

Error Analysis On Around-The-World Atomic Clocks Experiments⑦

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Abstract

The Around- The- World Atomic Clocks experiment paper published in the 1972 American Science Journal contains many conceptual errors. Thank you very much for the brave experiments of 2 American scientists J.C. Hafele and Richard E. Keating, because their experiments brought new scientific thinking.

Einstein proposed the Relativity time dilation, He should first define the concept and definition of time, But there is not these contents in the theory of relativity. Thesis of losing conceptual and definitional constraints, it's just a science fiction, not the theoretical system.

The concept and definition of time have been usefully explored by the author and will be presented in separate articles. This paper deals only with issues related to the Around- The- World Atomic Clocks experiment by American scientists J.C. Hafele and Richard E. Keating.

Keywords

Concept; definitions; time of relative theory; atomic clock time; speed; human-atomic clock interaction

J.C. Hafele, Professor at the University of Washington, USA, and Richard E. Keating, an expert at the United States Navy Observatory, Global Atomic Bell Experiment, 1971. Two articles published in the United States Journal Science.^[2]

1. Around- The- World Atomic Clocks: Predicted Relativistic Time Gains Author(s): J.C.Hafele and Richard E.Keating Source: *Science*, New Series, Vol. 177, No.4044 (Jul.14,1972),pp.166-168
2. Around- The- World Atomic Clocks: Observed Relativistic Time Gains Author(s): J.C.Hafele and Richard E.Keating Source: *Science*, New Series, Vol. 177, No.4044 (Jul.14,1972),pp.168-170

There has been a logical error in the title of the above-mentioned paper, which shows that the authors of the Around- The- World Atomic Clocks Experimental Paper are unclear about the concept of time. These errors have not been corrected by the scientific community for more than 50 years.

The important questions raised in this article are as follows:

How do American scientists control the atomic clock in an experiment up there?

My research paper there is a simulation of a professional phrase:

Human-atomic clock interaction.

Human-atomic clock interaction is the focus of this paper discussion.

Communication between people can use language, writing, music, sign language,

The tools people communicate with are mobile phones, computers, telegrams, advertising media, telephones, etc.

The communication between people and computers (human-computer interaction), which is also first designed as a computer language, when we use the computer, requires input methods, we direct the computer through keyboard input, and the specialized vocabulary is known as human-computer interaction.

But how do human - atomic clocks interact?

Do two scientists have phone contact with the atomic clock? Any input on the physical signals of speed and time for the atomic clocks?

How do we tell the atomic clock that the aircraft carrying the atomic clock is sailing at 800 km/h?

How can the atomic clock be made to understand the difference between 800 km/h and 1,200 km/h for the flight speed?

During the flight of the Boeing aircraft, the air and ground speed of the aircraft can be measured accurately through a variety of sophisticated instruments.

But for the main device that was involved in the test, the atomic clock was not equipped with a speed gauge like an aircraft.

The atomic clock itself can't measure speed or receive speed readings, and atomic clock can't By Math Calculate to convert speed into time reading.

The two United States scientists passed the speed of the aircraft directly to the atomic clock, and let the atomic clock directly calculate the result of a relativistic time dilation. This process is highly questionable and worth exploring in depth.

We all have an empirical judgment about the speed of a moving object, such as the speed of a bicycle, the speed of a car, the speed of an aircraft, which is derived from our senses and the thinking of the brain, or from the store of knowledge in books. Air and ground speed measurements of the aircraft are done by physical instruments of a particular principle and, through a particular computation process, data are shown on the display screen to enable the pilot to read the speed information directly. The speed of the aircraft is measured by instrument to show, record, and the pilot can report to the control tower and to the two professors who designed the Around- The- World Atomic Clocks Experiment.

Atomic clocks do not access information on the speed of flight. Because atomic clock don't have human visuals, they can't see speed meters. The atomic clock unlike human beings, they have not the ability to think and can not judge speed based on experience. We humans don't have a special design for the atomic clock. So the atomic clock doesn't have a special speed measurement function. These types of functions of atomic clocks are completely zero in physics.

The formula that calculates the Relativity time dilation of the atomic clock in flight is just a subjective imagination of our human race, those equations, which can be expressed in periodicals in words, and we as readers, communicate information when reading journals.

But atom clocks don't understand American Science Journal, how do they translate the word of science journals from journals into physical signals that atomic clocks can sense? How do you input sampling data from the formula to the atomic clock?

