

# **CHAPTER 4**

## **DISCUSSIONS**

## 4.1 Is Light Speed Constant or Not

Is light speed constant or not? This is a question debated by the scientists for over a century. Actually, it's a simple question and the answer is right there. But somehow people are just blind to see.

We know that the light speed with respect to any stationary objects on Earth is constant in all direction. However, in some equipment which is not stationary on Earth, the light speed with respect to the equipment is not constant. Hereby we are going to discuss some phenomena and effects which disprove the proposition of the constancy of the speed of light.

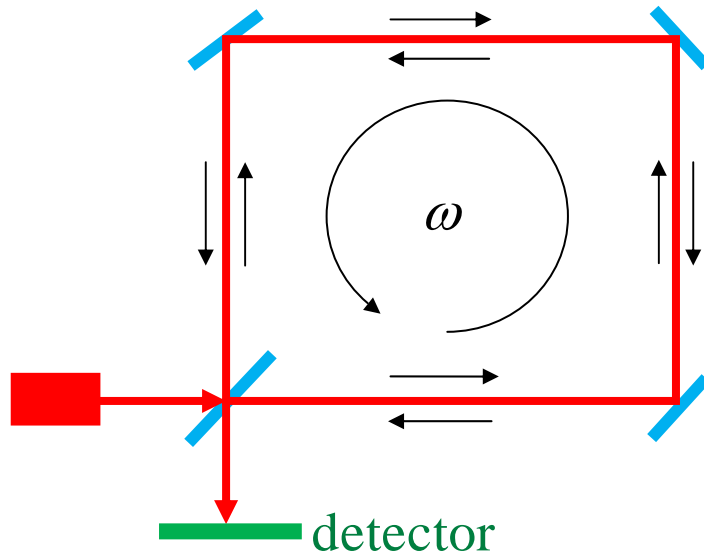
### **4.1.1 The Space Dragged by Ground**

Since there is no relative velocity between Earth and the space vortex of the sun, hence the revolution speed of Earth around the sun can not affect the light beams on Earth. Meanwhile, since all of the objects and even the air are moving synchronously with the rotation of Earth, hence everything on the ground surface including the space inside the atmosphere can be taken as a closed system. This means the space inside the atmosphere is dragged synchronously by Earth rotation. The space inside the atmosphere will not have any relative velocity with respect to the atmosphere and ground. And hence the relative velocity of light with respect to everything inside the atmosphere which is stationary with respect to the ground surface will be the same in all direction.

The space inside the atmosphere is dragged by Earth rotation synchronously. But the space flow outside the atmosphere will follow the equation ( $v = \sqrt{GM/r}$ ) derived in *Chapter 3 Part 3.6*. In this case, some experiments like the Michelson–Morley experiment which has been performed on the ground surface, stationary with respect to ground, can never detect the relative velocity of the medium of light since there is no relative velocity of the space with respect to the ground surface. And the result will be the same even outside the atmosphere. This complies with all the experiment results on Earth.

### 4.1.2 Sagnac Effect

The Sagnac effect (also called as Sagnac interference), named after French physicist Georges Sagnac, is a phenomenon encountered in interferometry that is elicited by rotation. The time difference  $\Delta t$  between the light beams travel on a Sagnac interferometer CW and CCW is proportional to the loop area  $A$  and the angular speed  $\omega$  of the interferometer.



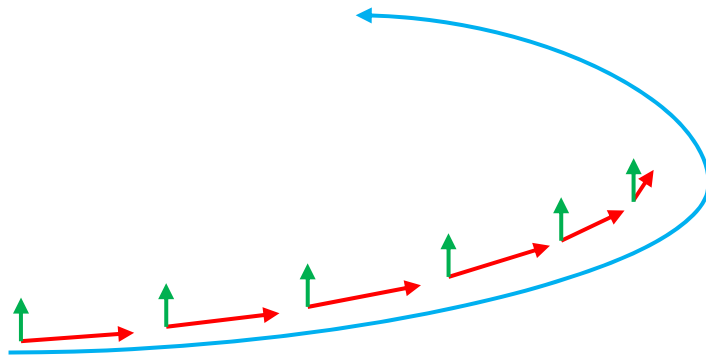
(Fig4.1-1: The basic construction of a Sagnac interferometer)

$$\Delta t = \frac{4A\omega}{c^2}$$

This actually disproves the proposition of the constancy of the speed of light though some relativists tried to explain it in some other way. However, the experiment result complies with the mathematical calculation exactly. And the calculation is based on the time difference of the two light beams traveled in opposite way. These are undoubted facts. Since there is time difference between the two coherent light beams to the same detector, this proves the two coherent light beams traveled the same path in different relative speed with respect to the detector.

