Cold fusion debate points to new approach to physics

Carol White reviews some theoretical implications of new theories emerging from the experimental work on cold fusion, including suggestions from Lyndon LaRouche.

Despite the extraordinary and deliberate disinformation campaign being conducted by the U.S. science mafia to discredit work in the domain of cold fusion, recent experimental results continue to be extraordinarily promising. At the same time, various theoretical hypotheses have surfaced which are of great interest.

Oddly, many of these attempts to explain the results observed are contradictory in their implications—at least as they are presently formulated—yet they are of great intrinsic interest. We can hope, that out of this apparent theoretical chaos, a new approach to physics itself will emerge, perhaps of profound theoretical importance. To date however, each of the theories on cold fusion has been fitted to the traditional norms of quantum theory.

After being briefed on breaking developments in the field, Lyndon LaRouche issued the following remarks on the status of cold fusion research in the United States, and the role of the science mafia in trying to destroy the promise of this work. On May 20, he said:

"If our civilization survives the U.S. Bush administration, the past two years will be remembered as a remarkably shameful page in the history of modern science. The exemplary case is the disgusting response which most of the official science mafia has made to the so-called cold fusion experimental report of [Martin] Fleischmann and [Stanley] Pons. This must be seen in the setting of a virtual fascist takeover of many leading U.S. universities by the so-called political correctness movement.

"The Fleischmann-Pons phenomena are significant in several respects, principally two.

"First of all, the experimental phenomena have implicitly a crucial importance for nuclear physics, physical chemistry, and so forth, in the respect that there are fundamental theoretical problems involved, and at least some degree of implied overturning of existing physical theory.

"Secondly, the experiment is crucial in that it highlights the question, whether at the present time institutionalized U.S. science is capable of facing truthfully any issue which involves a crucial theoretical question of physics.

"On the first account: We do not know whether the Fleischmann-Pons experiment is a true fusion experiment in the meaningful sense, or something else. We do know that whatever it is, it's extremely important, and does go to fundamental questions of nuclear physics.

"It should be noted, however, that this is *not* the first time this line of investigation has been considered, but, rather, we have circles associated with the famous Lise Meitner and others, back in the middle of the 1920s, who were already looking in these experimental directions—a fact which points out to us the possible place in which to locate the experimental phenomena in the history of physical science to date, i.e., in respect to the deeper understanding of the Periodic Table.

"I would suggest that we take not only the general accumulation of proven experimental results from various sources inside the United States and elsewhere over the recent two years, but take perhaps as a point of reference the contrast between the thesis advanced recently by [Frederick] Mayer and the contrasting thesis advanced in Italy by [Giuliano] Preparata. What should be done, at this point, is to aim experimentally at settling the question, whether either of these two proposals, or a possible third or even fourth, will indicate the correct direction in which to carry further experimental work."

Is it really fusion?

Our May 21 issue reported on a Boston press conference given by Frederick Mayer and John Reitz, in which they proposed that in "cold fusion" experiments, what actually was occurring was the formation of a short-lived virtual neutron capable of penetrating heavy elements and changing their isotopic structure. According to their theory, they should be able to build a demonstration reactor five years from now. Mayer and Reitz also claim that their theory can explain how heat is generated at the center of the Earth.

An interview with Dr. Giuliano Preparata appeared in the Winter 1990 issue of *21st Century Science & Technology* magazine, which we reprint below. His theory of how cold fusion works is of special interest, because it ties together the phenomena of superconductivity and cold fusion. He believes that his theory is also applicable to work of optical biophysicists such as Dr. Fritz Popp, who hypothesizes that cells communicate by principles similar to those by which lasers in the ultraviolet range operate. Dr. Preparata is a theoretical physicist at the University of Milan, who spent a semester last year as a visiting professor with the National Cold Fusion Institute at the University of Utah in Salt Lake City. He is the author of more than 200 theoretical papers on high-energy physics. He earned his degree in 1964 from the University of Rome, and up until 1988 he mainly worked on the theory of high-energy physics, or subnuclear physics. He has spent time at various universities in the United States including Princeton, Harvard, Rockefeller University, and New York University, as well as being connected with the European Center for Nuclear Research (CERN). Clearly his credentials are impeccable when it comes to certifying—as he does—the importance of the experimental work of Fleischmann and Pons. Despite the fact that he is primarily a theoretical physicist, he has also worked on the free electron laser.

Essentially, Preparata believes that the palladium lattice acts to transform deuterium gas, because the palladium at room temperature acts like a metal which has become supercooled to become a superconductor.

One-quarter of all metals can become superconducting at temperatures close to absolute zero. Ceramics can also become superconducting at temperatures of about −200°F. In a superconductor, the extremely cold temperatures allow the reorganization of electrons, so that electric current can flow without resistance. According to Preparata, something similar occurs in cold fusion. He points out that superconductors tend to maintain themselves by expelling heat. This bleeds entropy from the system. In other words, the system maximizes order, or negentropy.

He relates this to cold fusion, by again supposing that the palladium lattice acts as if it were cooled to temperatures in the neighborhood of absolute zero. According to standard quantum theory, the state of electrons in the palladium should be structured according to quantum constraints, so that no two electrons could exist simultaneously in precisely the same state. This is known as obeying Fermi statistics. Preparata says that this is not the case, but the palladium lattice, under circumstances of electrical flow, behaves according to Bose statistics: in other words, as if it were photons rather than electrons. Light or photons, unlike matter, operate according to Bose statistics, which means that they can be organized to act in unison, or sequentially to emit coherent, lased light.

In the instance of palladium, the coherent oscillations of the electrons create spaces in the palladium which allow the deuterium to enter. It is in these holes that fusion takes place. (For this to occur however, the palladium must be specially treated chemically—and how this is done is being closely guarded by holders of industrial patents on the process.)

Preparata, unlike Mayer, does believe that what is occurring in the cold fusion experiments is actually a fusion reaction. Nonetheless, a cold fusion reaction does have different characteristics from fusion which takes place at temperatures approaching that of the Sun.

For example, with high-temperature deuterium fusion—hot fusion—a compound nucleus is generated, and a neutron and helium-3 are released, along with a proton and tritium. With the Fleischmann and Pons experiment, it is more likely that helium-4 and heat will be produced. This presents a problem for the conventional picture of condensed matter. Preparata believes that this can be explained by the fact that the electrons around the nuclei of palladium are able to make oscillations, which concentrated the negative charge and screened the positive charge, thus lowering the Coulomb barrier for penetration.

In the original experiment conducted by Martin Fleischmann and Stanley Pons, announced in March 1989, the basic apparatus consists of palladium and platinum electrodes placed in a glass tube with heavy water. A voltage applied across the electrodes splits the water into oxygen and deuterium, and the deuterium is then absorbed by the palladium. Excess heat at room temperature was measured, which Fleischmann and Pons attributed to a nuclear process—the fusing of deuterium atoms. The experiment occurs at room temperature, hence the name, cold fusion.