SPECIAL RELATIVITY
reviewed and corrected

How to reveal the deviation ?

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INTRODUCTION

The new interpretation of the famous thought experience by Einstein that I have presented in my document "Special Relativity Theory reviewed and corrected (first part)" has permitted to show up the possibility to reveal, for any mobile, its proper movement without a need of an external reference, unlike Galileo's belief.

Effectively, for an observer aboard a mobile moving at constant speed **v**, a light beam emitted perpendicularly to the direction of displacement, is deviated by an angle **a = arctan v/c** towards the back of the mobile. I have demonstrated in this document that this angle **a** is the maximum value for the deviation.

In that document, I have also established a set of values of **a for** different speeds of displacement **v**. Finally, I have concluded that no mobile on earth could permit us to verify this deviation.

What we cannot accomplish down here on earth, we'll have to do it else where.

Let's go outer space, and aboard of .....

Our spaceship called Earth …..

Voilà, Monsieur Galileo, here's your sideral boat !

Let's recall some data.

v/c	km/s	D	M	S	
1	300000	45	0	0	
0,9	270000	41	59	13	
0,8	240000	38	39	35	
0,7	210000	34	59	31	
0,6	180000	30	57	49	
0,5	150000	26	33	54	
0,4	120000	21	48	5	
0,3	90000	16	41	57	
0,2	60000	11	18	35	
0,1	30000	5	42	38	
0,01	**3000**	**0**	**34**	**22**	
0,001	300	0	3	26	
0,0001	**30**	**0**	**0**	**20**	**Earth**
0,00001	3	0	0	2	
0,000001	0,3	0	0	0	
0,0000001	0,03	0	0	0	
0,00000001	0,003	0	0	0	

a	v (km/s)
1"	1,454441043
30"	43,63323161
1'	87,26646506
30'	**2618,060337**
1°	5236,519478
20"	**29,08882096**

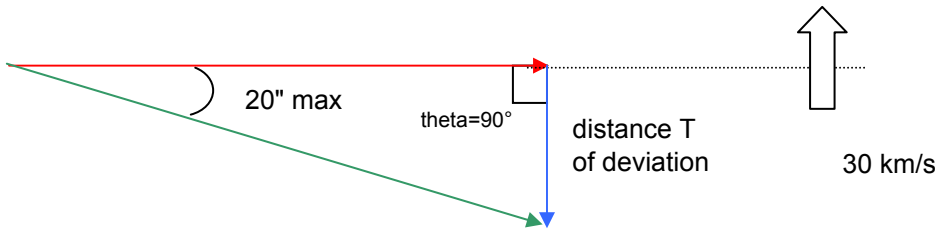
For an angle of deviation of one second of arc, the speed of a mobile must be at least 5236 km/h that is 1,45 km/s.

Our Earth, with its 30 km/s around the Sun, will permit us to verify the deviation of the light due to its proper movement.

But there are some conditions to respect ! Let's try to list them all.

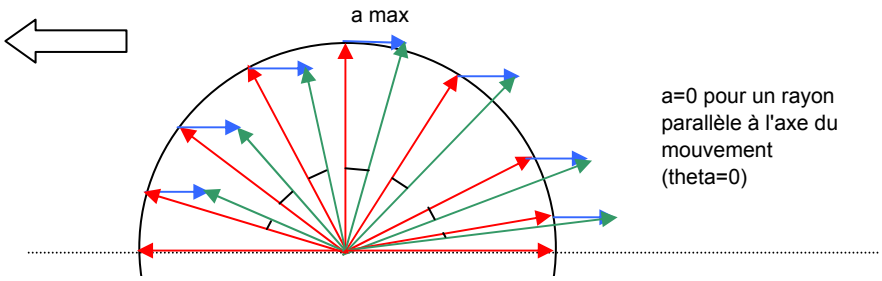
A) Condition for maximal deviation angle

For the Earth (speed 30 km/s), the maximal deviation angle is 20" of arc when the beam is emitted **perpendicularly** to the direction of displacement.



Below, you can see the value of deviation for different angle of emission. The value is the greatest when the route of emission is perpendicular to the axe of movement.

The deviation **a** becomes smaller when this crossing angle ***theta*** diverges from 90°. (In fact, the theta value for maximal deviation angle will shift with higher speed towards the light speed).