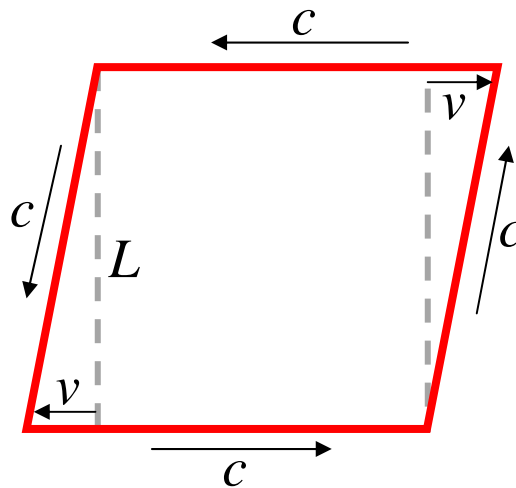
### 4.1.2 Fiber Optic Gyroscope (FOG)

A fiber optic gyroscope (FOG) is a gyroscope based on the Sagnac effect that uses the interference of light to detect mechanical rotation. The FOG can somehow detect the Earth rotation. This seems to be contrary to our postulation that the space has no relative velocity with respect Earth rotation. However, for the Sagnac interferometer on Earth, there is another effect which will affect the photon when it's moving north-south, the Coriolis Effect.

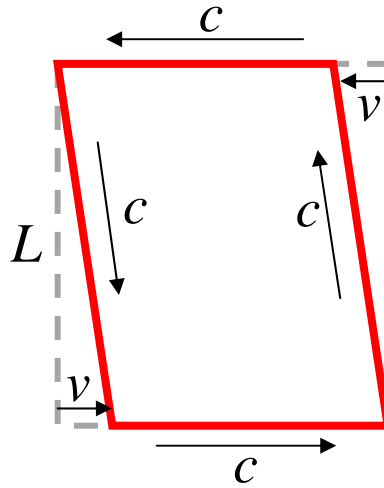


(Fig4.1-2: The Coriolis Effect on the Sagnac interferometer)

When the photon is moving in the north-south direction, the Coriolis Effect will force it to shift in east-west direction. However, the speed of light will remain constant even it is shifting transversely. Below we use a square loop to demonstrate the change of the light path.



(Fig4.1-3: The Coriolis Effect at Northern Hemisphere)



(Fig4.1-4: The Coriolis Effect at Southern Hemisphere)

Although the Coriolis Effect will not affect the light speed, however it does change the direction of the light beam. When the light beam moves for a distance  $L$  in north-south direction, it will also shift a distance  $L \cdot \frac{v}{c}$  in east-west direction. And hence the length of the light path in east-west direction will become as:

$$L' = L \pm L \cdot \frac{v}{c} = L \cdot \left( 1 \pm \frac{v}{c} \right)$$

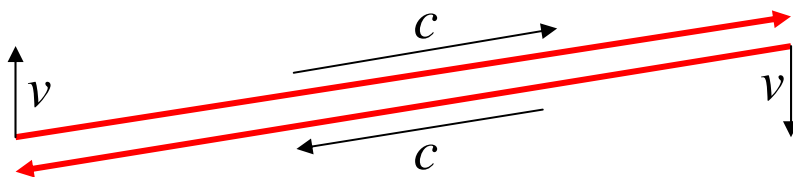
And hence change the time for the light to travel in east-west direction. This equals to change of the light speed though even the light speed does not actually change.

$$L \cdot \left( 1 \pm \frac{v}{c} \right) : L = c' \cdot t : c \cdot t \Rightarrow \left( 1 \pm \frac{v}{c} \right) : 1 = c' : c$$

$$\rightarrow c' = \left( 1 \pm \frac{v}{c} \right) \cdot c = c \pm v$$

In this case, the rotation of Earth detected in Northern and Southern Hemisphere will have the same magnitude but reverse direction. If Earth rotation detected on a FOG is caused by the change of light speed, the direction detected in Northern and Southern Hemisphere should be the same. If Earth rotation will change the light speed, it should be able to be detected on a sophisticated interferometer. This does not in compliance with the fact.

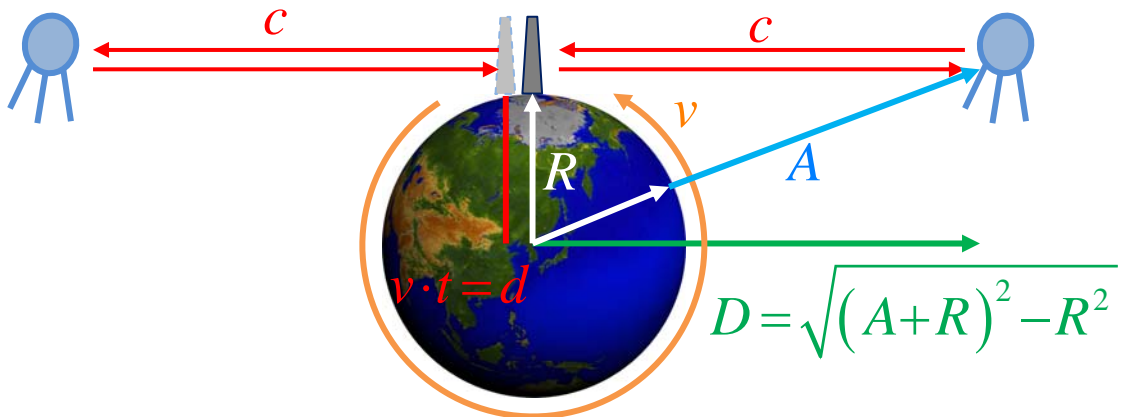
For the Michelson–Morley interferometers, the light beams do not travel in a circular loop but only been reflected back and forth, the shifting of light beams will not change the length of light path. And the shifting of the light projection will compensate with each other. And hence can not detect the Earth rotation.



