Fusion Power Possible Within One Year

July 18 (IPS) — Ten days ago the American Chemical Society announced a major breakthrough in laser development, the immediate implication of which is to make the actual development of controlled fusion possible within one year. Significantly, this news was blacked out of the major media.

The full press release is reprinted below. IPS will publish a detailed analysis of this crucial development next week.

CHEMICAL TRIGGER FOR FUSION POWER IS REPORTED

Albuquerque, July 8 — Dramatic results in channeling peak energy from a chemical explosion into laser power, giving a powerful chemical laser with clear potential to trigger fusion power, were described here today at the second annual Rocky Mountain Regional Meeting of the American Chemical Society.

New design has converted the hydrogen flouride laser into a high power chemical laser that achieves a 250 per cent conversion of electrical energy into laser energy, and this will make it possible to provide laser pulses near one million joules of energy **at an early date and at low cost,** said Dr. Reed J. Jensen, group leader of the "Laser-3" program at Los Alamos Scientific Laboratory. He cited the joint efforts of Jack P. Aldridge, N. Roy Greiner, Larry S. Blair, Richard W. Getzinger, Paul F. Bird, Robert G. Wenzel, and George P. Arnold — all from Los Alamos — and E.L. Patterson and R.A. Gerber of Sandia Laboratories in Albuquerque.

The reaction between hydrogen and flourine is explosive in nature, and the concept of harnessing the energy from this reaction to multiply laser energy is not new. However, the production from chemical explosions of the large amount of pulsed laser energy needed to initiate fusion required fundamental innovations in triggering chemical reactions and in rapidly driving them to completion to extract the maximum amount of energy. This has now been accomplished, Dr. Jensen said in an explanation of his work, continuing:

"Recent developments in the technique of instantaneous ignition of the explosion of mixtures of hydrogen and flourine have produced dramatic results in coupling rapid chemical energy release directly into laster power. In a recent series of experiments, over 2,300 joules of laser energy was obtained in a 30 nanosecond (0.00000003 second) pulse by investing less than 1000 joules of electrical energy in the gas to initiate the explosion. This high rate of energy return will make it possible to provide laser pulses near one million joules at an early date and at a low cost, so that the basic physics of laser-driven pelletimplosionnecessary for laser fusion can be investigated."

An electron beam was used to initiate the reaction. The laser tube contained fluorine, oxygen, hydrogen, and sulfur hexafluoride. The oxygen was present to keep the hydrogen and fluorine from reacting before the electron beam pulse was delivered. The sulfur hexafluorine is an extra source of reactive fluorine atoms; it sheds extra fluorine atoms at an early time in therreaction to boost the rate of reaction to the highest possible value, he explained.

High pressure used in the latest experiment leads to a very rapid reaction rate so that the pulse duration is only 24 nanoseconds (0.000000024 seconds) and the peak power is 100 billion watts. A watt is an international unit of power equal to one joule of energy per second.

"In future work, we will increase the pressure of each of the constituents about tenfold, thereby reducing the lasing time to less than 2.5 nanoseconds. We hope to eventually get the pulse energy to nearly one million joules," he continued.

A chemical laser is a system that depends upon an energy-evolving chemical reaction to provide Light Amplified by Stimulated Emission of Radiation (LASER). Gas molecules can absorb light energy and become excited. However, in the normal state of affairs, there are more molecules in the normal energy state ("ground" state) than in the excited state. A laser makes use of the reverse situation; it is based on what happens when the majority of gas molecules are excited and then irradiated. This situation, in which most of the molecules are excited, is unstable and can be caused by a more or less violent excitation such as electrical discharge, intense radiation, or chemical reaction. Such excited molecules still react to the stimulus of a beam of light (energy) in the only way left to them: they return to the normal "ground" state, transferring their excess energy to the beam and amplifying the total energy of the beam, Dr. Jensen explained. (The energy difference between the excited and ground state of the gas must be identical to the energy of the beam.)

The team at Los Alamos and Sandia Laboratories has found a way to instantaneously initiate and speed the reaction between hydrogen and fluorine, driving it to completion in a short, short time, thus concentrating the energy derived from the reaction into one short intense laser pulse.