The Relationship between Black Holes and Quantum Bridges

Are black holes the beginning and end of quantum bridges?

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Abstract

The following extended essay aims to determine if ***black holes are the beginning and end of quantum bridges*** through the synthesis of literature and analyzing its limitations. This first involves selecting articles pertaining to black holes, quantum bridges, and/or their relationship. Each article is then read on its own and analyzed. Once all articles were analyzed, the information is extracted from each is compared. Points of agreement or similarity are then used to create claims. Points of disagreement are explored through the acquiring of more literature and consideration of the limitations of each argument until a claim can be made. The information gathered is then used to support the developed claims. Arguments are made assuming that the universe began with the inflation of a singularity, is finite, and part of a multiverse. The investigation leads one to two conclusions-the first being that by the confirmed duality between black holes and quantum bridges, that black holes are the beginning and end of quantum bridges and the second being that the multiple results that can be yielded by black holes under the conditions of loop quantum gravity only support black holes as the beginning of quantum bridges.

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Exhibit Maya is slowly getting caught in the web of tradition as it faces biases in its Search for

Quantum bridges, also named wormholes by John Wheeler, are

equations and

is defined by a single number that is the same everywhere in spacetimes that have no matter or energy. A Lorentzian manifold is space modeled on Euclidean space with a metric tensor (1, n-1) which is equivalent to (n-1, 1).

s describe a curvature of spacetime and the distribution of matter throughout spacetime. Gravity is defined as the bending of space and time and comes from massive objects.

String Theory dictates that within background space, there are strings of about Planck length that have tension and that the excitation modes of these strings are the elementary particles that are observed.

And due to the

Assumptions

The following arguments are made assuming that the universe is finite and part of a multiverse

ago in which a singularity inflated and cooled.

Duality

Åminneborg, Bengtsson, Brill, Holst, and Peldán find that differentspacetimes can be constructed by identifying points in 2+1 anti-de sitter space using transformations that preserve distance. Only spacetimes with one asymptotic region are constructed. Their work yielded non-

be compressed anymore and create and outward pressure called a quantum bounce. The Big

a part of a cycle. Pullin and Gambini went beyond and applied the big bounce theory to a smaller scale of a black hole. Pullin and Gambini further support the aforementioned duality between black holes and quantum bridges by describing black holes as the method of transportation for information. This is done by arguing that there is not a singularity within a black hole and that information is conserved through transfer (Pullin and Gambini, 2013). This conclusion is

quantum bridges lead to branching, closed universes (Hawking, 1988).

Analysis and Limitations

While there is no experimental evidence that quantum bridges exist, there is no evidence that can support the hypothesis that they do not exist (Scientific American, 1997). Åminneborg, Bengtsson, Brill, Holst, and Peldán ack gravitational waves and do not account for angular momentum. Loop quantum gravity challenges string theory. Neither has been experimentally tested, though string theory does not treat general relativistic revolution as fundamental. However, the degrees of freedom of the field cannot be described for loop quantum gravity and the Immirzi parameter, that measures the quantum area in planck units, is not fixed. On the other hand, loop quantum gravity does not require super symmetry, proton decay, or a higher dimension (Rovelli). quantum bridge consisted of constructions in a massless field when in reality the field would contain a mass. The limitations of the investigation made above include a lack of exploring how the thermodynamics of a black hole might influence its role in the black-hole quantum bridge cycle and that the constructions made in the different literature utilized for investigation used different spacetimes.

Also, different types of black holes are used to form the above arguments. Moreover, most of the arguments are formed under the assumption that there is a singularity at the core of a black hole yet the concept of a singularity is removed in the latter portion of the argument utilizing loop quantum gravity as a means of establishing the cyclic relationship between black holes and quantum bridges. Finally, the black holes observed in our universe are three dimensional but the mathematics used by the above researchers works with two dimensional spaces. Achúcarro and

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