(Fig4.1-5: The Coriolis Effect on an interferometer)

### 4.1.3 Satellite and Earth Rotation

In the case of the geosynchronous satellites transceiving signals to the ground from an altitude of about 36,000km while Earth is rotating, the ground speed will affect the relative velocity of light since there is a relative velocity of the ground station with respect to the satellites.



(Fig4.1-6: Satellite and Earth rotation)

In this case, the distance between the ground station and the satellite will equal to about 36,631km. And hence the electromagnetic waves will have to take about 0.25s to travel back and forth for one trip. This makes measuring of the difference of the relative velocity caused by Earth rotation possible by calculating the time difference of the signal transceiving.

Here comes a critical inconsistency to the proposition of the constancy of the speed of light. First we choose the Solar System as a rest reference, we assume the speed of light travels from the ground station to the satellite and back to the ground station is constant  $c$ , no matter it's been dragged, partially dragged or no drag. Based on this assumption, we calculate the time for the light travels in this distance.

$$2D \pm d = c \cdot t \Rightarrow 2D \pm v \cdot t = c \cdot t \quad , \quad d = v \cdot t$$

$$\Rightarrow t = \frac{2D}{c \pm v}$$

In this case, the electromagnetic waves will have to take less or more time to travel the distance altered by the displacement of the ground station. As a result, the electromagnetic waves will then travel in different periods of time. And hence there comes different relative speeds of the light with respect to the ground station since the result  $c \pm v$  is just the definition of the relative speed.

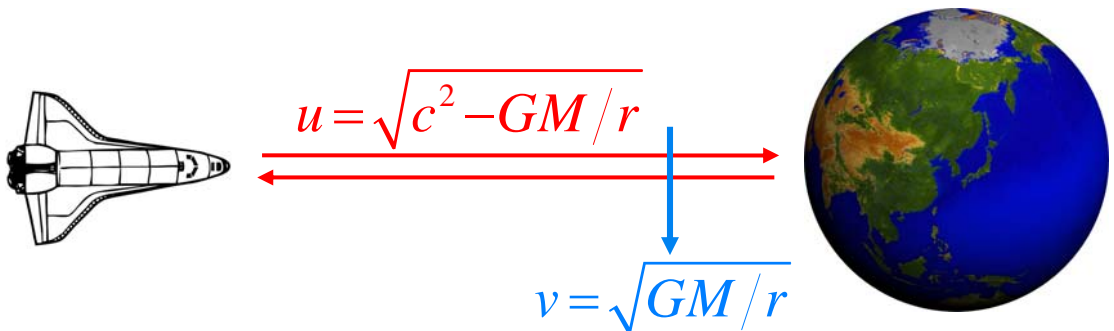
If one insists the speed of light to be constant  $c$ ,  $c \pm v = c$ , that means there is no relative velocity between the ground station and the satellite. Not  $c' \pm v = c$  because there will then have two different light speeds. In this case, the transceiving time should be independent of Earth rotation, then how will we measure the distance? One might also claim that the first assumption of the light speed to be constant  $c$  for our calculation is wrong. Therefore, the constant light speed can only be applied to either one of this example, the first assumption or the end result. This means two different values of the light speed.

### 4.14 Light Speed vs. Spacecraft

If we take the Solar System as a rest reference frame, for the light comes from the outer space heading towards the sun, the relative light speed with respect to the Solar System will reduce little by little gradually. The light speed with respect to the space vortex of the sun is constant  $c$ , however, the speed of the space vortex with respect to the sun complies with the equation ( $v = \sqrt{GM/r}$ ). In this case, the relative speed of light with respect to the stationary sun  $u$  can be derived as below:

$$u = \sqrt{c^2 - v^2} = \sqrt{c^2 - \frac{GM}{r}}$$

Hence the light speed with respect to the stationary sun will decrease while it's heading towards the sun and increase while it's leaving away from the sun.



(Fig4.1-6: Signals transceiving from a spacecraft to Earth)

For a spacecraft heading towards the sun or getting away from the sun in the space, the relative velocity of the spacecraft with respect to the sun will remain constant if there is no acceleration or deceleration by any external force. In this case, if the spacecraft is transceiving the signals to the ground station on Earth while it's returning to Earth, we will perceive that the spacecraft is speeding up because the light speed is decelerating while the spacecraft remains at constant speed. On the contrary, we will perceive that the spacecraft is slowing down if the spacecraft is leaving away from Earth because the light speed is accelerating while the spacecraft remains at constant speed.