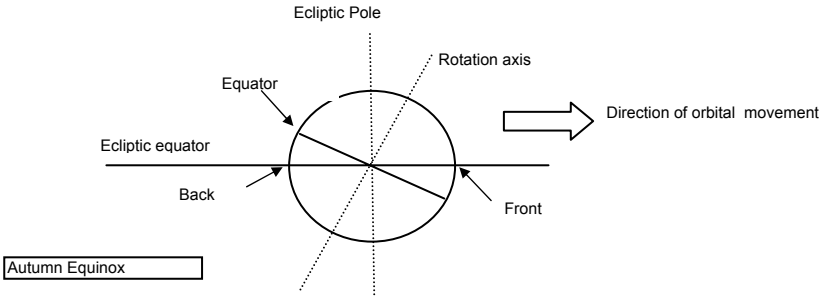
I let you compute the formula giving **a** under **theta** and **v** variations. For theta = 90° and at "lower" speed, you must find a(max) = arctan(v/c).

The way the crossing angle **theta** can affect the maximal deviation can explain why this deviation is, generally, imperceptible for us, terrestrials, in our daily life. Some conditions (spot, moment and measurement time) have to be verified before.

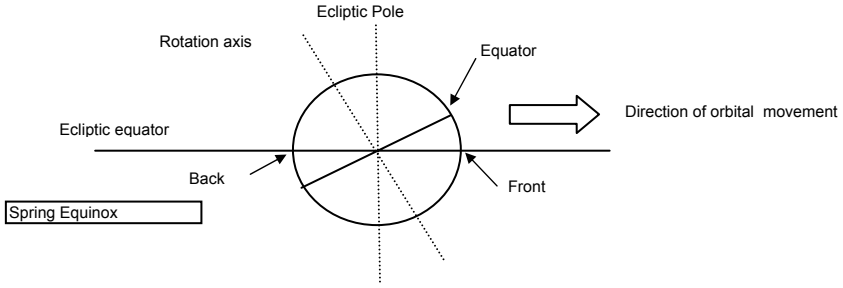
Let's see how.

B) Preleminary spottings of the earth orbital movement

Our Earth is a particular vehicle. When she moves around the Sun, Earth does not show the same front just like a terrestrial car. The seasons will be important for the choice of the location of the test.
The following drawings show Earth at particular points on her annual path. The Sun is not shown but is behind the representation of Earth.

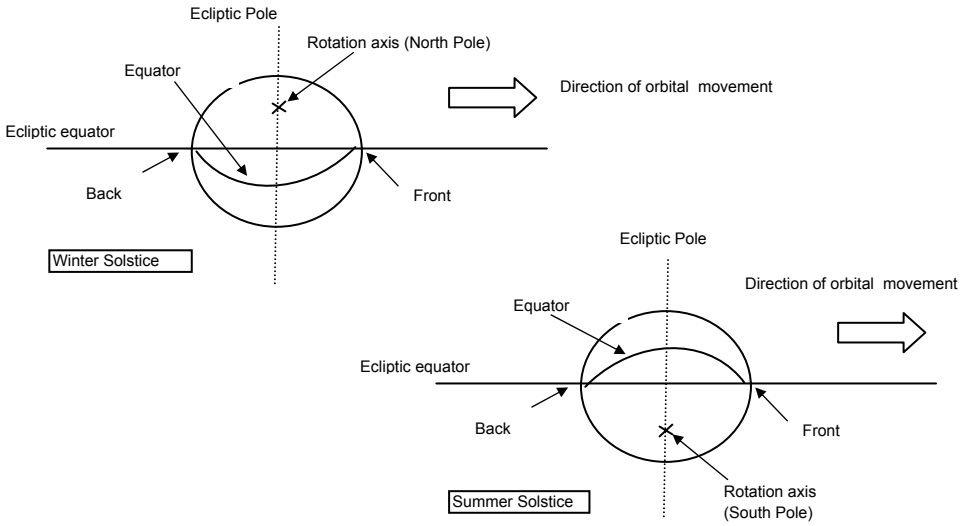


At autumn equinox, the front of Earth is at the latitude of the Tropic of Cancer; the back is the Tropic of Capricorn level



