Contribution ID: **18**   Type: **not specified**

String Theory and Loop Quantum Gravity: True Theory vs ad hoc Hypothesis?

Tuesday, 10 September 2024 12:40 (25 minutes)

As physicists know, string theory suggests to replace the 0-dimensional (point) particles of the standard model with 1-dimensional vibrating strings. So each particle world line (1-dimensional)) is replaced with string world sheet (2-dimensional): this avoids formation of singularities when particles are strongly compressed together, giving for the first time an acceptable description of the state of primordial universe. One of the best results of the theory is the natural appearance just in the spectrum of the simplest string of a massless spin-2 state, which well represents the state of a graviton, suggesting string theory as a first example of quantum gravity. This at the expense of increasing the spacetime dimensions at least to 11. So the mathematics of the theory becomes very difficult.

On more recent years a second proposal has been made for quantum gravity: the so called loop quantum gravity (LQG). In this case the machinery of the standard model is left unaltered, with the advantage of a much simpler mathematics in the 4-dimensional spacetime, gaining also here a good explanation of the initial singularity of the universe only through the quantization of the gravity. At the end the two theories show many similarities also due to the appearance in LQG of spin foams, which resemble the world sheets of string theory.

I think that the hypothesis of loop quantum gravity when incorporated inside the standard model can well become a complete theory of matter, as string theory wants also. So the word moves on to the experiments. Only their results can make it possible to choose between these two descriptions of the world. And being an experimentalist I believe that the best way to discriminate between string theory and LQG is to demonstrate the existence of the extradimensions foreseen by the string theory.

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