioned, most sciences have made a historical shift from substance frameworks to process views of their subject matter. Sciences of mentality are delayed in this respect, possibly because

to the EDWs perspective: the “particle” and the “wave” are not real properties but mirror “how we ‘look’ at the photon”. (Ionicioiu and Terno 2011, p. 4) In their experiment, the authors show that using a single “experimental setup”, we can observe the complementarity of phenomena. “Our result suggests a reinterpretation of the complementarity principle – instead of complementarity of experimental

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the mental is the primary realm that encounters the split of normativity and intentionality from the rest of the world. But the shift to process has also occurred in fundamental physics, so a shift to a metaphysics of process is consistent with and lends itself to consideration of this property of contemporary physics. In particular, according to quantum field theory, there are no particles. Everything is organizations of quantum field processes, and particle-like phenomena are results of the quantization of quantum field processes [Cao, 1999; Clifton, 1988; Halvorson and Clifton; 2002; Huggett, 2000; Kuhlmann, Lyre, Wayne, 2002; Weinberg, 1977]. This is akin to the quantization of the number of waves in a guitar string, and similarly gives no basis for assuming particles — there are no guitar sound particles, and no quantum field particles either. Everything is stable (or not so stable) organizations of processes. We know, of course, that contemporary physics is incomplete and has to be wrong in crucial respects. But a return to a substance or particle framework is precluded by the empirical confirmation of multiple non-localities, and dynamic space-time and vacuum effects. Such phenomena are not consistent with the local independence and fixedness of particles and substances.” (Bickard 2011) Bickard works on the metaphysics of processes and the metaphysics of particles. In order to avoid some problems (in fact ontological contradictions) imposed by the problematic “mixture” of waves and particles (in reality, the mixture of the wave-EW and the particles-EW), some physicists believe in the “quantization of quantum field processes” and reject the existence of particles. The main ontological dualities (wave-particles, micro-particles and macro-particles, mind-brain, life-organism/cell) from different sciences (physics, cognitive neuroscience, and biology) mirror such ontological contradictions. An absolute reductionist, working inevitable within the unicorn world, would correctly reduce everything to a particular class of entities or processes, for instance waves! In this framework, only such (correct) absolute movement would avoid the above (hyer)ontological contradictions! (In the philosophy of mind this was the case with eliminativists who, working within the unicorn world, correctly rejected the mind. See Vacariu 2008) (Also, see the string theory in Vacariu and Vacariu 2010) (Related to the topic of “metaphysics of processes”, see the scientific dispute between the “reality of particles” (Newton and the total differential equations that reflect the discontinuity of matter) and the “reality of fields” (Maxwell and the partial differential equations that reflect the continuity of matter) in Vacariu and Vacariu 2010, Chapter 7) As I showed in my first two books, the particles and the fields belong to the EDWs.

setups (Bohr's view) we have complementarity of experimental data." (Ionicioiu and Terno 2011, p. 4) Within the EDWs perspective, at the first view, Bohr's complementarity is "complementarity of experimental data", i.e., complementarity of EDWs. However, at a closer look, the EDWs are not "complementary"! As I wrote in my books, the EDWs are complementary only for the human observer who can change the conditions of observation, but in reality, the entities and their interactions from one EW do not exist for entities and their interactions that belong to another EW.<sup>1</sup> For instance, the microparticle does not exist for the wave or the planet and vice versa. Therefore, it is not about "complementarity" but about EDWs. Their conclusion is the following:

Discussing the delayed-choice experiment, Wheeler concludes: "In this sense, we have a strange inversion of the normal order of time. We, now, by moving the mirror in or out have an unavoidable effect on what we have a right to say about the *already* past history of that photon" [5]. We disagree with this interpretation. There is no inversion of the normal order of time – in our case we measure the photon *before* the ancilla deciding the experimental setup (open or closed interferometer). It is only after we interpret the photon data, by correlating them with the results of the ancilla, that either a particle- or wave-like behaviour emerges: *behaviour is in the eye of the observer*. (Ionicioiu and Terno 2011, p. 4)<sup>2</sup>

*It seems as if Ionicioiu and Terno created their experiment within the EDWs perspective!*<sup>3</sup> However, their conclusion lacks precisely the EDWs perspective: "behavior" is not "in the eye of the observer", the particle and the wave really exist but in EDWs.<sup>4</sup> Moreover, quantum

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<sup>1</sup> It is exactly the same situation for those two observers A (in the train) and B (on the ground) regarding Einstein's theory of special relativity.

<sup>2</sup> In my book (2008), I rejected Wheeler's delayed experiment. I am lucky I published my books several years before Ionicioiu and Terno published their paper. However, I posted my books on Internet after 2-3 months of being published by the company publisher.

<sup>3</sup> Ionicioiu is a Romanian physicist who works in Canada and Terno is Australian physicist at one university in Sydney (Australia). I am Romanian and in 2008 I got one of my PhD degrees at University of New South Wales in Sydney. What coincidences! (However, for some UNBELIEVABLE "coincidences" between my ideas and the ideas of a professor of philosophy from a German university, see the Appendix of this book).

<sup>4</sup> In this context, I emphasize that quite many people do not understand correctly and completely my EDWs perspective just because it is a completely new framework of

mechanics has had great problems even since it appeared and nobody has been able to come with a solution. As I showed in my books from 2008 and 2010, these problems (and many others) are in fact pseudo-problems created through the mixture of entities/phenomena that belong to the EDWs. This is the reason nobody has been able to solve them.

### **7.5 The results of BICEP2 (March 2014) about Big Bang, gravitational waves and inflation**

My EDWs perspective can be applied to any major notion or theory that describe a significant process that belong to one or another EW. In the last few days, a possible very great result has been furnished by the team working with BICEP2 (Background Imaging of Cosmic Extragalactic Polarization 2) in detecting gravitational waves immediately after Big Bang.<sup>1</sup> Einstein's general theory of relativity predicted that "acceleration of large masses would cause waves to ripple through space in a manner analogous to ripples on the surface of a pond". (Luntz 2014) In 1979, Alan Guth elaborated the idea of "inflation": immediately after Big Bang, the universe dramatically increased in its size in an extremely short time ( $10^{-34}$  seconds).<sup>2</sup>

According to the most popular, but not universally accepted, theory of the early universe,  $10^{-34}$  seconds after it began the universe experienced a period of rapid growth – expanding 100 trillion trillion times to something the size of a marble. An

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thinking and not just few ideas. (This footnote is related with the topic from the Appendix.)

<sup>1</sup> I mention that I have never worked on "inflation". However, I would like to emphasize that I wrote this section on this topic not common for me and under a very great time pressure only because I wanted to show that my perspective could be applied to any great problem regarding the "universe"/"world". I wrote this section when a person from the publishing company was in the last stage of editing my book. In 3 days, I collected the information about this discovery from the Internet and I wrote this section. I apologize for any error or inconvenience in writing this section in this way.

<sup>2</sup> "For the first 300 million years the universe was opaque to all electromagnetic radiation. However, gravitational waves could propagate through this early universe, and we can thus in principle detect signatures from the time of the Big Bang. It is probably the only way we can get signals from the origin of the universe." (Jesper Munch in Luntz 2014)