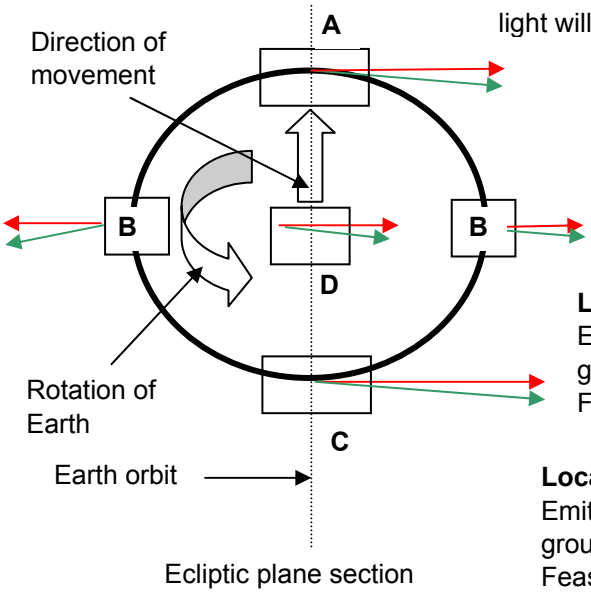
At spring equinox, that's the other way.
The front of Earth is at the Tropic of Capricorn and the back, at the Tropic of Cancer level.

At the solstices (winter and summer), the front and the back are at the Equator level.



C) Location selection

We have to select earth location which will allow us to respect this condition during the measurement time.
The following drawing show Earth viewed by her north ecliptic pole.



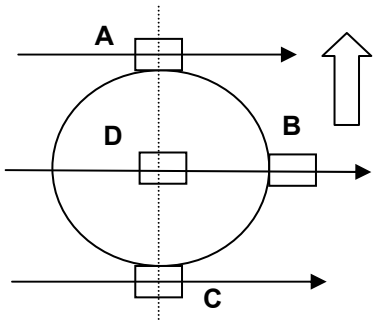
Location A : "front" of Earth
Emitted in a parallel direction to the ground, light will deviate downwards. Feasable.

Location B : "side" of Earth
Emitted towards the sky, light will deviate to the west or east depending the choosen side of Earth. Hardly feasable.

Location C : "back" of Earth
Emitted in a parallel direction to the ground, light will deviate upwards. Feasable as for A location.

Location D : at the poles (écliptical)
Emitted in a parallel direction to the ground, light will deviate to the west. Feasable.

For sceptics ones and to use the representation of the lift cabin dear to Einstein, the A location looks like a cabin which goes up, pushed by the Earth. Location C is drawn downwardsby the Earth; locations B et D are drawn by the side.



Important point :

The choice of location for the test will define the moment in the daytime when the maximal deviation will be visible.

Location A : at dawn
Location B : at noon or midnight
Location C : at sunset
Location D : any time we want

D) Determining the duration of the test

We have to determine the measurement duration and thereby the distance between sender and receivers. This is necessary to get the condition of immobility of the instruments even with the ceaseless rotation of Earth.

Values utilizable for every zone

The distance L of 3 km between sender and receivers has been chosen to allow the construction of the measurement zone.

The deviation of 30 cm seems to be large but that is in fact the distance covered by Earth during 0.00001 second.

Time (s)	Deviation(km)	Distance L(km)
1	30	300000
0,1	3	30000
0,01	0,3	3000
0,001	0,03	300
0,0001	0,003	30
0,00001	**0,0003**	**3**
0,000001	0,00003	0,3
0,0000001	0,000003	0,03
0,00000001	0,0000003	0,003
0,000000001	0,00000003	0,0003

But let us don't forget a small detail : the unceasing rotation of Earth.

A intermediate computation is needed.

Calculation of the displacement due to the rotation of the Earth

Daily rotation		Radius (km)	Equator (km)	Tangential speed	
24	hours	6400	40212,38597	0,465421134	km/s
86400	seconds				

During **0,00001 s,** the ground has moved **4,65421E-06 km**
that is **4,654211339 mm**

The value of the displacement due to the rotation of the Earth may be considered as insignificant and ignored.

NB : that value computed above is the maximal value at the equator level.

The displacement is smaller in the case of the tropics.

Now, let's go for the test.

