New scientific theory waiting in the wings

by Carol White

While conflicting claims about cold fusion are the most dramatic example of experiments awaiting an adequate theory, they are by no means the only case. For example, scientists at the University of California at Los Angeles (UCLA) have produced a bubble of nitrogen gas, which can be made to oscillate and emit extraordinary light flashes. What is involved here is a phonon-photon interchange, in which sound waves are used to generate light pulses of extraordinary intensity.

This is known as sonoluminescence, and the phenomenon has been observed for more than 50 years. New diagnostics, however, have shown remarkable results. Light flashes are emitted from the bubble, which occur over the extremely short time-frame of less than 100 picoseconds (one-trillionth of a second), much shorter than the duration of the sound wave which generates it.

The work was reported at a meeting in Baltimore, Maryland of the Acoustical Society of America held during the first week of May. What occurs is an oscillation by the bubble, which operates like a switch; however, the surprising development is that the switching takes place 10,000 times more rapidly than would have been predicted.

Seth Putterman, a physicist who led the UCLA team, calls the results "spectacular." Considering that they are seeing energy densification in the range of trillionths of a second, 1 billion times shorter than the sound wavelength, this is not hyperbole. A single nitrogen bubble is trapped by a 20-kilohertz sound field in a mixture of water and glycerine. Their experiment was built upon observation of the time necessary for the light pulse to build up, and the time involved during the emission of the light.

The techniques which have allowed scientists to observe this phenomena were developed at the University of Mississippi at Oxford by Felipe Gaitan and Lawrence A. Crum. What they found was that the light is emitted at the point of maximum compression of the bubble. After emitting light, the bubble waits to again rhythmically synchronize with the sound field. The bubble will shrink and expand several times during any given sound-wave cycle, but it will only emit light one time per sound cycle.

Sound energy is apparently absorbed by the bubble as it expands to its maximum size. Then, as it contracts, it delivers this energy in a focused way to a small number of atoms or molecules enclosed in the bubble. Out of this compression a lasing type of phenomenon occurs, with the atoms becoming excited and emitting short pulses consisting of about 1 million photons.

One might expect that the bubble would be destroyed after the light was emitted, but this is not the case. The bubble can oscillate over periods of hours or even days. As yet there is no adequate theory to explain this. Should researchers find that the emission of light occurs within 10 or fewer picoseconds, which some predict, then conventional scientific explanations will be overthrown.

The significance of these results is that they may tie in with phenomena otherwise observed in cold fusion experiments. The idea that a phonon-photon exchange in the palladium lattice is involved in cold fusion, is explored in some theories. Relevant points of comparison are the action of the palladium lattice in somehow allowing the absorption of energy into the deuterium gas over a considerable period of time, up to two weeks, before the emission of energy takes place.

It is also the case that the traditional explanation of low-temperature superconductors, which involves the formation of Cooper pairs, also involves a phonon-photon interchange. So far, this has not been observed in the higher-temperature superconductors, but it is attractive to suppose that cold fusion will some day be explained in terms which are coherent with the existence of both types of superconductor.

Clusters of ions and bubble phenomena have also been observed in "hot" fusion experiments. The question is whether these bubbles are compressible and act to pump out light. Some researchers not working on the project have hypothesized that the bubbles are acting like super-atoms which are undergoing a lasing action.

One might also ask whether the emission of light by the "soap bubble" may not in turn interact with the propagation of the sound. In music, there is a phenomenon akin to lasing, used by *bel canto* singers, which allows the singer to focus his or her voice. This has led Lyndon LaRouche to assert that sound waves must fundamentally be electromagnetic in character.

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tions are, however, that donors are prioritizing the Gulf States and Eastern Europe for aid provision, and are not prepared to augment their budgets to cope with Africa. So these nations end up as double losers. The war weakens already-ravaged economies, and the war deflects away aid resources which they might otherwise have received.

Without such assistance, however, the list of war casualties could still yet grow.