### **4.1.5 Conclusions**

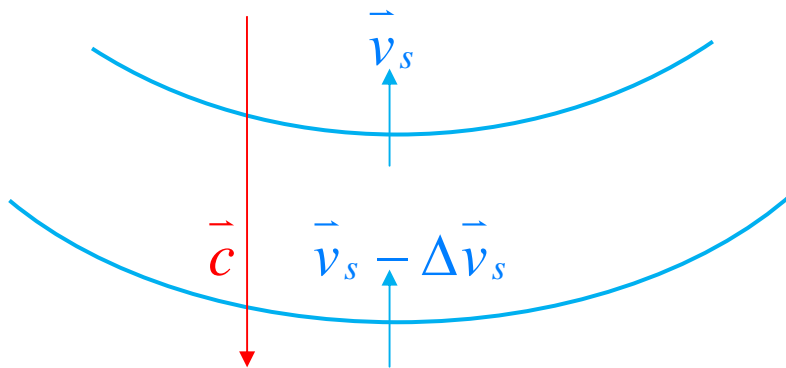
According to the examples demonstrated in this section, we can have the following conclusions:

- 1) As a conclusion, the speed of light with respect to its medium is constant.
- 2) The speed of light varies in accordance with the relative velocity of the observers with respect to the medium of light.

## 4.2 Gravitational Redshift and Blue-shift

Redshift and blue-shift of light waves happens when a light wave travels through a gravitational field. The light waves leaving out from the gravitational field will cause the redshift. On the contrary, the light waves entering into the gravitational field will cause the blue-shift.

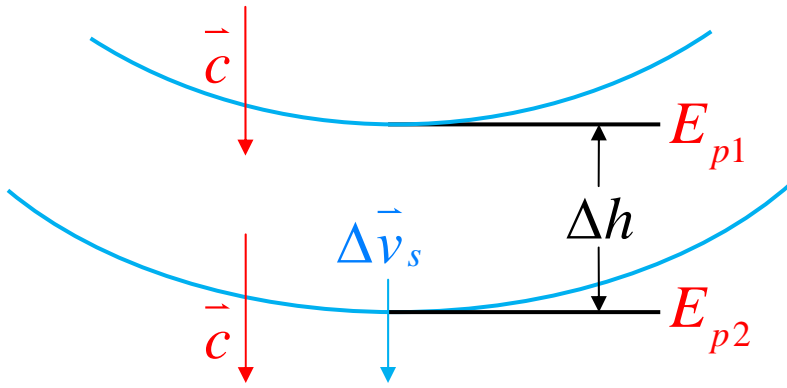
When a light wave is leaving out from a gravitational field, this means it's getting away from the space vortex of the gravitational field. In a space vortex, the space is being dragged into the center of the vortex, the speed of the space flow in this direction is inversely proportional to the square of the distance. This means the speed of the space flow which pointing towards the center of the vortex will become slower with increase of the distance with respect to the vortex center.



(Fig4.2-1: Light wave leaving away from a space vortex)

This can be taken as the speed of the space flow has increased for a value of  $\Delta\vec{v}_s$  in the reverse direction with respect to the inner space.

Since space is the medium of light, the speed of light will be limited to the light speed in that medium and hence the light speed in the inner and outer place of the space vortex will always be the same light speed  $c$  in vacuum. In this case, the photon has to speed up to catch up with light speed when leaving away from the gravitational field.



(Fig4.2-2: Light speed with respect to the speed of the space flow)

In this case, the photon has to consume some energy and transmute it into the kinetic energy to speed up. On the other hand, this can be taken as the photon is increasing the gravitational potential energy. However, the total energy of a photon should conserve with itself during traveling in the space. In this case, the energy transmutation of a photon moves for a distance of  $\Delta h$  in the space vortex can be described as below:

$$E_{p1} = E_{p2} + mg\Delta h$$

$$\Rightarrow E_{p1} > E_{p2}$$

$$\Rightarrow h \cdot f_{p1} > h \cdot f_{p2} \Leftrightarrow f_{p1} > f_{p2} \quad , \quad \because E = h \cdot f$$

$$\Rightarrow \frac{c}{\lambda_{p1}} > \frac{c}{\lambda_{p2}} \Leftrightarrow \frac{1}{\lambda_{p1}} > \frac{1}{\lambda_{p2}} \quad , \quad \because c = f \cdot \lambda$$

$$\Rightarrow \lambda_{p1} < \lambda_{p2}$$

In this case, the photon will lose energy but keep the light speed with respect to the flow of space and hence increases its wavelength while it's leaving away from a gravitational field. This causes the redshift to the light waves.

Comparatively, while a photon is entering into a gravitational field, it will gain some energy but keep the light speed with respect to the flow of space and hence decreases its wavelength. This causes the blue-shift to the light waves.

