Journal of Theoretics Vol.3-5

The Crash of General Relativity: General-Relativistic Time Dilation Contradicts Gravitational Time Slowing Experiments

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Abstract: It is shown that general-relativistic (like special-relativistic) time is larger than the proper one (gravitational time dilation). This conclusion contradicts the experiments on the gravitational time slowing down.

Special Theory of Relativity (STR)

Recall that time t plays the role of the forth coordinate in the united Minkowski space-time. As a result, according to STR, the duration of physical processes depends on movement velocity v. This is expressed by the known equation of relativistic time dilation (increase)

$$dt=d\tau\gamma=d\tau(1-v^2/c^2)^{-1/2} \quad . \qquad (1)$$

Here the relativistic (coordinate) time figures are on the left, and the classical (proper) time on the right. In the non-relativistic (Galilean) approximation of small velocities $dt \to d\tau$, we have to deal with the proper or invariant time (independent of velocity).

One should pay attention to a poor expression: "time dilation." As known, the change of time rate is conditioned by changing the time standard. But in the given case, dt and $d\tau$ are measured in the same seconds.

The increase of the lifetime of moving elementary particles (relativistic time is larger than the proper one) is the known consequence of eq.(1).

General Theory of Relativity (GTR)

Let us consider now the general-relativistic relationship[1]

$$dt_S=d\tau(1-2|\Phi|/c^2-v^2/c^2)^{-1/2} \qquad (2)$$

corresponding to eq.(1) and based on Schwarzschild's solution. As seen, it indeed transits to (1) in the case $|\Phi|=0$, and we have a pure gravitational time dilation (increase) in the case v=0. Thus, the stronger a gravitational field the larger the duration of physical processes (the general-relativistic time is larger than the proper one).

For example, the reading of an airplane clock (t^h) in the known experiments on the investigation of the gravity influence on the clock rate[2-4] must be smaller than the corresponding reading of a clock on the ground (t^g):

$$t^h < t^g \quad . \qquad (3)$$

However, this experiment gives an opposite result:

$$t^h_{ex} > t^g_{ex} \quad . \qquad (4)$$

Emphasize that the observed change of atomic clock rate here is conditioned by its own construction. Thus, the previous conclusion[5] of the failure of GTR is confirmed experimentally.

Conclusion: Special-relativistic time dilation corroborates experiment, but general-relativistic time dilation is at variance with the facts.

References

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