Section 2: The Methods' Supplementary Section

In this section we are going to describe the methodology used in this research, starting with an introduction on its main features. This methodology was based on the relationships between the solar and lunar date and time by the author on the construction of Hijri Callender combined to Gregorian calendar by Mathematical methods, published by Matter International Journal for Science and Technology. The baseline information of the research was derived from the findings of other paper by the author on the Construction of the Natural Solar Calendar by Mathematical Methods, published by the Global Journal of Science. The hypothesis of the two papers were derived from a verse in the Holly Quran in Alkahf Sura on the story of righteous youths escaped from their evil governor to a cave where they stayed there for a number of years. The verse translated as "*They stayed in their Cave Three hundred years, and Add nine* ", which interpreted by the author that every 309 lunar year equals exactly 300 solar years without any decimal point, and was proved in the first paper. The main issue in the methodology of this research is the calculation of accumulated figures for measuring the space-time locations based on a month's accumulated standard figures calculated in the second paper. This was done by breaking down the solar months' accumulated figures to the lowest attainable scale of time. Another important issue in this research is that, as discovered in the first paper, the structure of number of months' days per year found to be the same for all years for each specific period, which, first, it proved that the time repeats itself each specific period; second, it facilitates the sophisticated calculations in the two papers; otherwise the calculation would have to be done for each year, which is a very tiresome work.

2.1 Methodology

2.1.1. Introduction

The methodology of this research is based on methodology and results of previous two papers by the author. The first one is on the construction of Hijri Calendar and its conformance to the Gregorian calendar by mathematical calculations, 1; the second one is on the construction of Natural Solar Calendar by mathematical calculations, 2. The key point of this method is a verse from the Holly Quran, verse number 25, Alkahf Sura, translated as "They *stayed in their Cave Three hundred years, and add nine*". The story of this incidence was that there were righteous youths escaped from their evil governor to a cave, where they stayed therein for a number of years. According to our understanding of this verse we hypothesized that every 300 solar year equals exactly 309 lunar years without any decimal point. From this relationship we calculated a standard figure and accumulated it for the lunar months for 309 lunar years. The number of month' days for each lunar year were calculated from these accumulated figures. Accordingly we constructed Hijri calendar that we called a Mathematical Hijri Calendar aligned it to the Gregorian calendar. In the second paper, we applied the same method to construct the Mathematical Natural Solar Calendar from accumulated figures calculated from the same relationship. In this research we applied the same method for the measurements of space-time, using the month's accumulated figure of the reference's date/time from the Mathematical Solar Natural calendar paper; then we broke it down to the most smallest attainable fraction of units of time, starting from month's, day's, hour's, minute's, second's, microsecond's, nanosecond's accumulated figures and so on down to Zeptoseconds, the smallest defined unit of time; then we

proceeded with a scale of time that we developed after the Zeptoseconds defined as XN.Zepto-seconds, where N equals 1 and over; and each XN.Zepto-second consists of 1000 X(N-1).Zepto-seconds. We continued with these units starting from X1.Zeptosecond down to the smallest fraction could be attained. Accordingly, we constructed sets of space-time modules from the different accumulated figures as measurement of space-time, from the earliest stages of the Big Bang up to the current stage of the expanding universe. The Reference's Date and time of the beginning of the modules was 8/6/2024, 18:18:29 GMT, the starting date of this research, which advanced the total eclipse in 8/4/2024–18:18:29 GMT by two months. According to our Mathematical Natural Solar Calendar date, the eclipse date was before the Gregorian date by two days to be in 6/4/2024 –18:18:29. We note here that because the space-time descending fractions of time units are so small that it would not be completely shown by the available calculation devices, we developed a mathematical procedure to identify part of them through the deeply lower scale of time at the early stages of space-time. Although this procedure does not show all decimal points, it maintains the uniqueness of the identified figures down to very far lower attained fractions of time.

2.1.2 Calculation the required accumulated figures

The standard months accumulated figures in the two previous papers were calculated as follows:

- 309 lunar years = 300 solar years = 109575 days = 3600 months ---------- (1)
- For the Mathematical Hijri calendar the standard monthly figure S_{MHJ} calculated as follows
    - Number of Hijri months per 309 Hijri years = 309*12 = 3708------- (2)
    - The average number of days per month, A = 109575/3708 = 29.5509708738 --- (3)
    - S_{MNJ} = 30 – A = 30 - 29.550970873 7864= 0.4490291262 13592- - (4)
- For the Mathematical Solar calendar the standard monthly figure S_{MNS} calculated as follows
    - The average number of days per month A = 109575/3600 = 30.4375 ---------- (5)
    - S_{MNS} = 31 – A = 31 - 30.4375 = 0.5625 ---------- (6)

2.1.3 *Calculation the number of days per month for the solar natural calendar*

- Accumulated figures for 300 years Mathematical Solar months were calculated by accumulation of the standard figure value of S_{MNS} (0.5625).
- Assigning the number of months' days per year for 300 years' months (3600), to be 30 or 31, from the decimal points of the months accumulated figures whether its decimal point less or more than the standard figure.
- By studying thoroughly the number of months' days for the 300 solar year we discovered that the structure of these days repeated itself each 4 years.