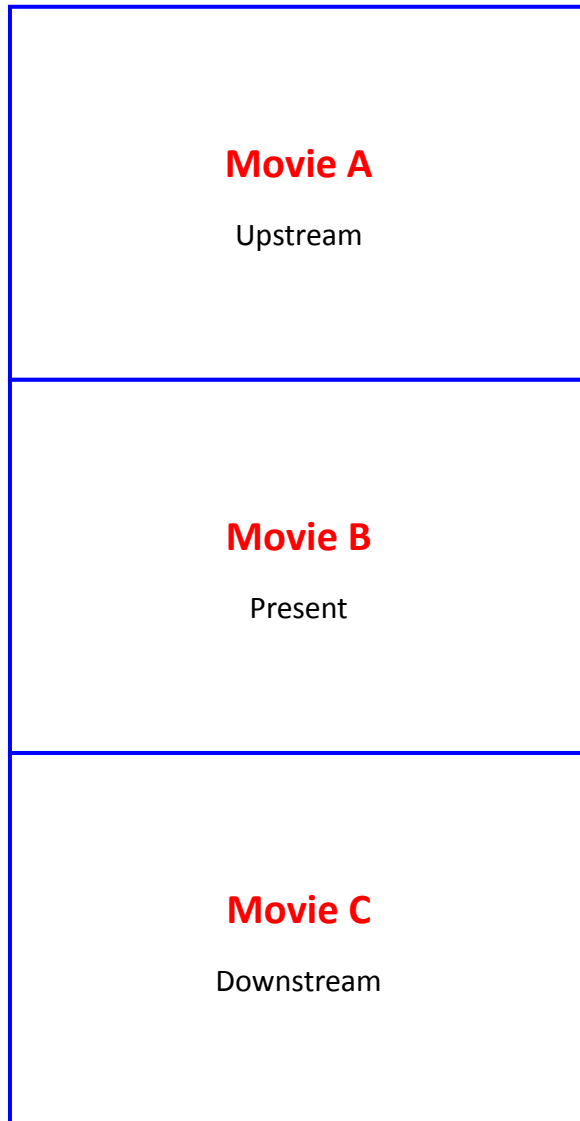
## **4.3 Construction of the 4D World**

Though we can not measure time in the way we measure the distance, but we do can measure time indirectly by measuring the change of an object. That is because a 3-dimensional equipment is not capable of measuring in 4-dimensional. Anyway, the 4th time dimension is true though even we can't see it. Thus, the universe must be a 4-dimensional one actually. And our world is a 3D section in that 4D universe.

### **4.3.1 Construction of a 4-dimensional World**

As we have defined the-future and the-past of our world as an upstream and a downstream time domain of our present world in *Chapter 1*. Though the worlds of the upstream and downstream time domains are defined as different worlds from ours, because they may not be the same as our world, however, it is also possible that some of these time domains maybe exactly the same with our world but in a little time advance and delay. This is similar to a film movie, for each frame of a video film, every single frame can be taken as an independent picture, a different 2D world. They do not have physical relationship among one another though even they are linked in a frame sequence. We see the movie plays just because we are looking at different frame pictures in a sequence.

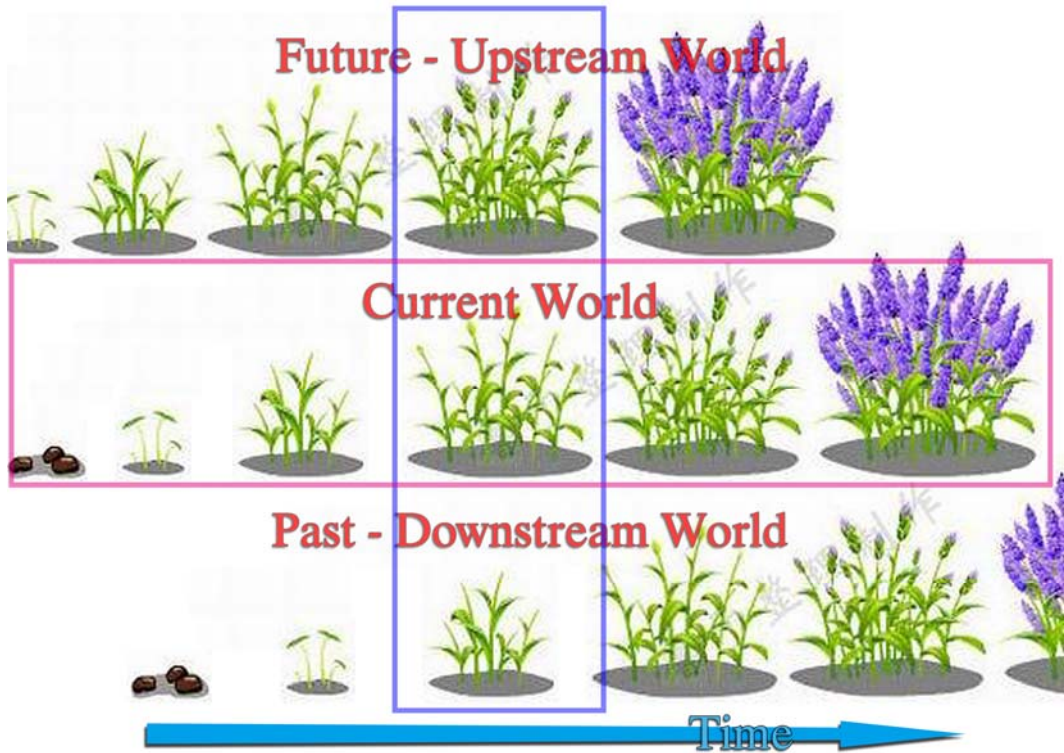
The time domains are all linked one after one like a film. The despace holes connect between the time domains and lead the space to flow through them. This somehow makes all the time domains to have the same story. Just like all the time domains are playing the same movie with differential time difference. And makes the upstream time domains to become the same as our future, makes the downstream time domains to become the same as our past. This is similar to play several identical movies on the screens placed in series. But there is a little time difference among these movies. The movies of the upstream time domains are always precedent to those in the downstream time domains. This can be shown as the following picture:



