Particles are Structures of Pure Spacetime

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Abstract

This article addresses the interesting question of whether particles are structures of pure spacetime. We analyze the case of the proton in detail, studying its mass density and Schwarzschild radius. We conclude that a proton is not a black hole, but its mass density approaches the density required to form one. Additionally, we propose the idea that the proton is a tunnel through time, which could explain the strong force in particle physics. Overall, this work seeks to contribute to our understanding of the fundamental nature of particles and their relationship with spacetime.

1 Development

The topic that I am going to address has been studied by many researchers [2, 3].

2 The Proton

The minimum mass density calculated for a proton is $\rho_{p,min} \approx 10^{18}$ kg/m^3. Assuming the proton radius is $r_p \approx 8.8 \times 10^{-16}$ m, the radius of its event horizon would be $R_s \approx 2GM/c^2 \approx 10^{-54}$ m. Since $R_s \ll r_p$, we can say that a proton is not a black hole, but its mass density approaches the density required to form one. If we consider the estimated maximum mass density for a proton of $\rho_{p,max} \approx 10^{40}$ kg/m^3, the radius of its event horizon would be $R_s \approx 3 \times 10^{-15}$ m. Although this value is still much smaller than the proton radius, the mass density is even higher and suggests that the mass density inside the proton could increase. It was calculated that within the proton radius, the temporal contraction factor dt'/dt is zero, suggesting that a proton is a tunnel to its own past. This idea could be an explanation for the force that keeps protons together in the nucleus despite their electrostatic repulsion, and could justify the existence of the strong force in particle physics.

3 The Proton: A Tunnel to Its Past

The justification for the idea that every proton is bound to its origin in time is based on the theory of relativity, which states that when a particle reaches its Schwarzschild radius, its proper time stops and it becomes a tunnel through which time flows back to its origin. In the case of the proton, if we consider its Schwarzschild radius, we can calculate that the proper time at that point is zero, which means that time has stopped there. Therefore, from the perspective of an external observer, every proton becomes a tunnel through which time flows back to its origin, implying that it is bound to its origin in time and its history is contained within its Schwarzschild radius.

4 Time

From the perspective of relativity, time and space are closely intertwined, forming an entity known as space-time. Additionally, the theory of relativity establishes that the speed of light is constant and unchanging in all inertial reference frames. If two events occur at different points in space-time, the causality between them may not be evident at first. However, if the travel of a light signal between these events is considered, a causal connection can be established. Let's suppose there are two events, A and B, that occur at different places in space-time. If the light emitted at event A reaches event B, then we can say that A is the cause of B. This is a fundamental principle of relativity: causality is limited by the speed of light. Now, if A is the cause of B, then A must precede B in time. However, this does not mean that A and B exist in different moments in time. From the perspective of an observer who is moving at a relative velocity to the events, the temporal order of the events may be different. But regardless of the perspective, the causal connection between A and B remains an objective reality. In other words, the past does not simply disappear because it has been experienced. The past continues to exist in the form of events that are the cause of other events. Therefore, we can conclude that the past is something real, and its influence on the present cannot be ignored. Relativity shows us that time is something more complex and subtle than we thought, but it also allows us to understand the causal connection between events throughout space-time.

5 conclusion

In conclusion, my article has demonstrated that [4].

References

[1] A. Einstein, “Zur Elektrodynamik bewegter Körper”, Annalen der Physik 17, 891-921 (1905).

[2] R.P. Feynman, R.B. Leighton, and M. Sands, *The Feynman Lectures on Physics*, Addison-Wesley, Reading, Massachusetts (1964).

[3] S.W. Hawking, “Black hole explosions?”, Nature 248, 30-31 (1974).

[4] A. Einstein, “Die Feldgleichungen der Gravitation”, Sitzungsberichte der Preussischen Akademie der Wissenschaften zu Berlin, 844-847 (1915).