

Low Energy Nuclear Reactions (LENRs) and “cold fusion” are not the same

December 13, 2011

Dear Readers:

In different ways, many people are mistakenly conflating the Internet brouhaha and charges of quackery swirling around Rossi *et al.* (whatever he and his so-called “E-Cats” may or may not be) and “cold fusion” with the relatively new, growing field of low energy nuclear reactions (LENRs).

“Cold fusion” and LENRs are not necessarily synonymous and isomorphous, as I will now explain.

First, LENRs are legitimate science. “Cold fusion” (i.e., $D + D \rightarrow He-4 + \text{heat}$; more generally, nuclear fusion of charged particles in the presence of high Coulomb barriers at high reaction rates at low temperatures) is not, and never was legitimate science; on that particular point, I agree with the critics.

Importantly, the distinction between the two concepts (LENRs versus “cold fusion”) is fundamental, not mere semantics as the cold fusioners might have readers believe (in the CFers last ditch attempt to obscure the intellectual bankruptcy of their longstanding, erroneous ideas about physics).

For example, during the past several years “cold fusion” proponents have deliberately tried to muddy the conceptual waters by publicly asserting that neutron capture processes are really a form of fusion. They are not “fusion”, as a cursory examination of major physics dictionaries readily reveals. Also, there are no Coulomb barriers to neutron captures since neutrons have no charge, i.e., they are neutral particles. Frankly, anyone who insists that neutron capture is a fusion process doesn’t know very much about nuclear physics (which happens to be true of many of the cold fusioners and their camp followers).

Many people also seem to be under a mistaken impression that little or none of the work in the field of LENRs has been published in peer-reviewed journals. They are partially correct in that researchers have been unable to get “cold fusion” theoretical papers published in major refereed physics journals (or experimental papers in which authors try to explain their observed results with a “cold fusion” mechanism). This state-of-affairs is to be expected, because the concept of “cold fusion” is provably nonsensical from a physics standpoint, something that was well-established back in 1989 - 1990.

By contrast, the closely interrelated ideas of weak-interaction neutron production in condensed matter and subsequent neutron captures and nuclear decays are based upon well-established electroweak theory (under the ‘umbrella’ of the so-called Standard Model of physics) and a well-published body of knowledge about nuclear physics that has been developed since W.W.II. The Widom-Larsen theory of LENRs is solidly based upon these ‘bedrock’ elements of modern science; there is no “new physics” in any of our work. *At the highest level of abstraction, in a sense all we have done is to integrate modern electroweak theory with collective, many-body condensed matter quantum effects in a novel way.*

Not surprisingly, key elements of the Widom-Larsen theory of LENRs have in fact been published in well-respected, peer-reviewed specialist physics journals as follows (URLs provided to free copies of papers):

“Ultra Low Momentum Neutron Catalyzed Nuclear Reactions on Metallic Hydride Surfaces”

A. Widom and L. Larsen

European Physical Journal C – Particles and Fields **46** pp. 107 (2006 – released on arXiv in May 2005)

<http://www.newenergytimes.com/v2/library/2006/2006Widom-UltraLowMomentumNeutronCatalyzed.pdf>

“A primer for electroweak induced low-energy nuclear reactions”

Y. N. Srivastava, A. Widom, and L. Larsen

Pramana – Journal of Physics **75** (4) pp. 617 – 637 October 2010

<http://www.ias.ac.in/pramana/v75/p617/fulltext.pdf>

Last but not least, in February 2011, Lattice Energy LLC was awarded a fundamental U.S. patent as follows; please read it and you will see the distinction between LENRs and “cold fusion” that we are discussing herein:

US Patent #7,893,414 B2

“Apparatus and Method for Absorption of Incident Gamma Radiation and its Conversion to Outgoing Radiation at Less Penetrating, Lower Energies and Frequencies”

Inventors: L. Larsen and A. Widom

Issued by the USPTO on February 22, 2011

<http://www.slideshare.net/lewisglarsen/us-patent-7893414-b2>

Obviously, the U.S. patent office believes that LENRs do constitute valid science, or this particular patent would never have been awarded and issued to our company.

Interestingly, the “cold fusion” researchers have been complaining publicly and vociferously that the US Patent and Trademark Office has refused to grant them any patents. Such a policy by the US Patent Office should not be a surprise to anyone: unlike Lattice, their incessant patenting efforts have generally been unsuccessful because an underlying concept of “cold fusion” permeates their patent applications --- unlike LENRs, “cold fusion” is scientific nonsense --- the USPTO is simply behaving appropriately.

In conclusion, LENRs and “cold fusion” are different, readily distinguishable concepts.

Thus, LENRs are ‘real’ but “cold fusion” is not.

At the very end of our “*Primer*” paper published in *Pramana* (2010) we concluded that:

“The analysis presented in this paper leads us to conclude that realistic possibilities exist for designing LENR devices capable of producing ‘green energy’, that is, production of excess heat at low cost without lethal nuclear waste, dangerous gamma-rays or unwanted neutrons. The necessary tools and the essential theoretical know-how to manufacture such devices appear to be well within the reach of the technology available now. Vigorous efforts must now be made to develop such devices whose functionality requires all three interactions of the Standard Model acting in concert.”

In my opinion, a twenty-year obsession with the erroneous notion of “cold fusion” (which has no predictive value whatsoever in terms of reliably guiding further, more fruitful experimentation) on the part of an extremely vocal, publicity-seeking subgroup of LENR researchers has been a major impediment to forward experimental progress in the field. It has also hampered widespread worldwide acceptance of LENRs and discouraged increased participation in LENR research by mainstream scientists. Hopefully that will change in the near future.

Happy holidays and best regards,

Lew

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