(Fig4.3-1: Identical movies played and placed together)

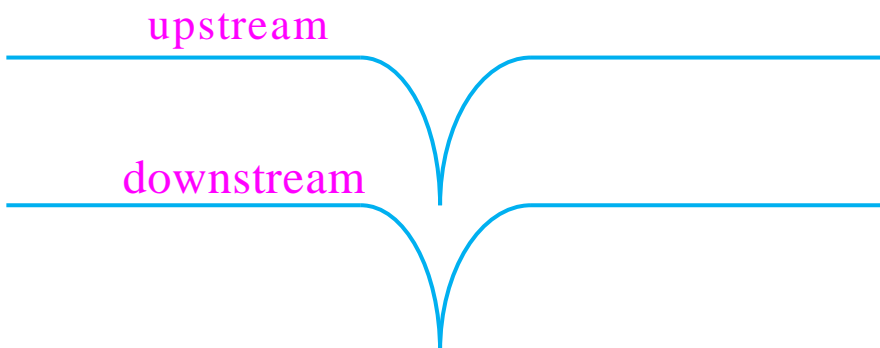
### **4.3.2 Relation between Upstream and Downstream Time Domains**

According to above, how the 4-dimensional world works can be simulated as the below picture. The flowers are growing in all the time domains. They are growing in exactly the same speed. However, the flowers in the upstream worlds always grow precedent to those in the downstream worlds. When the flowers in the upstream bloom, the flowers in the downstream worlds may still in buds or maybe still be as seeds.



(Fig4.3-2: A simulation of a 4D world)

Since there are despace holes connecting between the upstream and downstream time domains, the despace holes in the upstream time domain will end up in the downstream time domain and start up with another despace hole in that time domain. In this case, the two conjunction time domains will be almost exactly the same.



(Fig4.3-3: Despace holes between time domains)

However, since the direction of the space flow in  $T$  axis is always from the upstream to the downstream, if the despace holes in the upstream move or change 3-dimensionally, it will then affect those in the downstream. This causes the downstream world to follow after the upstream world. In this case, if there is any slight change in the upstream time domain, it will then affect all the downstream time domains to change accordingly. If the flowers wither or dry-up in the upstream world, it will then happen to those in the downstream worlds as well.

## **4.4 Time-Space Energy**

Undoubtedly, the whole world is “moving” towards its future continuously. Everything and every corner in the world is also “moving” towards the same future in the same speed and phase. In this case, is “Time” itself some kind of energy?

We know that the Gravitation is a kind of powerful energy and it's inexhaustible though even we can not use it freely since everything will finally touches the ground. However, it's no doubt that the Gravitation is a kind of energy of the universe. According to our theory, the Gravitation is caused by the space drag. This means such energy is the power of the space flow. And this space flow flows in time dimension. This is the energy of the time-space.

### **4.4.1 Conservation in 4-dimensional**

First of all, conservation in 3-dimensional space can be invalid sometimes, because conservation is based on time and space. That should be 4 dimensional.

We know that it requires a lot of power to drive a train to a very high speed. But when we travel on a train, we can not perceive such powerful energy. Everything on the train acts exactly the same as the train is not moving. It consumes the same amount of the energy to move on the train no matter the train is moving or not. When the train is moving in a very high speed, if we throw something out of the train, it will release a lot of energy once it touches the ground. If someone wants to throw an object onto that train from the ground, he will have to deliver energy to the object.

The universe is similar to above example. The whole universe is like the train travels in time dimension. We can not drain the energy from time dimension because we all move in the same speed in time dimension. If one can change its speed in time dimension, he will be able to drain and release energy from the 4th dimension into the 3-dimensional world. This can be described as the following:

$$E_{x,y,z} = F_{x,y,z} \cdot S_{x,y,z} = F \cdot \begin{bmatrix} S_{\Delta x} \\ S_{\Delta y} \\ S_{\Delta z} \end{bmatrix} \quad , \text{3-dimensionally}$$

This equals to:

$$E_{x,y,z,t} = F \cdot \begin{bmatrix} S_{\Delta x} \\ S_{\Delta y} \\ S_{\Delta z} \\ 0_{\Delta t} \end{bmatrix} = F \cdot \begin{bmatrix} S_{\Delta x} \\ S_{\Delta y} \\ S_{\Delta z} \\ S_{\Delta t=0} \end{bmatrix} \quad , \text{4-dimensionally}$$

We can't perceive the power of time because we are in the same speed with the whole universe in time dimension. We are on the same train.

