Heisenberg Traps

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Some fun speculations follow that consider possible use of the Heisenberg principle to design devices that continuously borrow free energy from the vacuum.

Uncertainty of momentum for a particle (electron) constrained by distance delta x is given by:

delta mv = h/(2 Pi delta x)

but since

KE = (1/2) m v^2 = (1/(2 m)) (delta mv)^2

delta KE = (1/(2 m)) (h/(2 Pi delta x))^2

delta KE = h^2 /((8 Pi^2 m)   (delta x)^2)

the more you can confine the *position* of an electron the more energy you can potentially observe when you sample that energy. If an electron can be confined to a 1 angstrom range then there is an uncertainty of 1.06x10^-24 kg-m/s on the momentum and thus 6.1x10^-19 J or 3.8 eV uncertainty on energy.

This could be an explanation in part for "heat after death", excess heat in the Szpak cell (where electrons are concentrated on one end of the cathode), as well as other excess heat observations not occurring until the gamma phase of loading. Conductivity of the cathode is reduced in the gamma phase of loading. The necessary condition for heat creation in Pd type CF experiments is filling of (and therefore eliminating) the Pd conduction bands - in addition to basic loading. This has to happen without cracking the lattice, which is apparently the difficult part. When the lattice cracks the gas in the vicinity leaks and confinement is ended. Large parts of an electrode volume have cracks and thus there is a steady flow of hydrogen into and out of a cathode, which precludes electron trapping in those volumes.

Adsorbed protons are ionically bound to the lattice. A paired electron moves along with the adsorbed proton as it moves through the lattice. THe paired electron moves within the conduction bands. Once loading reaches the point where the conduction bands become filled, the electrons trapped along with their paired hydrogen nuclei lose all degrees of freedom and are thus trapped by the confines of the interstitial site in which the paired nucleus is trapped. The electron location is thus known and fixed, and there must be a corresponding range increase on uncertainty of the trapped electron's momentum, and thus the average momentum observed when sampling the electron's energy. This increase in momentum is not temporary - it is permanent for the duration of confinement.

The lattice samples the trapped electron's energy via Brownian like collisions. Sampling the electron's energy by collision does not release the electron's confinement, or change its energy uncertainty. This means that, as the lattice bleeds off energy from the electron, in the form of phonons, that energy gets replaced to the electron from the zero point field (ZPF). The result is continual and permanent energy output with no observable input.

The key to practical free energy is permanently trapping electrons in small volumes. This may or may not require trapping them with associated hydrogen nuclei, as is done in CF cells, but it is clear that having net charge be neutral, as it is in the lattice, is a useful advantage.

The key to building successful CF electrodes is likely in engineering lattice material in which the conduction bands exist in only one or two axes, thus are easily filled and blocked, leaving a confined one dimensional degree of freedom. The object is to load the lattice with protons in spaces too confined to form atoms, and then shut off all the conduction paths so as to fix the location of and thereby trap free electrons associated with trapped (but covalently unbound) nuclei.

One possibility for doing this might be to use a semiconducting material used for making FET's. If protons (not in the form of atoms) can be injected or built into the lattice, the associated electrons can be frozen in place by imposition of an electrostatic field gradient that removes conductivity from the lattice. There are the problems of keeping the interstitial spaces intact and small enough and strong enough to prevent hydrogen atom formation. Perhaps a similar strategy can be implemented using powerful magnetic fields - imposed on proton doped semiconductor lattices to eliminate conductivity.

It is possible that geometry is more important than composition for trapping electrons, i.e. confining many electrons in a small volume. The ideal location for doing so is at the tips of dendrites on a cathode. The formation of long thin dendrites takes time, and this may help explain in part the long run times before excess heat is observed. The use of platinum anodes may in fact inhibit the dendrite formation or limit the duration of dendrite activity due to dendrite erosion.

Perhaps energy generating solids can be built using epitaxy, crystal growing techniques, electrodeposition, or other means. All that is required is the trapping of free electrons in the lattice and confinement of their range. Knowing the objective should make the materials science much easier.

Further notes, Jan. 2006, follow.

An example of a Heisenberg trap, and a powerful conduit to the zero point field, may be the nucleus itself. Stable nuclei, like stable atoms, do not radiate. However, they sustain a large kinetic energy density. Consider the following article from the AIP:

"PHYSICS NEWS UPDATE
The American Institute of Physics Bulletin of Physics News
Number 443 August 16, 1999 by Phillip F. Schewe and Ben Stein

NUCLEAR THERMOMETER. How hot is it inside the nucleus of a dysprosium atom (element 66, abbreviated Dy) Temperature is a statistical concept that normally applies to an ensemble of many particles, such as air molecules or a gas of atoms kept in a bottle. Inside a heavy nucleus, swarming with protons and neutrons (collectively called nucleons) it's not so easy to define temperature, owing to the many pairing and other inter-nucleon interactions that take place, but it can be done. The nuclear environment can be sampled by colliding nuclei together and then carefully measuring the photons that fly out: high energy gamma rays, in this case, rather than the visible and infrared photons that come out of heated-up atomic gases. In this way, physicists at the University of Oslo have deduced the temperature inside a Dy nucleus (in effect, a gas of 162 nucleons) to be 6 billion K. It can be said, therefore, that even in winter parts of Norway (very small parts) remain quite warm. This is the first time a nuclear temperature has been measured strictly on the basis of the spectrum of gammas emitted. (E. Melby et al., Physical Review Letters, tent. 30 August 1999; contact Magne Guttormsen, magne.guttormsen@fys.uio.no, 011-47-2285-6460.)"

