THE BOSE CONDENSATE HYPOTHESIS OF COLD FUSION

Horace Heffner - 1/30/96

The recent creation of a .002 inch 3000 atom Bose condensate by Carl Weiman and Eric Cornell may provide a possible insight to some cold fusion phenomena. The rubidium atom condensate was created with much difficulty and ingenuity at the extreme temperature of 20 nanokelvins, which was created by applying an RF field to atoms in a magnetic trap. The RF field was tuned to resonate with higher energy atoms, and thus caused these rubidium atoms to flip and then be shot out of the trap, thus leaving only those atoms with no significant energy.

Though this was a difficult and amazing feat, demonstrating the Heisenberg uncertainty principle relates to a true physical state of matter, not just experimental uncertainty, perhaps nature readily accomplishes it in a small way in metallic lattices. It is a much less difficult feat to create an overlap of two hydrogen nuclei in a 1 A condensate than it is to create an overlap of 3000 rubidium atoms in a 500,000 A condensate.

The rubidium atom overlap was sustainable for more than 15 minutes. To be significant to CF, a condensate of two protons or deuterons in a lattice site need only be formed a very short time, if formed often enough.

It seems that the Weiman-Cornell experiment, supported by the Pritchard slit experiments, clearly demonstrates the reality of the wave nature of matter. Perhaps it is the only form of matter. The particle nature of matter might be explained strictly by wave function collapse, which is not a characteristic of ordinary waves, but clearly is a characteristic of quantum waveforms. For example, looking at the photoelectric effect, suppose a huge photon waveform from a distant star impacts via it's own random selection process at a particular point on a metal surface, ejecting an electron, why do we have to say the photon is a particle at the point of the electron ejection? It could just as easily be considered (called) a collapsed photon waveform as it could be considered a particle. A waveform collapse consists of an instantaneous change in wave form center and distribution. Such a collapse also clearly accounts for tunneling effects as well. Where is the need for a particle model at all?

If matter is totally wave like, it seems inescapable that charge must be therefore be distributed in the waveform, as there exists no point to carry it. This has the benefit, as Richard Feynman pointed out, of conservation of energy, because a point charge could generate an infinitely intense field, as you approach the point, requiring an infinite amount of energy to create the field.

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Wave function collapse occurs probabilistically on the relative approach of two or more quantum waveforms. One quantum waveform can collapse to the location of the other. If two overlapped, i.e. relatively to each other slow, waveforms in a Bose condensate are penetrated by a high velocity waveform, a condensation can occur. Also,a kind of paradox occurs. All motion is relative. Assume the condensate is two protons, and the high velocity waveform is an electron. From the point of view of the proton condensate, the wavelength (size) of the electron is small. From the point of view of the electron, though, the condensate must be very small, and more importantly, since the waveforms of the proton condensate are phase locked and co-located, the condensate must appear located in a small volume. Thus, if there is an interaction, it would seem there would be a high probability that the interaction would be a 3 body interaction. That is to say the phase locking tendency of a condensate would greatly change waveform co-location probabilities. Given two protons jammed into a lattice site, the Schroedinger Equation predicts that they will be instantaneously found in opposing locations within the site. However, should they form a Bose condensate, it is logical that their locations would appear to be the same to a fast moving particle.

This hypothesis provides some explanation for various effects. One is the Kasagi experiment, where deuterated titanium is bombarded with deuterons. The reaction hypothesized by Kasagi to account for the observed results:

D + D + D -> p + n + alpha (+ 21.62 MeV)

requires a mechanism to make such a reaction likely in the matrix, i.e. to cause target deuteron pairs to tend to be located at nuclear distances from each other. The subject hypothesis provides such a mechanism.

Similarly, the original experiments by Pons and Fleischmann, tended to produce neutrons in pairs, i.e. from single events. A deuteron condensate, stimulated by particles resulting from cosmic rays, could produce a variety of products, including neutron pairs, He4, He3, and T, as well as, depending on the type of impacting particle, transmutations such as Li and Be. Let [D + D] represent a two deuterium atom condensate. If a cosmic ray struck a deuterium nucleus, which then struck a deuterium condensate, we could have something like:

D + [D + D] -> n + n + p + He3 (+ .584 MeV)

Similarly, in various observed hydrogen systems a condensate could form, giving

e + [p + p] -> n + p (+ energy)

or

e + [p + Li(n)] -> Li(n+1) (+energy)

or

e + [p + D] -> T (+energy)

where the possibility of such formations is a matter of considerable debate.

The case of :

e + [p + p] -> n + p (+ energy)

is just a variation of:

e + p -> n (+ energy)

proposed by Elio Conte. The importance of Conte's theory in this regard is that it predicts the possibility of creating such a bound state with the release of energy (17 keV) and without a neutrino.

To a much smaller degree, it seems possible that a Bose condensate might momentarily be formed between adsorbed hydrogen and lattice atoms. Such cases, as well as cases of neutron formation noted above, could possibly account for various transmutations observed in CF experiments.

This hypothesis also provides some explanation for observed positive effects of using particles to stimulate loaded cathodes.

TESTING THE HYPOTHESIS

One way to test the hypothesis would involve colliding a particle beam with a Bose condensate and looking at the resulting products spectrographic ally, e.g. bombard with protons and look for Strontium, Tungsten, or Osmium, etc., spectral lines in the results, and the presence of high energy neutrons or other particles. Additionally, high energy electron bombardment of the Bose condensate might create similar effects by catalyzing the condensate waveform collapse.

PRACTICAL APPLICATION

If true, the hypothesis indicates that spiking the cathodes of CF electrolysis cells with particle emitters should greatly increase the yield and reliability of the CF effects.