An Unexpected Source of Clean Energy? Part II

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Introduction

Part I of this paper[1] suggested that the knowable universe is filled with a concentrated matrix of protons and electrons, possibly Bose-Einstein condensed hydrogen. Such a matrix is consistent with the medium assumed by both Huygens and Maxwell in developing their wave equations. Conversion of the hydrogen atoms in water into this matrix (the aether?) would be expected to produce enormous quantities of energy and oxygen gas. Such a reaction may be the source of the energy produced in lightning storms. Perhaps high voltage discharge in the proper pressure of water vapor and in the presence of the proper catalysts would produce great excesses of energy.

The paper gave a simple explanation for the forces between magnets separated by vacuum.

The present paper includes evidence that the proposed matrix would be paramagnetic and, thus, would be affected by neighboring permanent magnets. The paper also includes a brief history of Bose-Einstein condensation.

Magnetism

The following quote is from Pauling's, "Nature of the Chemical Bond"[2], for which he received his first Nobel Prize:

> "The Pauli exclusion principle requires that no more than two electrons occupy a single orbit, and that the two electrons in the same orbit have opposed spins, and thus mutually neutralize their magnetic moments. The most stable orbit in every atom is the 1s orbit of the K shell. In the normal hydrogen atom this is occupied by one electron, the spin magnetic moment of which makes monatomic hydrogen gas paramagnetic. In the normal helium atom the 1s orbit is occupied by two electrons, which are required by the exclusion principle to have opposed spins; in sequence of this helium is diamagnetic, the spin magnetic moment of the two electrons neutralizing one another."
>
> "It is customary to refer to electrons with opposed spins as paired, whether they occupy the same orbit in one atom or are involved in the formation of a bond."

I propose that space is filled with a matrix of protons and electrons and the structure may be similar to that of molten salt. Just as no chloride ion touches another chloride ion; no electron touches another electron and the electrons are not paired. Such a matrix should be paramagnetic and respond appropriately to an approaching magnet. The presence of

such a matrix permits simple explanations for the forces between separated permanent magnets.

Bose-Einstein Condensation (BEC)

The 2001 Nobel Prize for physics was awarded to Eric A. Cornell and Carl E. Wieman of the University of Colorado and independently to Wolfgang Ketterle of MIT for producing Bose-Einstein condensates (BEC). A group headed by Cornell and Wieman produced the condensate of rubidium in June of 1995. Ketterle's group produced the condensate of sodium in September of 1995. Each group cooled gases of the atoms to almost zero degrees absolute and produced "superatoms", which are combinations of many particles which behave like individual particles[3]. Since 1995, a Bose-Einstein condensate has been made from lithium but there was difficulty in condensing hydrogen. In 1998, a team led by Ketterle produced Bose-Einstein condensed hydrogen from spin polarized hydrogen atoms[4].

Perhaps Experimenters had previously produced Bose-Einstein condensed hydrogen but couldn't detect it, because it simply became part of the aether. It is difficult to detect water created in a lake? Ice is easy to detect.

A Bose-Einstein condensate is a combination of atoms in their lowest possible energy state. Bose-Einstein condensed hydrogen is a combination of protons and electrons in their lowest possible energy state. Conversion of hydrogen molecules into a Bose-Einstein condensate would be expected to release considerable energy.

A 1982 "Scientific American" article by Isaac F. Silvera and Jook Walraven [5] includes an excellent description of Bose-Einstein Condensation. The following quotes are from that article:

> "The statistical theory that describes atoms was first studied by the Indian physicist S. N. Bose and is called Bose statistics. The phenomenon predicted by Einstein is a mathematical consequence of Bose statistics, but it was so contrary to the intuition of physicists in the 1920's that it was then regarded as a mathematical oddity that would never be found in a real system. It is now thought, however, that the phenomenon is observable in the laboratory. It is called Bose-Einstein condensation."
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> "In a Bose-Einstein-condensed gas, however, a large fraction of the atoms would occupy the ground state at an experimentally accessible temperature, and nearly 100 percent of the atoms would become condensate atoms at a temperature above absolute zero."
>
> "The most sought-after quantum phenomenon is a sudden condensation of a large proportion of the atoms in the gas into a state of minimum energy. The condensation is expected to take place at a low temperature that depends only on the density of the gas. For example, at a density of 10^{24} atoms per cubic

centimeter the critical temperature is .016 degrees K, whereas at the density of interstellar hydrogen the critical temperature is 10^{-18} degree K. The critical temperature for the condensation is proportional to the density raised to the 2/3 power."

"It is the coherent motion of the condensate atoms of a Bose-Einstein-condensed gas that is expected to give rise to extraordinary macroscopic properties at temperatures well above absolute zero."

"It is highly possible but not yet definitely established by experiment that superfluid helium 4 is Bose-Einstein condensed."

