A History of Dark Matter ?

Footnotes

1. Christiaan Huygens is a famous scientist, who was a contemporary of Isaac Newton.
2. Diffraction patterns of dark and light areas are formed when light from a single source passes through two or more tiny openings onto an otherwise dark plate. Huygens developed formulas that predict effects of the shape and positions of the holes and position of the dark plate on the designs produced.
3. Quicksilver is mercury.
4. Sound does not travel through a vacuum. It requires a medium of particles (gas, liquid or solid). What carries light energy?
5. James Clerk Maxwell is a famous scientist who contributed to many fields of physics. He developed equations used to predict reflection, bending and absorption of electromagnetic radiation under various conditions. His wave equations predict the properties of electromagnetic frequencies that he didn't know existed.
6. Electromagnetic radiation includes radio, radar, light, x-rays and gamma rays. The main difference is the frequency of the radiation. The higher the frequency: the more energetic the radiation. Frequency is the number of times the direction of the current reverses in a second. Direct current = 0 cycles per second, Alternating current = 60 cycles per second, AM radio approximately 1million cycles per second, Visible light approximately one thousand trillion cycles/second.
7. Magnetic properties are generally attributed to unpaired electrons in a material. Electrons are extremely tiny negatively charged particles. They are present in all materials. If an electron is paired with another electron, its magnetic properties are canceled. Permanent magnets contain unpaired electrons that are not randomly oriented. Paramagnetic materials contain randomly oriented, unpaired electrons. In the vicinity of a permanent magnet, some of the unpaired electrons in a paramagnetic material become non-randomly oriented. The paramagnetic material behaves like a permanent magnet, until the permanent magnet is removed.
8. All materials contain positive and negative particles. When a material is placed between oppositely charged metal plates, positive particles tend to move toward the negative plate. Negative particles tend to move toward the positive plate. This is equivalent to the storage

of electrical energy. The relative dielectric constant of a material is the ratio of the electrical energy stored by the material to that stored by vacuum.

9. Specific conductivity refers to the speed of energy transmission through a medium.

10. Specific capacity is related to dielectric properties. Maxwell's wave equations require that vacuum have definite magnetic and dielectric properties. Can a void have such properties?

The relative dielectric constants of materials reduce dramatically as the frequency of electromagnetic radiation increases. This is attributed to the inertia of some of its particles to movement. At some frequencies, some particles are unable to move fast enough and no longer contribute to dielectric properties. The dielectric constant of vacuum does not change with frequency. If it contains particles, they must have an extremely low moment of inertia. This suggests that they must be extremely small in size and have very low masses. Electrons have just such properties.

11. Discharge tubes are similar to the tubes employed in neon signs. Skinner's tubes were straight, with a metal electrode at each end. The negative electrode (cathode) was at one end and the positive electrode (anode) was at the other end. The tube was evacuated and pure helium (or other gas to be tested) was introduced into the tube to a pressure of about three thousandth of atmospheric. The voltage across the tube was increased until glows appeared. The voltage was gradually reduced to keep the current passing through the tube at 0.003 amperes.

12. Michael Faraday contributed greatly to many fields of physics. He developed equations that predict the amount of a product that will be produced when a constant electric current is passed through a material.

13. Cathode fall is the difference in voltage between the cathode and a position, in the tube, between the cathode and the anode.

14. Each gas produces a specific spectrum when subjected to electrical discharge. The presence of hydrogen gas is easily detected by its spectra.

15. This is over 1000 times as much hydrogen than the silver cathode could have originally contained.

16. Sir J.J. Thomson was awarded the Nobel Prize for his work. He was knighted for discovering the electron and determining its mass along with other important contributions to science.

17. Positive rays are positive ions produced in discharge tubes. By passing such ions through electric and magnetic fields, Thomson was

able to measure the mass and relative concentration of each ion. His work led to the development of the mass spectrometer

18. One millionth of a millimeter of mercury pressure is 0.00076 th. of atmospheric pressure.

19. $10^{-1} = 0.1$, $10^{-2} = 0.01$, $10^{-3} = 0.001$, etc. The symbol for meters is m.

20. Temperatures in this speech are in degrees absolute. Zero degrees absolute is the lowest possible temperature.

21. Daniel Kleppner was awarded the Nobel Prize in physics for this work.

22. Hydrogen, lithium, sodium and rubidium have similar structures. They are in the first column of the periodic table. When they ionize, they tend to form a singly positive charged ions and electrons.

23. Spin polarized indicates that all the hydrogen atoms are in the same alignment.

24. Bose-Einstein condensed sodium is expected to be much denser than Bose-Einstein condensed hydrogen. Its dielectric constant should be much greater than Bose-Einstein condensed hydrogen. Light would be expected to pass through the sodium condensate much slower.

25. In order to explain the stability of galaxies, scientist have introduced the concept of dark matter. Could their dark matter be Bose-Einstein condensed hydrogen?

26. The spectra of light from distant parts of the universe have shifted toward the red. For this reason, scientists believe the universe is expanding. If any energy is lost in traveling through the matrix, a similar red shift might be expected.

27. Light is believed to pass through space as packets or photons. E is the energy of the photon. Planck's constant is a universal constant employed to make this and many other equations useful.

I suspect Planck's constant is based on the inertia of the electron to the movement required for light transmission. The following may explain much about light transmission:

When a DC current passes through a straight wire, a compass needle near the wire points perpendicular to the wire. It remains so oriented until the current is stopped. This suggests that moving electrons in the wire cause matrix electrons, in the vicinity of the wire, to orient. When the current is reversed, the needle points in the opposite direction. At extremely low frequencies, the orientation of the needle changes with frequency. At higher frequencies, the needle of the compass cannot reorient fast enough, because of its inertia. Matrix (ether) electrons have very little inertia and continue to orient with changing current direction, even at extremely high frequencies.

Let us consider a half-wave dipole antenna operating at an FM frequency. I understand that the current moves along the surface of such an antenna and at the speed of light. According to Huygens' principle, each orienting matrix electron passes all of its energy to a neighboring matrix electron, etc. This effect moves away from the antenna at the speed of light.

As the direction of the current changes, a line of energy starts forming at one end of the antenna. Just as the direction of the current changes again, this line of energy leaves the other end of the antenna. The result is a line of energy (a photon?) moving through the ether at the speed of light. This line is in a plane of the antenna and at an angle of 45 degrees to the antenna.

When the direction of the current changes again, a similar line of energy (photon) is produced. This photon is also in a plane of the antenna but at an angle of 135 degrees to the antenna. Its ether electrons are orienting oppositely. What we consider one wave in the antenna may produce a pair of photons. Each photon might be considered a mirror image of the previous photon.

At any instant, an integer number of active electrons are involved in a photon. There are no fractional electrons. For this reason, only specific amounts of energy can be carried as photons. The higher the frequency: the greater energy difference between possible photons. This may be the basis for quantum mechanics.