The nucleus itself may be an endless repository of kinetic energy which can be tapped if a means to repetitively and frequently kinetically interact with it can be found. Such a means might include photon stimulation, interaction with energetic electrons, or coupling and jiggling via a lattice. It seems reasonable to conjecture that the jiggle of rapidly diffusing Li, D or T nuclei might siphon off some of their nuclear heat energy via spin coupling or EM coupling with close energetic free electrons, or possibly even the lattice. Further, in electron catalyzed fusion, the nucleus itself may assist the escape of the catalysing electron via coupling to the nuclear heat, the nuclear kinetic energy. Once tapped, the nucleus can subsequently replenish its heat from the ZPF.

The radius of a Dy nucleus can be estimated at

$R_{\_Dy}$ = 1.4x10^-13 cm * A^(1/3)

= 1.4x10^-13 cm * (162)^(1/3)

= 7.6x10^-15 m.

The atomic weight of Dy is 162.5 AMU, which, at 1.66x10^-27 kg/AMU gives a mass m of 2.7x10^-25 kg. Letting gives

delta KE = h^2 /(8 Pi^2 (2.7x10^-25 kg) (delta x)^2)

= h^2 / ((8 Pi^2 (2.7x10^-25 kg)) (7.6x10^-15 m)^2)

= 3.6x10^-16 J = 2200 eV.

At 11,600 Deg. K per eV, we have a minimum Dy temperature of 26 million Deg. K. This is way short of 6 billion degrees.

Given there are 162 nucleons in Dy, that is 486 quarks. The quarks have an average mass of 5.58x10^-28 kg. Now we can aske the question, how big do the quarks have to be to account for the nuclear temperature? The temperature of 6 billion degrees is equivalent to 5.15x10^5 eV per quark. We have:

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5.15x10^5 eV = h^2 /(8 Pi^2 (5.58x10^-28 kg) (delta x)^2)

(8 Pi^2 (5.58x10^-28 kg) (delta x)^2) = h^2 /(5.15x10^5 eV)

(delta x)^2 = h^2 /((5.15x10^5 eV) (8 Pi^2 (5.58x10^-28 kg)))

(delta x)^2 = 1.208 m^2

delta x = 1.10 x10^-14 m

We thus have the minimum diameter of the quark as being about 10^-14 m. The *proton* diameter is given by some references as about 10^-15 meters. See: <http://hypertextbook.com/facts/1999/YelenaMeskina.shtml>.

If the quarks have an uncertainty in position of 10^-14 m then that fits OK with the quarks staying in the 10^-23 diameter of the Dy atom, but does not fit with some estimates of the diameter of the proton. The quarks jammed into protons may thus be even hotter than 6 billion degrees.

Alternatively, we can assume the unit of mass involved in sustaining the heat is not the quarks but rather the 162 nucleons. We thus have a mean mass of (2.7x10^-25 kg)/162 = 1.667x10^-27 kg, and:

5.15x10^5 eV = h^2 /(8 Pi^2 (1.667x10^-27 kg) (delta x)^2)

delta x = 6.36x10^-15 m

And this fits very nicely into the Dy or radius of 7.6x10^-15 m. It thus may be reasonable to expect that the nucleons are the primary unit of interaction with the zero point field. However, there is a small discrepancy in that the nucleus is slightly hotter that it should be for its size. Perhaps their is a hierarchical sharing of zero ZPF gathered energy between each level of existence. In other words thhe quarks share some of their ZPF energy with their nulceons, the nucleons share some of their ZPE gathered energy between alpha-like nucleon substructures, etc.

Assuming the nucleons assume a temperature depending on the confining radius, we can predict, given A the mass number, the nuclear temperature T in kelvin for large nuclei by:

T = (11,600 degrees K/eV) (h^2) /
(8 Pi^2 (1.667x10^-27 kg) (1.4x10^-13 cm * A^(1/3))^2)

We can see T is inversely proportional to A^(3/2), thus using Dy as a baseline we have a rule of thumb:

T = K_temp * A^(-2/3)

where:

K_temp = 6x10^9/(162^(-2/3)) deg.K = 1.78x10^11 deg. K and thus

T = (1.78x10^11 deg. K) * A^(-2/3)

This rule of thumb then takes into account the ZPF interactions of quarks and other substructures of the nucleus. Converting the rule of thumb to constituant KE in electron volts we have:

KE = (1.53x10^7 eV) * A^(-2/3)

These rules of thumb then can be applied to create Table 1 below.

Elem.	**Atomic Number A**	**Nuclear Temp. GigaK**	**Nuclear Temp. MeV**
Dy	162	5.99	0.51
C	12	33.96	2.92
O	16	28.03	2.41
Fe	56	12.16	1.05
W	184	5.50	0.47
Ge	72	10.28	0.88
Pt	78	9.75	0.84
Ni	58	11.88	1.02
Cu	63	11.24	0.97
Pd	106	7.95	0.68
Au	196	5.28	0.45
Ag	107	7.90	0.68
Al	27	19.78	1.70
Ce	133	6.83	0.59
Yb	173	5.73	0.49

Table 1 - Nuclear Temperatures of Dy, misc. elements and FCC Elements

The FCC elements in Table 1 are ordered by the volume of their tetrahedral space sizes. If nuclear ZPF tapped heat accounts for any of the observed cold fusion heat, due to electron interaction with the nucleus in high fugacity partial orbital environments, then Ni stands out as the prime candidate for extracting such heat. Aluminum is a strong second, because copper is impervious to hydrogen. Oxygen, best of all in the table, provides a prospective nucleus for interaction in the plasma-liquid environment of the anode glow.