《Around- The- World Atomic Clocks: Predicted Relativistic Time Gains》

Examples of the formula used in the above paper are as follows (directly copied without any changes):

$$\tau - \tau_0 = -(2R \Omega v + v^2) \tau_0 / 2C^2 \quad (1)$$

$$\tau - \tau_0 = [gh/c^2 - (2R \Omega v + v^2)/2c^2] \tau_0 \quad (2)$$

For the interpretation of the formulae, the originals of two professors, J.C. Hafele and Richard E. Keating, are quoted here:

"For this purpose, consider a view of the (rotating) Earth as it would be perceived by an inertial observer looking down on the North Pole from a great distance. A clock that is stationary on the surface at the equator has a speed RQ relative to nonrotating space, and hence runs slow relative to hypothetical clocks of this space in the ratio $1 - R^2 \Omega^2 / 2C^2$, where R is the Earth's radius and Q its angular speed. On the other hand, a flying clock circumnavigating the Earth near the surface in the equatorial plane with a ground speed V has a coordinate speed $RQ + v$, and hence runs slow with a corresponding time ratio $1 - (RQ + v)^2 / 2c^2$. Therefore, if τ and τ_0 are the respective times recorded by the flying and ground reference clocks during a complete circumnavigation, their time difference, to a first approximation, is given by

$$\tau - \tau_0 = -(2RQv + v^2) \tau_0 / 2C^2 \quad (1)$$

.....

General relativity predicts another effect that (for weak gravitational fields) is proportional to the difference in the gravitational potential for the flying and ground reference clocks. If the surface value of the acceleration of gravity is g and the altitude for the circumnavigation is $h \ll R$, the potential difference is gh , and Eq.1 then reads

$$\tau - \tau_0 = [gh/c^2 - (2RQv + v^2)/2c^2] \tau_0 \quad (2) "$$

We see that the thinking of the two professors, J.C. Hafele and Richard E. Keating, is very clear, but are these all the products of human mind thinking, can these Contents atom clocks read, understand and calculate? Does the atomic clock have these Capacity? Do atomic clocks have these logical procedures? Should the atomic clock also become an expert in relativity?

We know that, to date, there are no such design ideas and the experimental instruments available. Even Einstein himself didn't think of those issues. The absence of clear concepts and definitions of the whole theory of relativity,

Our scientists there have been many validation experiments for relativity that are self-righteous, but in essence they have been wrong.

Atomic clocks are completely unaware of the changes in the Earth's time. For example, the International Earth Rotation and Reference System Service has detected that the Earth's rotation period is speeding up. The time it takes for the Earth to rotate once was reduced by 1.59 milliseconds on June 29,2022. The unexpected acceleration of the Earth's rotation again reduced the time by 1.59 milliseconds on July 9,2025. This is already a very significant unexpected number in terms of the Earth's rotational angular velocity or time, but atomic clocks are completely unaware to the above changes in time of Earth's time, the atomic clocks screen cannot be shown changes of Earth's time too.

Since the Earth was born billions of years ago, the Earth's rotation period has changed from 14 hours per day in the past to the current 24 hours per day. These 10 hours of change, spread over billions of years, over the past billions of years, the Earth's rotation has slowed down, resulting in an average increase of 24.6 ns per day in its rotation period compared to the original period.

The calculation formula is as follows:

$$14 + (40 \times 10^9 \times 365.25 - 1)x = 24$$

Calculate Formula (1)

The Earth's rotation slows down, assuming that the daily delay is on average x seconds

Calculate results $x = 24.6 \text{ ns}$

Since the operation of UTC, 27 positive leap seconds have been inserted, calculated using the above formula:

$$86400 + (53 \times 365.25 - 1)x = 86427$$

Calculate Formula (2)

In the formula (2), 86,400 seconds is the duration of a day and night, this is the definition of one day's time length by the International Bureau of Weights and Measures, the International Earth Rotation and Reference Systems Service, and the International Astronomical Union.

Since the regulation came into effect in 1972, it will be about 53 years until 2025. 86,427 seconds is the current length of a day, with the Earth's rotation period increased from 86,400 seconds to 86,427 seconds. Assuming the additional 27 seconds are evenly distributed over 53 years, the average daily increase would be $x = 1.39 \text{ milliseconds}$

Of course, the calculation above is only a hypothetical model; the Earth's rotation fluctuates over a short term of decades to a hundred years, the Earth's per day rotation period is sometimes speeding up and sometimes slowing down.

Due to the unexpected acceleration of the Earth's rotation, this change has been detected, and so far, the maximum acceleration of the one-day rotation cycle is 1.59 ms.

The Earth's rotation cycle is faster or slower, these values are obtained by the use of very long baseline interferometry by the International Earth Rotation and Reference System Service, very long baseline interferometry also uses atomic clock, but only use atomic clock cannot complete the test, which also points out a loophole in the Around the World Atomic Clock Experiment.

