

Space-time has a source... but not a quantum source.

I refer to the 2015-11-16 article, published on the *'Science'* site with the following title: "**The quantum source of space-time**". The author: Van Raamsdonk report us that on the entanglement base he can explain that with a reduction process until 0 step that lead to the emergence of space-time. For him, entanglement might be the basis of geometry.

That is an original theoretical conception, and the author got noticed: 'crackpot', when he submitted first a paper in 2010. But through sheer willpower and rewriting his final paper is published in: *'General Relativity and Gravitation'*, journal.

"Much of this work rests on a discovery announced by physicist J. Maldacena. His research has led him to consider the relationship between two seemingly different model universes. One is a cosmos similar to our own. Although it neither expands nor contracts, it has three dimensions, is filled with quantum particles and obeys Einstein's equations of gravity. Known as anti-de Sitter space (AdS), it is commonly referred to as the bulk. The other model is also filled with elementary particles, but it has one dimension fewer and doesn't recognize gravity. Commonly known as the boundary, it is a mathematically defined membrane that lies an infinite distance from any given point in the bulk, yet completely encloses it, much like the 2D surface of a balloon enclosing a 3D volume of air. The boundary particles obey the equations of a quantum system known as conformal field theory (CFT).

Maldacena discovered that the boundary and the bulk are completely equivalent. Like the 2D circuitry of a computer chip that encodes the 3D imagery of a computer game, the relatively simple, gravity-free equations that prevail on the boundary contain the same information and describe the same physics as the more complex equations that rule the bulk."

As many other physicists V. Raamsdonk worried about the central unsolved questions posed by Maldacena's discovery: exactly how does a quantum field on the boundary produce gravity in the bulk? There had already been hints that the answer might involve some sort of relation between geometry and entanglement. But it was unclear how significant these hints were. He first considered an empty bulk universe, which corresponded to a single quantum field on the boundary. This field, and the quantum relationships that tied various parts of it together, contained the only entanglement in the system. But now, Van Raamsdonk wondered, what would happen to the bulk universe if that boundary entanglement were removed?

He was able to answer that question using mathematical tools introduced in 2006 by Shinsei Ryu, and Tadashi Takanagi. Their equations allowed him to model a slow and methodical reduction in the

boundary field's entanglement, and to watch the response in the bulk, where he saw space-time steadily elongating and pulling apart. Ultimately, he found, reducing the entanglement to zero would break the space-time into disjointed chunks, like chewing gum chunks.

Better read the original article to support for the demonstration. Anyway for the author there is no doubt: *"Entanglement is the essential ingredient that knits space-time together into a smooth whole – not just in exotic cases with black holes, but always."*

Since 2013, in addition to this result, J. Maldacena and L. Susskind claim that E.R. = E.P.R. and if two particles are connected by entanglement, then they are effectively joined by a wormhole. The connection that physicists call a wormhole is equivalent to entanglement. **They are different ways** of describing the same underlying reality.

A wormhole: a tunnel through space-time was probably introduced first by Einstein and N Rosen (E.R.). Still it is a very enigmatic concept. There is a way to suppose that in that case the proper constraints of special relativity like causal connection and the C. limit velocity are not any more relevant. Anyway physicists do not know how to manage this concept.

Now I refer to my article viXra: 1511.0012 submitted on 2015-11-02: *'The world is not so Weird if...'*, paper in which I recall that with my hypothesis of the subject's own time τ_s (or TpS: Temps propre du Sujet) which magnitude is of the order of 10^{-23} to 10^{-25} s, it is then possible to explain why entanglement's phenomenon appears to the observer: "Effectively the duration of the entanglement's production of two quantum objects is very short, quasi instantaneous, and then the duration is $\Delta t_i < \tau_s$. Strictly, quantum physics tell us that the wave function of the entangled objects remains one and indivisible after the operation. We can consider that the observer, being incapable to distinguish each one of the objects which entangle at the beginning, cannot any more recover any ability for distinguish and identify each one of the elements. It's what we named the non-localisation. We don't know which is which, although we know that their spatio-temporal histories are very different." In fact, to be more exhaustive, I must precise that consequently none of the spatio-temporal relationship might relate to the entangled objects because inside the blind duration τ_s no space and no time can be founded by the observer. So the phenomenology that I advocate since ten years does not need the 'wormhole' subterfuge to explain the entanglement phenomenon.

To remind, I have introduce the τ_s hypothesis because we must take account of the generic *'Proper time of the thinking Subject'* and so the present moment, the present instant, of the observer is

an irremediable duration and must be considered as a physical fact. The absolute instantaneousness is not graspable by the observer. This additional hypothesis must be enrolled in the special relativity equations, and of course is in opposition to the Einstein's realism statement: 'The separation between past, present, and future is a great illusion, even so much tenacious it is". We note that this postulate lead straight forward as a boomerang effect to the 'Wormhole', thought up in 1935, but it is still dazzling physicists and it is why they are not yet capable to specify it. In fact the wormhole like entangled phenomenon tells us that the causal connection principle is a principle with reference of the human's mind. Could be the same thing for C velocity unsurpassable!