Age of the Universe

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In the 1920's, the age of the universe was believed to be determined for the idealized condition of a constant rate of expansion by simply taking the inverse of the Hubble constant. The challenge was not so much in the model, but rather in determining an accurate value of the Hubble constant, which has ranged over the years from 50 to 100 depending on the method and observation used. Objects close to the observer occurred relatively recently ago, but are subject to peculiar velocity making it difficult to determine the actual rate of the expansion of the universe. Objects far away are less influenced by peculiar velocity, but occurred long ago when the expansion rate may have been different; thereby, influencing the actual age of the universe in cosmological time. Today, a variety of tools are available that generally are in agreement with an age of the universe of 13.7 billion years. The IWPD Research Center has applied IWPD Scale Metrics to the age of the universe with a value of 14.2 billion years. This close agreement with observation provides support to the IWPD Scale Metrics model and suggests that the metric factor influencing the expansion of space also impacts time and mass.

Bullet Points

- The inverse fine-structure number provides a coupling constant impacting the strength of the electromagnetic force
- In IWPD Scale Metrics the strength of the electromagnetic force is related to the age of the universe
- IWPD Scale Metrics suggests that the ratio of vacuum energy to the energy of Baryonic Matter plus Lambda Cold Dark Matter is $1/137^2$
- Space is defined by the decomposition of Baryonic Matter and Lambda Cold Dark Matter to free space
- Initially, at the beginning of time, one Planck Mass produced one Planck Length in one Planck Time
- As the metric expansion of space occurs there is a corresponding metric effect on time and mass.
- This pattern of expansion continues and allows us to determine the total mass of the universe at any age as well as the total vacuum energy.
- The ratio of vacuum energy to mass reaches a value of $1/137^2$ at an age of 14.2 billion years

One of the beautiful, and powerful, outcomes of IWPD Scale Metrics (ISM) is that it provides a simple framework for the development of the universe and perhaps provides the ultimate testing ground for ISM, which requires no initial conditions nor does it tolerate any mechanisms for adjusting various parameters. The universe simple starts from any arbitrary collection of mass (primarily consisting of Lambda Cold Dark Matter) that decomposes into space at a rate relative to the frequency of the energime. (See 35 Steps to a New Fundamental Mass). The conversion of mass to free space is either in agreement with observation, or ISM is incorrect.

In ISM, the magnitude of the electrostatic force is determined partially by a statement that only 1/137 of the space on the initial ISM two-dimensional space grid (2DSG) was actually available for the recombination of the electron. Along two-dimensions, the magnitude of decomposed space is equal to

$$\left(\frac{1}{137}\right)^2 = 5.32 \times 10^{-5}$$

The question then becomes, how old would the universe need to be in order to have undergone enough decomposition such that 5.32×10^{-5} of all the initially bound mass has been released as space? ISM states that the energime is the smallest possible photon. As such, we know the energime moves at a constant speed of c and has an observed wavelength equal to $1.01 \times 10^{31}\,m$. (As determined by a fundamental mass of $2.19x10^{-73}\,kg$.) This results in an observed frequency of the energime of $2.97 \times 10^{-23}\,s^{-1}$. The rate at which bound mass decomposes to space is therefore related to the observed frequency of the energime.

As space is emitted, light is able to move through the ever increasing area defined by the 2DSG. However, as light reaches a given observer, it must be noted that only ½ of the space released since the emission of the light pulse was actually transversed by the light pulse as it reaches any given destination. The free energime field is therefore larger than what any observer is able to see. A light pulse emitted in the earliest moments of the universe will only travel through ½ of all of free energimes emitted along its dimension of travel. When considered for the entire 2DSG, it follows that the area of the 2DSG must be four times greater than what we are able to see as "observed" space. Therefore, the actual rate of energime decomposition (required to fuel the expansion of the universe as we see it) must be four times greater than what we actually observe, or:

$$(4)\left(2.97 \times 10^{-23}\right)s^{-1} = 1.19 \times 10^{-22}\ energimes/second$$

It follows that the age of the universe can be determined by the time required to achieve a level of decomposition equal to 5.32×10^{-5} of all initially bound energimes. The interesting thing to note is that this calculation is not impacted by the initial size of the universe, but only by the rate of decomposition such that:

$$Age_{Universe} = \frac{5.32 \times 10^{-5}\ energimes}{1.19 \times 10^{-22}\ energimes/second} = 4.47 \times 10^{17}\ s = 14.2\,Billion\ Years$$