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Dilation of Time Explained in Suryasiddhanta

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I. INTRODUCTION

Even today interstellar journey is a challenging one for astronaut due to dilation of time. What is Time? Physicists tells that, "an atom is a type of clock. It vibrates at a certain frequency. When substance, like sodium, is made to glow, the wavelength of the light that emits can be measured accurately. This wavelength tells us exactly the frequency of the vibrations of the atom that comprise the substance. If the frequency should vary, the wavelength also will vary[1]." What will happen if it varies? That will create time dilation.

A) Time Dilation

"Einstein predicted that any periodic process that take place in an atom on the sun, where the gravity is very intense, must take place at a slightly slower rate than it does here on the earth[2]". Which means time will be slower on the Sun than, on the Earth. This proves that how atom and its frequency of vibration are inter related and form space-time. For example "If one of two twins went on a fast round-trip into the outer space, he would be younger than his brother when he come back home[3]." This is called as 'twin paradox' in physics. It tells that due to change in space, time varies. Time in the particular point of space is slower than the time on the Earth. And this difference is called as 'time dilation'. Indians had knowledge on this time dilation from Ancient times.

There is a famous story in Bagavat Purana as, "a king named Kakudmi went to Brahma-loka with his daughter Revati. As dance and music were going on, he waits for few minutes and he greeted Lord Brahma and asked him to suggest a bridegroom from a particular family for his daughter. After hearing this Brahma laugh and told when you were waiting here 27 *mahayug* (43,20,000 X 27 = 11,66,40,000 human years) had passed on the Earth[4].

There are three worlds referred very often in Vedas, they are: *Deva-loka, Pitṛ-lok.*and*Bhu-lok*(The Earth).[5] But 14 worlds were mentioned in Puranas. Seven upper worlds and seven lower worlds. They are *Satya, Tapa, Jana, Maha, Swarga, Bhuva,*and*Bhu*(The Earth) are the seven upper worlds.*Atala, Vitala, Sutala, Talatal, Rasatala, Mahatala,* and*Patala*are the seven lower world.This time dilation was not only explained as a simple story but it was clearly describedwith its nine main variations, which is called as*Navavida-kālamāna.* It is written by ancient Indian astronomer, Varahamihira in his text *Sūryasiddhāntaḥ*.

B) Navavida-kālamāna

Names of nine types of time dilation mentioned in the text Surya-Siddhanta. they are: 1) *Brahma,*2) *Prājāpatya,*3) *Divya*,4)*Pitrya,*5)*Gaurava,*6)*Saura,*7)*Sāvana,* 8) *Cāndra*and 9)*Nakṣatra*[6].

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[1](The Dancing Wu Li Master. Pg. No. 203)
[2](The Dancing Wu Li Master. Pg. No. 203)
[3](The Tao of Physics. Pg. No. 187)
[4](Śrīmadbhāgavatamahāpurāṇa.9.3.29-33)
[5](Bṛhadāraṇyakopaniṣad.3.1.8)
[6]ब्राह्मं दिव्यं तथा पित्र्यं प्राजापत्यं च गौरवम्।
सौरश्च सावनं चान्द्रमार्क्ष मानानि वै नव॥(Sūryasiddhāntaḥ.14.1)

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a) Brahma

Brahma-m*ana* means *Kalpa*. 1 *kalpa* =(14*manvantar*+ 15 *sandhi*). There are 71 *mahāyuga* in 1 *manvantar* so 14 X 71 = 994 *mahāyuga* in14*manvantar*. 1 *sandhi* is 4,800 *divyavarṣa* so 15 X 4,800 = 72,000 *divyavarṣa* to convert it into *mahayuga*72,000÷ 12,000 = 6 *mahāyuga*.Therefore, (14 *manvantar* = 994 *mahayu* + 15 *sandhi* = 6 *mahāyuga*) = 1,000 *mahāyuga*.

It could be explained simply as 1,0000 *mahāyuga* makes 1 *kalpa*. 1 *kalpa* is day (24 hours) for Brahma.If we want to convert it in *sauravarṣa* (human years) then,(1,000 Mahāyuga X 12,000*divyavarṣa*X 360 years) = 4,32,00,00,000 human year.