"Liquid helium 4 at or below 2.18 degrees is therefore called a superfluid. If it is set flowing in a tube closed on itself, the liquid continues to flow without friction, never coming to a stop as a normal fluid would. It flows into the smallest passages of its containing vessel and has the remarkable ability to flow through a densely packed powder as if the barrier were not present. A vessel with microscopic holes that would be impenetrable to a normal fluid can be as a leaky sieve to a superfluid. Such a vessel is said to have a superleak."

The above quotes led me to the following conclusions:

- A Bose-Einstein condensate is a group of atoms in their lowest possible energy state.
- To achieve this state considerable energy must be removed from room temperature atoms.
- Production of a Bose-Einstein condensate from atoms would release considerable energy.
- A Bose-Einstein condensate that was stable at elevated temperatures would be extremely dense and have interesting properties, including zero viscosity.

Light

The July 2001 issue of Scientific American includes an article by Lene Vestergaard Hau titled, "Frozen Light"[6]. The article describes experiments her group performed at the Rowland Institute in Cambridge, MA. They passed laser beams into Bose-Einstein condensed sodium and found that it transferred light at a much lower speed than vacuum or any other known material. In fact, they were able to stop light transmission and then restart it at will, using appropriate laser beams. This led me to assume the following

- Bose-Einstein condensed sodium transfers light.
- There is a medium in vacuum that transfers light.

- Many experimenters have reported the appearance of hydrogen gas in vacuum[7]. This suggests the presence of protons and electrons in vacuum and that the medium may be Bose-Einstein condensed hydrogen.

- In order to be stable at elevated temperatures, the Bose- Einstein condensed hydrogen must be extremely dense.

- We do not perceive the presence of such a medium since it has no viscosity. The medium permeates all materials and, since we weigh materials by difference, we don't appreciate the density of the medium, which may be the dark matter required to explain the stability of galaxies.

- In spite the successes of Huygens' and Maxwell's equations for the behavior of light, based on the presence of such a medium, we have based theoretical physics on the absence of any medium.

More on Magnetism

One of my papers[8] attempts to explain many observed phenomena by assuming vacuum contains a concentrated matrix of protons and electrons. As mentioned earlier such a combination might be stable, just as molten sodium chloride is stable. Sodium chloride is a concentrated matrix of positive sodium ions and negative chloride ions. Could Bose-Einstein condensed hydrogen be a similar matrix of protons and electrons? Production of gaseous hydrogen from vacuum requires the input of considerable energy. Production of Bose-Einstein condensed hydrogen from hydrogen gas is expected to release considerable energy.

A permanent magnet is believed to contain unpaired electrons some of which are oriented in a preferred direction. Heating the permanent magnets above their Curie temperature allows these electrons to orient randomly and removes the permanent magnetism. The former magnet is still attracted to a permanent magnet, because some of its unpaired electrons will be aligned by the oriented electrons in the permanent magnet.

A DC current in a wire orients the needle in a magnetic compass in its vicinity. This suggests that there are oriented electrons in the current carrying wire. The greater the current, the stronger the attraction. This indicates that the greater the current, the greater the concentration of oriented electrons in the wire. When the current is stopped, the wire loses its magnetic properties. These effects are noted even when the compass and the wire are separated by vacuum.

How can the oriented electrons in one material affect the orientation of electrons in a distant material? Most scientists would reply, "The oriented electrons produce a magnetic field and the field affects unpaired electrons in a distant paramagnetic object".

Perhaps, this works mathematically, but I find such a concept unreasonable. What are fields in a void? I can't accept that empty space has different properties in the vicinity of a magnet than in the absence of a magnet and that the void at one end of the magnet is different than the void at the other end.

Magnetic effects at a distance are easy to understand, if one accepts that space includes a concentration of unpaired electrons. The oriented electrons in a permanent magnet or in a conducting wire would be expected to cause unpaired electrons in the proposed matrix to orient and, in turn, orient unpaired electrons in a nearby object. Two permanent magnets would be expected to attract or repel each other depending on the orientations of the matrix electrons in their vicinities.

I picture the magnetic lines of force proposed by Faraday as matrix electrons aligned by oriented non-paired electrons in a magnet. The shorter the distance between two magnets, the greater the attraction or repulsion. The following quote is from Francis Bitter[9], who was, at the time, Professor of Physics at MIT:

> "A current passing through a coil of wire will produce a magnetic field at its center. The larger the current, the stronger the magnetic field. There is no saturation effect here. So far as we know, this increase of field with increasing current continues indefinitely."

Magnetic materials reach saturation in magnetic properties when all of their unpaired electrons are similarly aligned. The above quote suggests that vacuum contains an extremely high concentration of unpaired electrons.

Conclusions:

Converting hydrogen into a Bose-Einstein condensate should result in the release of considerable energy. Such a state may be the medium for light transfer accepted by the scientific community, prior to the twentieth century. The presence of such a medium permits simple explanations for otherwise complicated phenomena.

The enormous energy produced in lightning storms may be from the conversion of hydrogen atoms in atmospheric water into Bose-Einstein condensed hydrogen under high voltage discharge.

A serious investigation of high voltage electrical discharge in moist atmospheres may lead to the practical production of enormous quantities of cheap clean energy.

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