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# Determining Age, Expansion and Dark Matter for our Universe

**By Morton F. Spears**
**http://www.econ.iastate.edu/tesfatsi/MFSpears/**

**Abstract:** This report demonstrates that a changed model of the universe results when the assumption is made that permittivity reduces with time in an expanding universe. Age, expansion, and dark matter are all affected.

## Introduction:

The purpose of this report is to explain without resorting to speculations or new theories the reasons for several not-understood properties of our Universe. Only facts and physical laws are used to arrive at the conclusions. The text is descriptive and contains a minimum of mathematics or other complications for the benefit of non-technical readers interested in science. The specific properties to be considered are:

1.) A Universe That Appears To Be Younger Than Its Oldest Stars (See Fact #3).
2.) A Universe That Enlarges with Accelerating Expansion (See Fact #5).
3.) A Universe That Contains a Vast Amount of Unexplained (Dark) Matter (See Fact # 6).

## Properties and Explanations:

All facts about to be presented are either self evident or provable experimentally. The physical laws about to be referred to have survived the test of time and are accepted throughout the Physics Community. The explanations for the above properties are then developed in logical sequence.

**Fact #1:** If the "big bang" conception visualizing an explosive expanding universe is correct, then the electrical property *permittivity* of open space in that universe is reducing with time and with distance from the origin of the explosion. The proof follows.

On a small scale, the quantitative value of the permittivity of a volume of space can be determined by inserting it between two parallel conducting plates of a fixed area and fixed perpendicular spacing, then measuring the resulting value of *capacitance* between the plates. The capacitance is a direct function of the effective permittivity of the space. Any amount of small particles of any known substance peppered into the space will increase the effective permittivity above that of "pure" vacuum space, and the measured capacitance will increase as more and more particles are placed in the fixed volume. Conversely, the capacitance will decrease with a lessening of the particles in the

fixed volume. To dramatize this effect, a miniature ("little bang") explosion experiment can be performed. Suppose many tiny metal balls (preferably coated with a thin layer of electrical insulation) are glued together in a cluster evenly surrounding an explosive charge. When the charge is detonated, identically configured capacitors spaced along a radial path from the center of the explosion with accessible open space between the plates are used to measure capacitances (and therefore permittivities) as one particular particle (or small ball) passes through the capacitors' open spaces. The measurements will show that the effective permittivity is greater when the small ball passes through a capacitor space closer to the little bang at an earlier time than it is when it passes through a farther out capacitor space at a later time.

Relating the above to happenings in our Universe, visualize the Earth as the small ball, now dramatically larger in scale. Two giant sized capacitor plates (say each equivalent to an area in terms of the present-day velocity of light of 10,000 light years by 10,000 light years separated by 100 light years) are used to measure the capacitance of space which includes our earth site. Long ago, when the Earth was nearer the position of the big bang origin, the capacitance would measure greater than it does now, establishing that the effective permittivity was then greater for the space around the Earth than it is now. The greater effective space permittivity in the past was due to the larger density of stars, planets, asteroids, rocks, gases, vapors, nuclear particles, (quarks, wimps, and neutrinos, if they existed separately) or any other mass-energy bits situated in a volume of space selected nearer the big bang origin. Therefore, it is a non-escapable conclusion, that perceived permittivity in the space of our Universe is decreasing with time and distance from the big bang origin.

**Fact #2:** When the permittivity in the space of the Universe is decreasing with time or with increasing distance from the origin of the big bang, the velocity of light for those same circumstances is increasing. This happens because the square of the velocity of light is inversely proportional to the permittivity of the space it is passing through.

**Fact #3 (<u>Property 1. Explanation</u>):** Since any light one detects on earth from the distant past has traveled through a space medium with greater permittivity and reduced light velocity, the time at a distant observed location is actually longer ago than that expected based upon the present velocity of light. Consequently, the Universe is older than previously estimated, allowing ample time for the formation of even the oldest stars in accordance with accepted theory.

Conservation of Energy Law: The total energy of an isolated mass-energy entity remains the same over any time span. When the entity is not isolated and work is performed <u>on</u> the entity by some outside means, the total energy is increased by the exact energy resulting from the work performed. When work is performed <u>by</u> the entity on something else, the total energy of the entity is decreased by the exact energy resulting from the work performed. If no work is either performed on the entity or by the entity, the total energy of the entity remains the same.

**Fact #4:** First, consider our Earth as a mass-energy entity travelling on a radial path directly away from the origin of the big bang. Next, neglect all interchanges of

radiated heat and other energies (many orders of magnitude smaller than the Earth's mass energy) between the Earth and its neighbors. Then, consider the total mass-energy due to the Earth's mass as an isolated entity (from Einstein's famous discovery) as $m_e c^2$, where $m_e$ represents the mass of the earth and $c$ represents the velocity of light. But, from Fact #2, the magnitude of $c^2$ has continuously increased with time; yet the total energy $m_e c^2$ has remained the same. There can be only one explanation: By the Conservation of Energy Law, the effective mass of our Earth is lessening with the passage of time! In fact, the effective masses of all entities in our expanding Universe by similar analysis are decreasing with the passage of time.

**Fact #5 (<u>Property 2. Explanation</u>):** The motional kinetic energy of the Earth on its radial path away from the origin of our Universe is $m_e v_r^2 / 2$ where $v_r$ represents the outward radial velocity of the earth with respect to the origin. If no work is being performed <u>on</u> the Earth or <u>by</u> the Earth affecting this vector velocity, yet the effective Earth's mass $m_e$ is lessening with time, then by the Conservation of Energy Law, the velocity squared (and therefore radial velocity) must increase with time to keep the energy the same. By the same analysis, not only the Earth's velocity, but also the velocities relative to the origin for all the mass-energy entities are increasing with time. Therefore, our Universe is enlarging with accelerating expansion!

**Fact #6 (<u>Property 3. Explanation</u>):** Since the effective masses of all entities decrease with expansion time of the Universe, eons ago all the masses that we observe <u>now</u> were greater <u>then</u>. The farther back in time we look, the greater the effective mass was for an entity that is presently being observed. Furthermore, gravity forces between any two entities in the same time period were proportional to the product of the two masses, just as they are today. It follows, for example, that if an entity mass was four times greater then, all the other masses were also four times greater, and the gravity forces between the entities were sixteen times greater. This phenomenon can influence an Earth's observer to conclude incorrectly that one observed mass plus fifteen unobserved masses caused the greater gravity. After many observations and studies looking back to various long-ago times, the unexplained "unobservable masses" have been termed *dark matter*!