$$E_{x,y,z,t} = F \cdot \begin{bmatrix} S_{\Delta x=0} \\ S_{\Delta y=0} \\ S_{\Delta z=0} \\ S_{\Delta t=0} \end{bmatrix} = F \cdot \begin{bmatrix} 0_x \\ 0_y \\ 0_z \\ 0_t \end{bmatrix} = F \cdot 0 = 0$$

If we can drain energy from time dimension:

$$E_{0,0,0,t} = F \cdot \begin{bmatrix} 0 \\ 0 \\ 0 \\ s_{\Delta t} \end{bmatrix} = F \cdot s_{\Delta t}$$

This will not cause the object to move in time dimension but cause the flow of space to change its flow speed in time dimension. If we drain energy  $E$  from time dimension, we make the space flow to release energy  $E$  and decelerate. If we release energy  $E$  to time dimension, the space flow will absorb energy  $E$  and accelerate.

## **4.5 Time Travel**

I've spent all my life in searching for a way to travel in time dimension. However, after these years of researching and thinking, I realized that it is impractical to spend all the resource of mankind to send one single person to travel in time for his own good. Meanwhile, how can we make sure the time we arrive is the time we set? We can not estimate how dangerous it is to travel in time dimension.

### **4.5.1 Traveling**

In this new era, we should have a new way of thinking. What is traveling? A man moves from one place to another one? Do we really have to be at that place to be defined as arrived?

When we position at one place, we can see the sight, hear the sound, touch things, and communicate with others where we are. However, what if we place a camera, a microphone, a speaker, some tactile sensors to simulate the feeling of touch, and some actuators to accomplish our demand at the place where we are supposed to be? And we can just sit in our office or lie on the bed to receive these information and signals. Is there any difference? We can transport the equipments rather than transport our body.

We shave everyday. We scissor nails everyday. We might lose our hands or legs and keep alive. What if someday we lose our head or our brain? Some computers have multiple processors as backups of each other. Why can't we have backup of our brain or our whole body? Then we can send our backup body to travel and send the signals back to the main body at the safe place.

### **4.5.2 The Echo of Time**

Rather than traveling in time dimensions, I think it would be easier and more practical of finding a way to communicate between time domains. In this case, we have to find a kind of the signal which can propagate in time dimension first.

According to the Theory of Despace, the space flow caused by Gravitation in current world will affect the space flow of the other world behind our world. It may also affect the space flow of the world ahead of our world. If we can vary a certain mass of an object in a meaningful way, it will be possible to be detected as a signal of Gravitational Wave in the other world. And hence we might be able to communicate between time domains via some kind of signals like this.

There might be some other ways to communicate between time domains. Somehow, people can predict the fortune or dream what happens in the future. It seems our brain wave in the current time domain can be dragged into the downstream time domains by the time-space flow. And hence affect the other one's (or the one's own self in different time domain) brain wave as an echo in that time domain.

How can we send messages to our future? It's simple. Write a letter and keep it at a safety place. Ask someone to remind you to read this letter on the day you appointed. Then you've just send a message to your future. Actually, how we recall our past everyday is just as reading the message we saved in our mind in the past.

Though the worlds of the upstream and downstream time domains may be defined as different worlds from ours, however, they may also be taken as our future and past. In this case, if all the different time domains are positioned closely, the brain of each one of us in each time domain can act as an amplifier of our brain wave. And thus the thought of the one at the upstream time domain can be passed through time dimension to the downstream time domain. And hence affect the one's thought in the downstream time domains. Or in other words, our thought in the-future can affect our thought in the-past, though even they are not our real future nor the past since they are the different time domains.

As our thought being passed from the future (upstream) to the past (downstream) and affect our thought in that time domain, and the one of ourselves in the downstream past will also bring his thought been amplified (memorized) into his own future. Though the future of the downstream time domain is not actually our

future in our time domain, however, if they are the same, if what happened in other time domains is exactly the same with what will happen in our time domain, in this case, the future of the downstream time domain can be taken as the same as our future in our time domain. This generates an echo of our thought passing back and forth in time dimension. This is the echo of time.

## 4.6 Time Machine

It is the dream for a lot of people to travel in time dimension. To travel in time dimension, we might need a time machine or by some other means. However, I will not discuss about how to build a time machine. I do not know how to build the time machine. Here I only discuss how the time machine might work.

### **4.6.1 Definition of time travel**

What alleged as time travel is to transport in time dimension. This means to vary one's vector or position in time dimension.

**Example A :** One man spends a period of time to transport from spot A to spot B in space dimension. This man might experience different length of time than others in the world. Dose he travels in time dimension? The answer is NO.