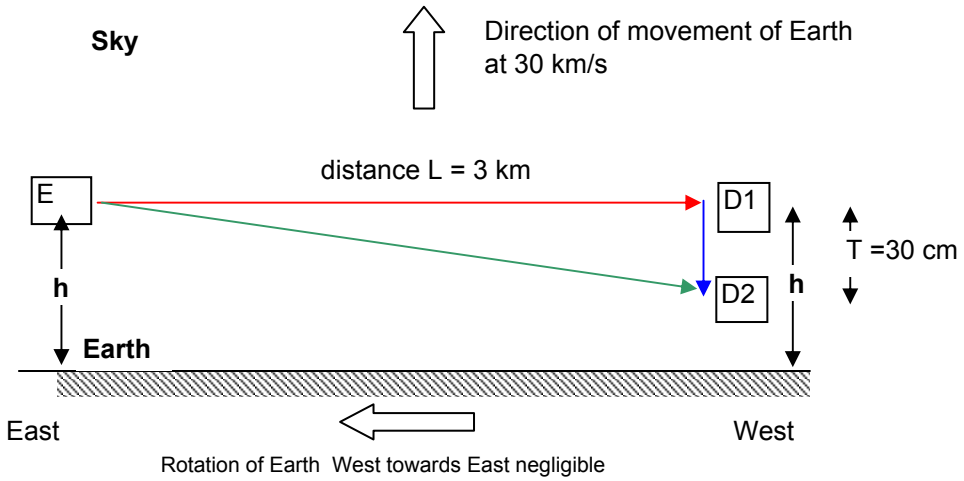
E) Realization of the test

Values for a measurement duration of **0,00001** s

Distance L	3 km
Distance T	0,0003 km or 30 cm
Rotation O-E	4,65421E-06 km or 4 mm

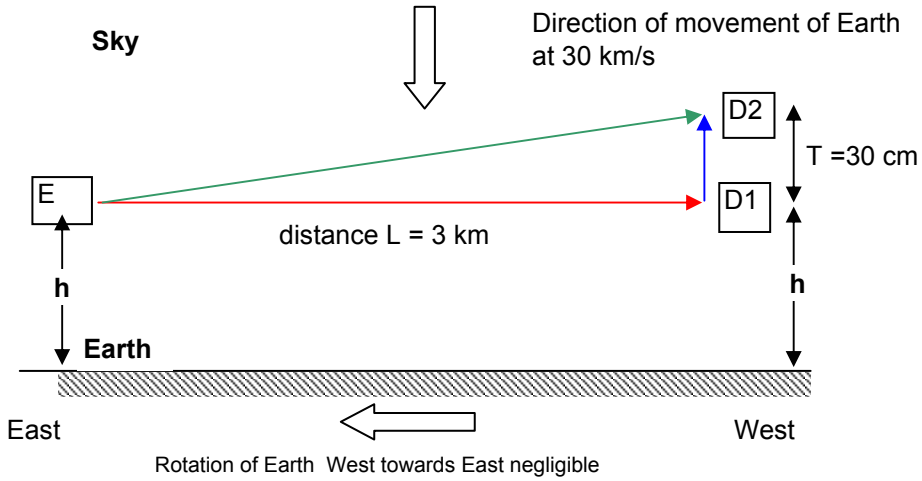
1) Location A : "front" of Earth

We equip the site with a light transmitter E and a receiver D1 at a distance of 3 km and at the same height **h.** Receiver D2 is 30 cm below of D1. We must detect a deviation of the light beam at D2 and not at D1 because Earth has moved this long during the time of measurement.



1) Location C : "back" of Earth

We equip the site with a light transmitter E and a receiver D1 at a distance of 3 km and at the same height **h.** Receiver D2 is 30 cm above of D1. We must detect a deviation of the light beam at D2 and not at D1 because Earth has moved this long during the time of measurement.