The International Bureau of Weights and Measures defines: 1 second is the duration of 9,192,631,770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the caesium-133 atom.

All the atomic clocks that are placed in the Earth's reference system are not aware of the 1.39 millisecond (slow). And 1.59 millisecond (fast) changes that occur in their own coordinates, and all the atomic clocks around the globe cannot display 1.39 millisecond (slow) and 1.59 milliseconds (fast) of this change on their own screen. That is because we humans did not design the working procedures for the creation of this atomic clock, which does not have the skill set of artificial intelligence. The screen of all the atomic clocks in the world shows that there can be only two, one the right time reading number, and another one is the wrong time reading number. The correct timescale is the result of the design and manufacture of metrology specialists, which is the oscillation of 9192631770 cycles per second as defined by the International Bureau of Metrology above.

The atomic clock can only operation at this frequency and cannot be changed, as it has been defined by The International Bureau of Weights and Measures

The other is the wrong time reading number, it's because of the atomic clock failure or because the environment in which it works interferes with the atomic clock. The incorrect time reading is due to the frequency shift produced by the atomic clock itself

Except for these two timescales, atomic clock there will be no displayed other time scales

Relativity time dilation, if there is any, there is no reason to let the atomic clock showing.

Changes in speed lead to the relativity time dilation, which is more complex than changes in Earth's rotation time.

Because, first and foremost, the speed at which an aircraft operates must be made known to the atomic clock, the atomic clock must also understand the equation between speed and time, and calculate out the value of Relativity time dilation.

When did two scientists in the United States plant such a complex program into the atomic clock? All atomic clocks simply cannot possess human perceptual abilities, imagination, and expressive skills.

How can atomic clocks speculate about the theoretical predictions of American scientists? How can atomic clocks be so submissive that what data do American scientists want that the atomic clock was then submissive to produce these data?

Can two scientists control atomic clocks with telepathy?

Can the atomic clock show the data that American scientists want?

We're going to have a deeper and clearer analysis of the problem.

Using human perceptual abilities to further explain.

The observers are sitting on the Einstein train. Einstein assumed his train will always to move at a constant speed.

From a physics perspective, this is impossible

We are sitting on a real passenger train, and modern train will have a screen showing the speed of the train.

If the train is not equipped with a screen, then our passengers cannot know the exact speed of the train!

Of course, we have some sense of the train's speed, such as the train being very fast or very slow, but the exact speed of the train is something passengers cannot know precisely.

So how does an atomic clock have the wisdom to sense and judge the speed of a plane? so that the clock pointer changes as the speed of an aircraft changes?

The frequency of the oscillation of the atomic clock will not change with the change of the Earth ' s rotational cycle, and will not change with the relativistic effect of time expansion (even if there is this effect)

Whether the atomic clock is placed in a standard laboratory environment, on the ground or at high altitude, to keep the atomic clock still or to fly,

Apart from the fact let the atomic clock to show the correct time reading number or the wrong time reading number, the atomic clock has no other function. We use atomic clocks, we just need to compare the high precision time of atomic clock with the Earth's rotational time, the atomic clock is used as a standard clock.

These complex concept and definitions are described in specialized articles, and these specialized Chinese articles have been Complete.

In sum, theoretical predictions of expressed by 2 United States scientists J.C. Hafele and Richard E. Keating in their experimental paper, And their measurements values of the experiments;

The superposition of time dilation effects in Special and General Relativity, these theoretical predictions and measurements values there's no any reason to let the atomic clock to show.

Therefore, these theoretical predictions and measured values listed by the two scientists, as well as these values high degree of agreement, can only be products of imagination or fabrication,

perhaps due to a miraculous stroke of luck.

Calculations and data are undoubtedly the hardcore foundation of scientific papers, but complex mathematical formulas only make sense when guided by correct concepts and definitions. The theoretical system of physics and experimental methods should be led by correct concepts and definitions. Two American scientists and Einstein, piled up mathematical formulas arbitrarily.

Without correct concepts and definitions for standardization, no matter how beautiful the form of mathematical formulas is, they will be hollow or incorrect.

From this perspective, all validation experiments of relativity must be re-examined at the level of concepts and definitions, including the three validation experiments of general relativity, the experiment on the lifetime extension of moving muons, and validation experiments of gravitational wave, to assess the authenticity of these validation experiments!

The Chinese wording in this paper is relatively precise. However, there might be errors in the Chinese-English translation process. Should there be any improper translations, kindly offer your criticism.

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