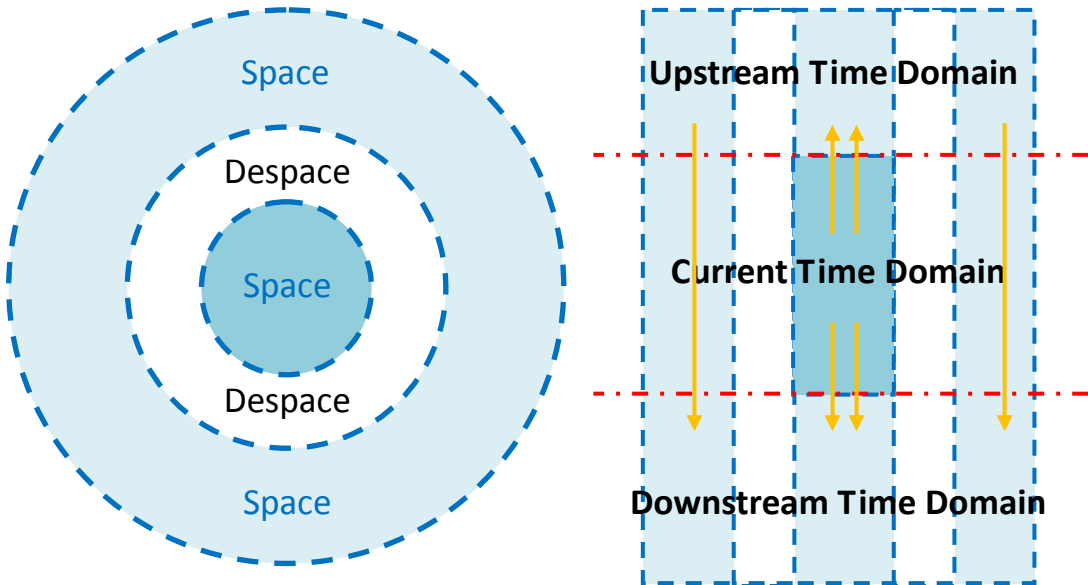
**Example B :** One man freezes his own time or himself for a period of time and unfreezes later. He wakes up in the future. Dose he travels in time dimension? The answer is NO.

Within the same time domain, no matter how you slow down or speed up your time, which might means your time runs slower or faster than others, your one minute might be longer or shorter than others', however, you are still in the same time domain. You will not jump back to the past which you have experienced. You will not jump forward to the future and skip the time period which you have to experience.

Therefore, to travel in time dimension, one must be isolated from the world and shift between time domains. For example, if one wants to transport into the-future, he will have to shift into the upstream time domain with a certain length of time precedent to our world. If one wants to transport into the-past, he will have to shift into the downstream time domain with a certain length of time lag behind our world.

### 4.6.2 An eye hole

The only one way to isolate one thing from the world is to be surrounded by the despace 3-dimensionally as below, note that the circles would be taken as spheres in 3 dimensional space:



(Fig4.6-1: An eye hole)

According to figure 4.6-1, it looks like a region of the space inside a black hole. Although the space outside of the black hole will be dragged into the despace and the speed of the space flow is extremely high, however, the speed of the space flow at the center of the black hole could be very slow. It looks like the space at the center will be drained out eventually, however, the upstream time domain will also keep pouring a certain quantity of the space into the current time domain 4-dimensionally. The center space will be keep isolated if the speed of the space flow of the space being dragged into the downstream time domain and the one being poured from the upstream time domain at the center region are counterbalanced.

It looks similar to an eye of the space and hence the name an “**eye hole**”. When the space in the center of the eye hole being isolated by the despace, the space flow will keep flowing in time dimension, from the upstream to the downstream time domains 4-dimensionally. If the despace gap is perfectly matched with the speed of the space flow, the space in the center of the eye hole will keep isolated. In this case, the speed of the space flow at the center of the eye hole can vary independently from the outside.

If we place one machine big enough at the center of the eye hole, and this machine can drain and release energy of the time-space in the eye hole, it will be able to control the space flow of the whole center space. We may call it as *time machine* in this article. Since the space of the whole 4D universe is flowing at a certain speed, if the speed of the space flow of the center space of the eye hole is different from the outside, it will cause the center space of the eye hole to shift up and down in time domain with respect to the outside time domains. Since the upstream time domains equal to our future and the downstream time domains equal to our past, hence shifting in time domains equals to travel in time dimension.

### **4.6.3 Transmitting 4-dimensionally**

There is no easy task to create or eliminate a black hole, not to mention the eye hole. It's not possible to pass through the despace into the eye hole and get out. You have to destroy the black hole or to be destroyed. In other words, it's not possible to ride on the time machine to do the time travel.

However, you don't have to be actually travelled. Sometimes you would just like to experience the travel not the travelling. Just like watching a movie or playing a video game. You can have a remote controllable device in another time domain which can receive control signals from your time domain and transmit signals back to your time domain. Of course, the control signals should pass through the weakest point of the despace gap of the eye hole and then transmit into another time domain.

Normally, the space flow in time dimension is very fast, one way from the upstream to the downstream. So there is no a signal can be transmitted from the downstream time domain into the upstream time domain directly. In this case, the signals must be saved in the time machine when received. The time machine will then have to shift upwards in time dimension. The time machine will repeat the signals when it reaches the designated time domain. Normally, an upstream time domain from ours to ensure the signal can pass through the eye hole and compensate the time delay for the signal to reach the receivers. Then we can communicate between different time domains via this method and hence to simulate the time travel.