



Everything you always wanted to know about cold fusion, but were afraid to ask.

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For over the last 27 years cold fusion (LENR) has been a scientific enigma for small community of scientists, engineers and interested laymen (www.iscmns.org). It has been meet with scorn and indifference from established science fields. The field has stayed in the background due to very slow pace of scientific understanding and control mainly due to the total absence of top notch resources. Modest quantity of excess heat and signatures of nuclear transmutation and helium production have been confirmed in experiments and theoretical work has only resulted in a large flora of inadequate theoretical scenarios. A true experimental extraordinary evidence number one that indicates that something is not right is generation of low intensity of radioactivity when Hydrogen isotope enters an experimental setup. This simple observation in countless of experiments since 1989 with statistics way higher than the background signal, breaks any nuclear physics understanding. Still this relative simple science logic has not made any impression on the nuclear physics field causing it not to report home “Houston, we've had a problem here” and the “disaster” may now be upon the field.

In this talk general introduction to fusion will first be given and then a brief account of experimental and theoretical history will be given. The later part of the talk will focus on the current state of research in Rydberg matter of Hydrogen that is showing strong signature of nuclear processes. Rydberg matter of Hydrogen is the only known state of matter that is able to bring huge collection of protons to so short distances and for so long time that tunneling becomes a reasonable process for making cold fusion or low energy nuclear reactions. Nuclear quantum entanglement can also become realistic process at these conditions.

An extensive cross-disciplinary effort of surface chemistry, catalysis, atomic physics, solid state physics, nuclear physics and quantum information is need to tackle the surprising experimental results that have so far been obtained. For an engineer there is an exciting era of new energy source looming in the far distance with opportunity to defer further global warming by replacing fossil fuel based energy sources and also creating in that way the new societal problem the energy glut.

Keywords: *fusion, energy, Hydrogen*

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