Pair Created LENR

Horace Heffner December, 2005

BACKGROUND

The prior focus for utilizing electron pair condensates (see: <http://mtaonline.net/~hheffner/ElectPairs.pdf>) was the creation of energy by use of an electron pair as a catalyst. Superconductors provide a way to generate such pairs in abundance. However, there is a natural design problem associated with using cold superconductors at close proximity to material in which heat is to be generated. Overlooked was the possibility of using free electron pairs, bosons, to demonstrate low energy nuclear reactions with high repeatability. Such free bosons are created by applying a sufficient negative potential to a superconductor to cause fermion pairs to be ejected, to tunnel out of the superconductor, as a pair.

WHY FOCUS ON LENR?

Pair boson catalyzed reactions would not have characteristic high energy nuclear signatures or branching ratios, thus would prove the existence of a new nuclear reaction regime. One application of this approach might be the generation of tritium by use face of a superconductor as the negative plate of a high voltage capacitor in which deuterium is between the plates. This would not generate a lot of tritium, but the advantage here is the ability to easily identify minute amounts of the tritium with high reliability. It may be advantageous to use D2O ice as a dielectric for the capacitor.

Use of D2O ice as a dielectric has various applications. The ice can be loaded with specific elements of interest which may absorb neutral de-energized hydrogen complexes that result from pair presence in dense hydrogen environments. Ice can be shaved to remove surface contaminants if needed, and melted and evaporated, or simply sublimated, instead of acid digested, in order to obtain concentration of the heavy reaction products. Ice may permit spectral analyses not feasible in water. Microscopic examination might show particle tracks. The sides of the capacitor dielectric plate might be polished in order to facilitate microscopic observations, absorption spectrometry, or the injection of laser beams. A transparent but conducting anode plate might be employed. Dissolved dyes, scintillating colloids or suspended scintillating material, or photo-reactants, might be employed to image reaction hot spots.

Alternatively, a hydrogen loaded anode might be placed immediately adjacent to the superconducting cathode, preferably adhered to it or applied to it with a separation distance achieved suitable to make a Josephson junction. The objective here is to manufacture neutral de-energized hydrogen states, e.g. He*, which can migrate into high mass nuclei and create signature free nuclear reactions.

WHY NO NUCLEAR SIGNATURES?

When two deuterons collide and fuse in hot fusion, it takes a lot of energy to overcome the Coulomb barrier, and that energy remains in the nucleus as potential energy. The resulting nucleus has a lot of pent up potential energy, which quickly ends up released in the form of decay particle energy, or gamma rays.

If the waveforms of two deuterons tunnel to the locus of an electron, i.e. the quantum waveforms of two deuterons and a centrally located electron collapse at the locus of the electron center of charge, then the resulting nucleus is not energetic. This concept was more fully described here in 2001. See <http://mtaonline.net/~hheffner/EcatFusion.pdf>.

Now, supposing T is the final result of the fusion, and no neutron. We then have:

D + D + e- ---> He* ---> T + P + 2 e-

or possibly, with condensation on an electron boson pair:

D + D + (e- + e-) ---> He* ---> T + P + 3 e-

where here He* here is not really helium at all, and certainly not an energetic isomer. It is a highly de-energized complex. Note that in the electron boson pair reaction the He* is neutral. Within He*, to produce the tritium reaction, there is an accelerated decay of a neutron, producing a P and e- which have to leave the nucleus, and which produces net nominal energy in the keV range. The work to eject both the P and e- from the nucleus nets to nearly zero. The work to eject a proton from a neutral nucleus is nearly zero. The work to eject the electrons de-energizes the nucleus. There will be no energetic gamma from the electron ejections. In fact, the energy for the ejection may have to be long-term borrowed from the ZPE sea.

Additionally, the ejection of P + 2 e- or p + 3 e-, could be expected to produce EM radiation, and not all in one high energy photon, but rather in smaller chunks. The only signatures of this reaction are thus low order heat and tritium.

The Pauli exclusion principle excludes superposition of two fermions not having opposed spins, e.g. 3 free electrons. There is evidence that a superposition event can occur between two fermions having opposed that makes them act like a boson. Examples of this are the ability of electrons to build Ken Shoulder's EV's (if they actually exist), superconductivity (the formation of electron pair bosons, superpositioned electrons with opposed spins, may be an alternative explanation of superconductivity) as well as the proven existence of fermion Bose condensates. Electron pair bosons additionally provide a rationale for the tendency of electrons to tunnel in pairs across Josephson junctions. The superposition of opposed spin particles cancels the net spin magnetic field, thus greatly reducing lattice interaction.

The quantum waveform (Psi) of any particle extends throughout the universe. The integral of Psi^2 for a volume indicates the probability of the particle's location in a given volume in a given time. When two or more particles have an "event", creating a new particle or particles, the waveforms of the old particles collapse, and the new particles waveforms instantly extend throughout the universe. (Yes, this implies FTL events can happen.) If any event can happen between any two or more particles, the probability of that event in some volume of space is just integral of the product of the Psi^2 value of the waveforms in the volume. The electron catalysis concept is simply, provided a 3rd (catalyst) particle can be involved in an event, its being located halfway between two other involved particles separated by distance X greatly increases the probability of the 3 body event over the probability of the two body event (excluding the catalyst) at the given distance X. Further, the event, the resulting product, must be energetically favorable, and having two bodies of one charge and one of the other, ensures that the event is energetically favorable with respect to coulomb charge. The wave function collapse of two deuterons upon a boson consisting of two opposed spin electrons would be even more energetically favorable. Thus you have the dual electron catalysis hypothesis. See also <http://mtaonline.net/~hheffner/DualElectronCatFusion.pdf>.

From electron pair catalysis of deuterium we then may have the reaction:

Pair Created LENR

Horace Heffner December, 2005

D+ + D+ + (e- + e-) ----> He4* ----> He4++ + e- + e-

or

D + D + (e- + e-) ---> He* ---> T + P + 3 e-

or it may be the de-energized He*, being neutral, might be able to penetrate a heavy nucleus provided some unknown bond can momentarily hold it together in the powerful field of the large nucleus, long enough for a strong reaction to occur. The creation of tritium, i.e. the disintegration of a neutron, might be favored in this case due to the presence of two electrons in the nucleus. Thus an unusual branching ratio is expected, both due to the low energy state and due to fermion count in the nucleus.