November 25, 2011

Subject: were LENRs observed in the early 1950s? Einstein and Bethe got involved in this saga

Dear Readers:

You may really enjoy reading this amazing tale of a brilliant LENR-related experimental discovery back in 1951 --- followed by its descent into total obscurity. Simply lost and forgotten by mainstream physics.

In the history of science, it seems that experimental results that don't somehow fit within some sort of contemporary conceptual paradigm often tend to get ignored. Sadly, in many cases such results are never reported anywhere in peer-reviewed journals for posterity. In that regard, this cover note is combined with scanned page images from Chapter 6 in Dr. Ernest Sternglass' little 1997 book, "***Before the Big Bang - the Origin of the Universe***."

The excerpted page scans from the above book chapter are those in which Dr. Sternglass describes some enigmatic experiments that he conducted in the Cornell University physics department back in the early 1950s.It recounts his work with an old hydrogen-filled X-ray tube, as well as a subsequent dialogue with Albert Einstein in attempting to understand the (then) utterly inexplicable experimental results.

Seven years ago, Sternglass, then in his late 80s, told me over the telephone that (before he had communicated with Einstein about his strange results) the legendary Hans Bethe had looked over his experimental data and was totally baffled too. Nobody at Cornell understood what was happening in the experimental setup that could possibly produce the observed fluxes of neutrons (obviously, ultra low momentum neutrons were not produced in his experiments --- they were more akin to what happens in high-current exploding wires as opposed to what happens in typical P&F aqueous electrolytic cells). So, a baffled Bethe called Einstein on the telephone and asked him to help PhD candidate Sternglass evaluate his unexpected experimental results. *The attached chapter taken from Sternglass' book relates that story.*

What is truly mind boggling about this tale is that Einstein simply *looked* at Sternglass' data and then immediately realized that the observed neutron production must involve some sort of many-body collective effects with electrons (which we utilize with great explanatory power in our theory of LENRs). Can you believe it --- what a mind Einstein had ---- even at that late stage in his life! At that point (1951), very few physicists really had any idea of what collective effects were about. *Well, Einstein surely did.*

Unfortunately, Ernest's bizarre experimental discovery was simply not pursued any further. In the end, Sternglass didn't heed Einstein's (and Bethe's) strong advice to "*be stubborn*" and publish the deeply anomalous results. Sternglass' experiments were subsequently lost and largely forgotten by other physicists in the ensuing years, just like the work of chemists Wendt and Irion at the University of Chicago back in 1922 and other related transmutation work published in refereed journals circa 1900 - 1927.

Einstein, the only contemporary scientist who had any real inkling of what might be happening in Sternglass' puzzling experiments, died just four years after his interaction with Sternglass on the unexplained neutron fluxes.

The only surviving document wherein these intriguing experimental results were ever mentioned was Sternglass' little book published many years later in 1997. In 2006, I stumbled across a copy of it in the $2.99 discount section at Border's bookstore and, curious, just for kicks picked it up to read over the weekend. After reading an amazing chapter (see scanned pages), I immediately called my theoretical collaborators and said, "*You guys won't believe what I just found*." They were equally amazed.

We plan to specifically discuss and explain the 1951 Sternglass/Bethe/Einstein saga in an upcoming paper; it appears that this experimental anomaly is just another aspect of LENRs. Perhaps now, after remaining in obscurity for 60 years, there can finally be some conceptual closure on Sternglass' long-lost, unpublished experimental results.

Besides the 1950s-era Sternglass affair, we heard the following story from one of the former graduate students who was directly involved in some amazing experiments: specifically, in the mid-1960s, unexpected neutron production was observed in comparatively low temperature, RF-excited (dusty) deuterium plasma experiments jointly conducted at the University of Florida by the EE and nuclear engineering departments. The well-documented experimental results were so bizarre (significant unexplained neutron fluxes, "heat-after-death" after the electrical power was completely turned-off, etc.) that in the end, the graduate students and faculty involved in the work decided not to even *try* to publish their work in a refereed journal. It was deemed too controversial and potentially risky for all of their careers. *Yes, this could potentially be yet another aspect of LENRs.*

Incredibly, from ~1905 - 1927 some of the most famous people in British science (Thomson, Ramsay, etc.) episodically reported experimental results that are, in hindsight, obviously the result of LENR nuclear transmutations. The anomalous effects (e.g., appearance of new elements) were observed spectroscopically in various electrical discharge experiments and published in premier refereed journals of that era (e.g., *Nature*, *Proceedings of the Royal Society,* etc.). Interestingly, Thomson published a paper in *Nature* in which he complained about having major problems with experimental reproducibility of such effects. Does this problem sound familiar --- *a la* the Pons & Fleischmann brouhaha in 1989?

Back in the 1920s, nobody had a sensible explanation for anomalous transmutation effects that were being discovered experimentally; so by 1932 (when Chadwick experimentally confirmed the existence of the neutron predicted by Rutherford) the whole area of inquiry had been quietly dropped with little fanfare, many people apparently preferring to pursue 'hotter' contemporary topics such as quantum mechanics.

Over the past 100+ years, who knows how many scientists have actually observed different aspects of LENR-related phenomena, could not explain or understand what they saw experimentally, and were then either unable or unwilling to publish such controversial results in well-recognized, peer-reviewed journals.

One can only wonder at what may have been lost to science.

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Special note: **in the highlighted sections, Sternglass is really talking about looking for the presence of neutrons he thought could potentially be produced in his hydrogen-filled X-ray tube experiments via the weak interaction, that is *e + p --> n + neutrino.* After actually observing the neutrons he had hypothesized might be created, the remaining theoretical puzzle became explaining how such neutrons could possibly be created under conditions present in his experiments. In Sternglass' words, *"... there was no chance that such an experiment could possibly succeed. The neutron was believed to have a mass so large that it would take an electron accelerated to about 780,000 volts to produce it. But the power supply of Parratt's X-ray tube would only provide about 35,000 volts, some twenty-two times less ... C. G. Darwin's calculations indicated that neutrons might be formed by capturing an electron even at low energies."* Einstein was clearly aware of Darwin's work when he suggested to Sternglass that, *"... perhaps more than the energy produced by the applied potential might become available if more than one electron were to give up its energy to a proton at the same time, something that is conceivable according to quantum theory."* Unfortunately, Sternglass did not pursue Einstein's astoundingly prescient suggestion and dropped the line of inquiry. What Einstein was referring to is today called many-body collective quantum effects and is a crucial component of the Widom-Larsen theory of LENRs in condensed matter. Unlike Sternglass, we followed Einstein's advice and built upon C. G. Darwin's seminal work in 1920. In our "*Primer*" paper published in *Pramana - Journal of Physics* (2010) we have a whole Section 4.1 pp. 629 - 631 titled, "*Darwin electrodynamics*." Sixty years later, we have implemented Einstein's bold vision in our work.**