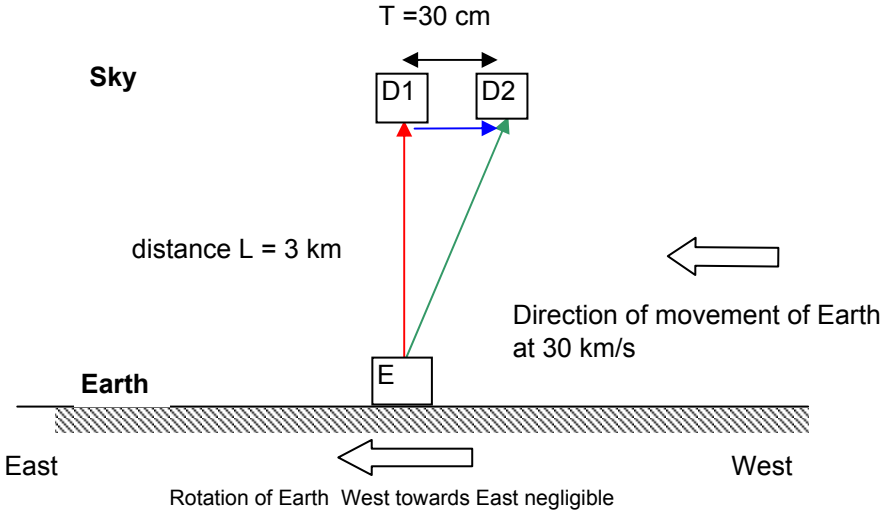


3) Location B : the "sides" of Earth

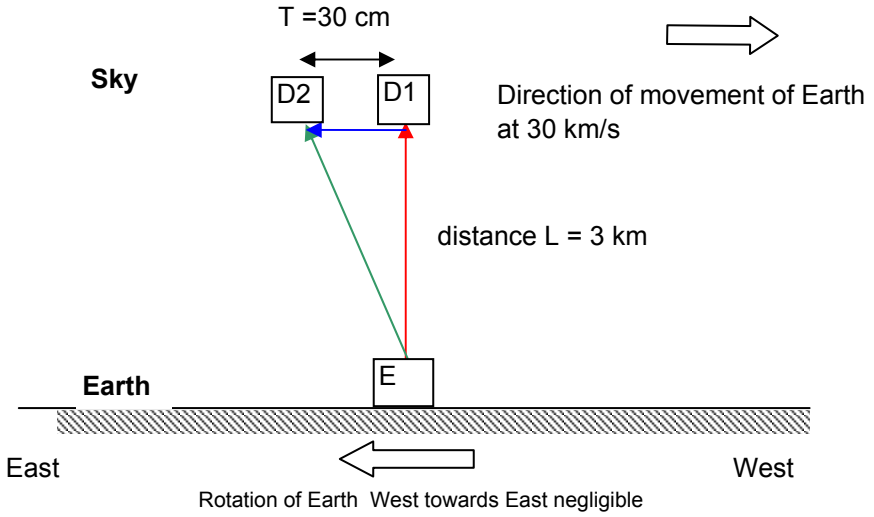
This case is harder to set up for we must install the transmitter E at ground level and the 2 receivers (D1 et D2) in altitude at 3 km.

Then, we have two possibilities. You know ! Relativity is really something you can't get through!

a) side opposite to the Sun : deviation towards the west

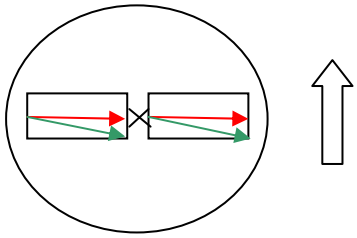


b) side of the Sun : deviation towards the east



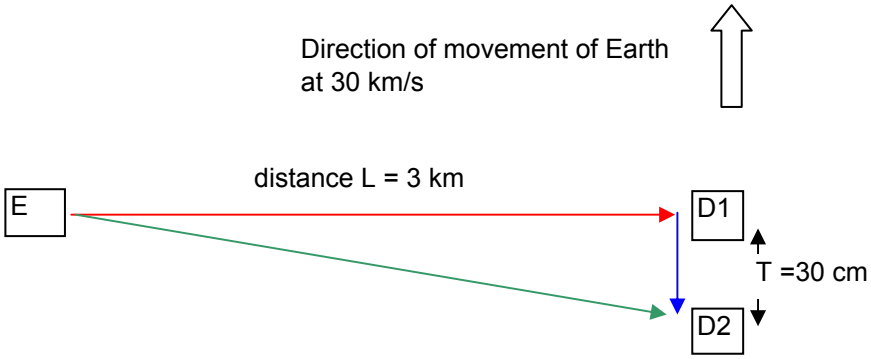
4) Location D : ecliptic poles

Same subtlety as for locations B.
For depending on where you are relative to the pole, the deviation is towards the West or the East :)



And what happens when you are at the south pole ????

For simplification, we can tell that the light beam is deviated "backwards" relative to the movement of Earth.



Conclusion

Whew ! Here we are at the end of our journey. The scenery is set. We can now enjoy the play.

As a ending, I would like to point out that the values and the data are roughly correct in order to simplify the description of phenomenom.

Of course, the precision of the data must be taken in account for the realization of the measurement "grandeur nature".

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2001, March

VERY IMPORTANT

To preserve the anteriority of this work, this document has been joined to an email by its author to these following eMail address, the sending and delivering date will be refered for datation :

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