Therefore, 4,32,00,00,000 years on the Earth is just 12 hours in *Brahma-loka.*

b) Prājāpatya

Prajapatya-mana means *manvantar*. 1 *manvantar* = 71 *mahāyuga*. 1 *mahāyuga* = 12,000*divyavarṣa*so, (71 X 12,000 X 360) = 30,67,20,000 *sauravarṣa.*

Therefore, 30,67,20,000 years on the Earth is 1 life cycle of Manu.

c) Divya

There are two *ayanas* in a year, they are: *uttatrayana* and*dakshinayana*. Each *ayana*is 6 months together it makes a year. Uttatrayana(6 months) is day for *devatā* and *dakshinayana* (6 months) is night for *devatā*. 1 *sauravarṣa*makes 1day and night for *devatā*. 360 *Sauravarṣa*(human years)makes 1 *divyavarṣa*.

Therefore, 360 years on the Earth equal to 1 year for *deva-loka.*

d) Pitrya

There are two *pakṣa*in one month, they are: *kṛṣṇapakṣa* and *śuklapakṣa*. each *pakṣa* is 15 days, both together makes one month. *Kṛṣṇapakṣa* (15 days) is day time in *pitṛ-loka*.*Śuklapakṣa*(15 days) is night for them.1 month (30 days) makes one day and night in*pitṛ-lok.*

Therefore, 1month on the Earth is just one day in *pitṛ-lok.*

e) Gaurava

Gaurava-mana is the time taken for the planet Jupitar to revolve 360 degrees. Jupitar takes 12 years (approximately) to complete the orbit of 360 degrees. It means:

Around 12 years on the Earth is one year on the Jupiter.

f) Saura

As we observe from the Earth we feel Sun is rotating around the Earth. Observer become the centre point of the universe. The Sun to complete the rotation of 360 degrees is considered as one year. Movement of the Sun over 1 degree is considered as 360 degrees. So there will be only 360 days in constant. This is called as *sauravarṣa.*

This *sauravarṣa*is mainly considered as human year to compare with other dilation of time.

g) Sāvana

One Sunrises to next Sun rise makes a day. There are 365 days in a year because sun takes 365 days and 5 hours to complete the rotation of 360 degrees. So extra few hours were adjusted as leap year in every four years.

This is generally accepted and followed by several countries on the Earth.

h) Cāndra

Moon take approximately 30 days to meet sun once again on new-moon day. This distance between the Sun and the Moon is measured as *tithi*. There are 30*tithi* in one lunar month. Rise of one *tithi* to another *tithi* is called as Chandra day. Moon completes 12 rotation (approximately) in a year.

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i) Nakṣatra

Moon takes 27 days (approximately) to complete one orbit of 360 degrees. There are 27 *Nakṣatra* (constellations). Rise of one Nakshatra to anothernakshatra is called as Nakshatra day. It is measured by the movement of the Moon.

C) Even More

Not only nine, we find more dilation of time mentioned in other text. Like: when Brahma completes 100 Brahma-years, that would be 1 minute for Vishnu when Vishnu completes 100 minutes that would 1 minute for Maheshvar. When Maheshvar completes 100 years that would be 1 minute for Isha. When Isha complete 100 years that would be 1 minute for Shiva. Like this when Shiva completes 12 years that would be 1 eye-blink of Krishna[7].

But it was not elaborated and given more importance. Because VarahaMihirtells that, "only *Saura, Sāvana,Cāndra*and*Nakṣatra* are used in day to day life. *Gauravai*s used only to mention the name of 60 Indian years. *Brahma,Prājāpatya,Divya*, and*Pitrya*were notbought in the regular use."[8] But still it is helped to explain the calculation till the end of creation. The other time dilations were ignored because they were not directly related to the people on the Earth in any way.

II. CONCLUSION

Topic like time dilation is very difficult to understand even for the modern people who live in the advanced world. But ancient Indians explained it with its variations. The study of time dilation and understanding it makes us feel that, we struck somewhere infiction world. But don't worry if you can't have interstellar journey. Instead you can have inter-interstellar journey as mentioned in Vedas.

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[7](Śrīmāheśvaratantram.25.41-44)
[8](Sūryasiddhāntaḥ.14.1)