2.1.4 *Calculation of number of days per month for the Solar Natural Calendar*

- From the accumulated figures of the first four years we assigned the number of days for this group of years.
- We replicated the number of months' days of the first 4 years for 300 years based on the circular phenomenon of time we discovered in this respect.

2.1.5 Breaking down the required monthly accumulated figure

- The accumulated figure value of the first month (June) of the reference's date at its starting point from the origin of Big Bang was found to be 3.375.

- The accumulated figure of this month (3.375) was broken down into accumulated figures for smaller units of time, starting from its last day, hour, minute … of the reference's time down to the last lowest possible subunit of time attained according to our defined smallest Zepto-seconds scale of time.

2.1.6 Calculation Sample groups of accumulated figures

As the methodology of this research is complicated, the accumulated figures were calculated for sample of two groups across the course of the space-time from the beginning of the Big Bang as follows:

The First Group: In this group the accumulated figures were calculated for a sample of aggregate days, months, years, decades, centuries and millenniums units of time.

The second Group: In this group, a sample of five days' accumulated figures broken down into small scales of time to the lowest possible scale classified into two periods, as follows:

The first period

1. *The First day*: Starts form the beginning of **the first day** of the **first month** of the **origin year** of the reference's date/time in space-time up to the end of the day.
2. *The Second day*: From the beginning of **the first day** of the **second month** of the **origin year** of the reference's date/time up to the end of the day
3. The Third day: Starts form the **first day** of the **first month** of **the second year** from the origin of the reference's date/time up to the end of the day

The second period

1. The Fourth day: Starts from the **origin of the reference's date at space-time** up to the end of the **reference's day**
2. The Fifth day: Starts from the **origin of the reference's date at space-time** up to the **reference's date/time incident**.

In this period, for the fourth day, the accumulation figures includes the complete reference's day scales of time, whereas for the fifth day (the reference's date/time), the accumulated figures stops at seconds scale of time because no time information was available on the incident of the total eclipse down the seconds scale of time.

The procedures of calculations of the accumulated figures for these units are as follows:

Days:

The first period: The sample of the accumulated figures for the first period consists of three days as follows:

- The accumulated figures of the first and the second month:
    - The monthly standard figure, 0.5625, is the accumulated figure of the first month (January); so, from this figure we calculated the accumulated figure of the origin of the reference's month (June) by multiplying 0.5625 with 6
        - 0.5625*6 = 3.375
    - The second month (July) accumulated figure calculated by multiplying 0.5625 with 7
        - 0.5625*7 = 3.9375

- The accumulated figures of the of the first and second month's days
    - According to the Solar Natural Calendar the number of days in June equals 31, then the accumulated figure of the first day of June equals
        - 3.375/31 = 0.0108871
    - According to the Solar Natural Calendar the number of day in July equals 31 then the accumulated figure of the first day of July equals:
        - 3.9375/31 = 0.12702

- The accumulated figures of the first day of the first month of the second year
    - The number of months in two years = 24
    - The second year's accumulated figure = 0.5625*24 = 13.5
    - The first month of the second year accumulated figure = 13.5/12 = 1.125
    - According to the Solar Natural Calendar the number days in the first month of the second year equals 30, then the accumulated figure of first day of this month equals:
        - 1.125/30 = 0.0375

Months:

The months' accumulated figures were calculated by accumulating the standard figure 0.5625. They were calculated for the first four years from the beginning of the space-time expansion.

Years:

Accumulated figures for 10 reference's date's years were calculated from the beginning of the space-time as follows:

- ✓ Accumulation of the monthly accumulated figures (0.5625) for the first 10 years.

Decades:

Accumulated figures for 10 decades from the beginning of the space-time were calculated as follows:

- ✓ The differences between the years' accumulated figures were calculated; found to be 6.75
- ✓ Each of the accumulated figures for the first 10 decades was calculated by multiplying it by 6.75.

Centuries:

The accumulated figures for the first 10 centuries from the beginning of the space-time were calculated by the same procedure as for the accumulated figures for decade by multiplying 6.75 with multiples of 100 years successively for each century.

Millenniums:

The accumulated figures for the first 10 millenniums from the beginning of the space-time were also calculated by the same procedure as for the accumulated figures for decade by multiplying 6.75 with multiples of 1000 years successively for each millennium.

We presented in the Tables and Figures Section the months' accumulated figures for the first four years; and details of accumulated figures for three groups of scales of time with 1000 sub-units per scale in ascendant order. The first group some subunits of the accumulated figures of the X.95.Zeptodeconds starting from infinity, to the infinitesimal scale border, and to the zero scale of time; the second group the accumulated figures for some subunits of the X10.Zeptosecond scale of time; the third group the accumulated figures of the last 10 subunits, starting from X1.Zeptoseconds to X9.Zepgoseconds scale of time according to our definition of extended scale of time; lastly, the fourth group, the last 10 subunits of this group, starting from Zeptoseconds the last defined scale of time, up to second; then the accumulated figures of seconds, minutes, hours; and finally the accumulated figure of the whole day.