



These charts (from top) show fusion process, Deuterium and Tritium isotopes under heat and pressure are fused, forming a new isotope of helium and releasing vast quantities of energy.

DISCLOSURE OF LOUIS GOLD  
to  
UNITED STATES ATOMIC ENERGY  
COMMISSION  
pursuant to  
Chapter 13 - Sec. 151 Atomic Energy Act  
of 1954

Attention:  
Martin R. Hoffmann  
General Counsel  
Atomic Energy Commission

DISCLOSURE  
LASER FUSION ENGINE PRINCIPLE  
CONTROLLED MICRO EXPLOSION  
OF FUSIONABLE FUELS

Several decades ago the prospect of producing fusion explosions on a small scale by the "exploding" wire technique was first described. Unfortunately, the limitations of the electrical circuitry did not permit sufficient energy concentration in both space and time, the inductance, for example, slowing discharge down to micro second range. The advent of the laser represented the breakthrough and with improving technology of nano to pico second pulses at increasingly high power levels, the possibility of fusion ignition mounted.

Conventional theory of laser fusion heating of cryogenic pellets of deuterium and tritium indicated that the breakeven point for power production would not occur until the range of megajoules output attained. Elementary calculation, however, suggested that enormous pressures could be generated in microgram samples of fusionable material, raising doubts as to the validity of the Lawson criterion. Evidence was provided that at thermonuclear temperatures of some tens of millions of degrees, many thousands of atmospheres of pressure could result for extremely rapid heating. Clearly pyconuclear conditions could arise to invalidate the Teller-Gamow barrier theory.

Moreover, at such high pressures generated by laser heating of solids, suppression ionization could be expected, or, at least, strong electron screening of positive nuclei would tend to reduce the coulomb repulsion. Addition of more strongly electronegative elements as lithium would serve to suppress ionization of hydrogenic isotopes. In other words, fusion might be expected to be enhanced by the precursor interaction of

neutrals which when ultimately ionized at the high temperatures would more completely react.

This suggests the entry of catalytic effects to enhance thermonuclear reactions in very dense media.

With heightened likelihood of fusion reactions as described, it was then realized that a dust cloud of finely divided material such as lithium deuteride might be detonated by a powerful enough laser spark. For micron-sized particles, 100 joules of laser energy properly focused could release thermonuclear energy explosively.

Such micro-dust explosions in a suitably designed chamber could be controlled in cascade fashion (more or less as in an internal combustion engine) to produce steady power flow. The level of explosive force would be reasonable enough for a kilowatt source to relax requirements on materials strength much below presently estimated ignition energies for droplets or pellets of millimeter size that would mean enormous bursts of energy.

What is envisioned, then, is an aerosol spray system in which finely divided fusion fuel is dispersed. On injection into a chamber, the medium would evaporate spontaneously leaving a cloud of particles flying about subject to randomized Brownian motion as in a gas.

Hence, unlike the need for larger pellets, to aim the laser beam accurately becomes unnecessary. The gaseous behavior of the fine particulate fusionable material permits ignition as in the case of a truly firing internal combustion engine.

The technique described for producing laser ignited fusion micro-explosions can be developed at a sufficiently reduced energy output to study the details of such power sources. With confidence established, increasingly higher power output would follow as suitable chamber design evolved to withstand intense explosive forces.

In the limit of macroexplosions, "clean" nuclear explosions could be generated. Environmentally attractive plowshare operations for peaceful use of fusion explosives would become available.

Louis Gold

14 day of December, 1972.

Receipt of Disclosure acknowledged this 14 day of December, 1972.

U.S. ATOMIC ENERGY COMMISSION

The first man-made fusion reaction which produced more energy than used in its ignition took place on Eniwetok Atoll in 1952. The system used was that of inertial confinement, and a nuclear fission bomb was used to ignite the fusion reaction. Deuterium and tritium were placed inside the atom bomb so that the fission bomb explosion compressed (imploded) the fusion fuel and then heated it to fusion temperatures.

### The Odyssey of Dr. Louis Gold

In 1949, Dr. Louis Gold, a leading scientist who worked on the Manhattan Project, suggested that controlled fusion could be achieved utilizing the same inertial confinement system as that projected for use in the "Super"- the original H-bomb.

The fission bomb used to spark fusion in the Super would be replaced by an electrical spark. Dr. Gold presented his findings in his paper "On the Production of Extreme Temperature by Electrical Discharges" in 1949. In exploring his proposed method of exploding electrodes to induce fusion, Dr. Gold discovered that lithium-6-deuteride (Li-6-D), could be utilized as a substitute fusion fuel for the hydrogen gasses deuterium and tritium.

The advantage of Li-6-D as a fusion fuel in inertial systems is that it is a solid at room temperatures and does not have to be refrigerated as hydrogen gasses must be. Neutrons from the fusion of deuterium "split" the lithium atom into helium and tritium and thus create the fuel for the D-T reaction in the process of the reaction itself. Edward Teller utilized Gold's concept to produce a viable hydrogen bomb.

Throughout 1950 and 1951 Dr. Gold lobbied for an overall effort to achieve controlled fusion exploring both magnetic containment (the system used in the Tokamak) and inertial confinement. Dr. Gold's clearance for data related to this research was cancelled. Shortly thereafter Dr. Gold lost his job.

Moreover, work on inertially confined systems to achieve fusion was kept under a cloak of strict secrecy, even though systems such as exploding electrodes could have no weapons applications. The largest conceivable burn of fusion fuel with an electrical ignition system the size of a three-story building would produce no more explosive effect than that of a few pounds of TNT.

With the invention of the laser in 1961, Dr. Gold saw a clear path to achieving controlled fusion. Previously, the use of electrical discharges necessitated a material link between the fusion fuel and the electrical ignition system. This link substantially limited both the amount and rate at which energy could be dumped into fusion fuel.

But lasers produce coherent electromagnetic radiation pulses which travel through empty space. Therefore large quantities of energy could be optically focused within billionths of seconds on extremely small quantities of fusion fuel.

Gold's efforts to get the AEC and other interested government agencies to undertake a major research program to develop lasers applicable to fusion and begin experimentation in laser fusion were completely rebuffed.

Publicly the AEC contended that the scale of lasers needed to produce fusion temperatures would have to have energy outputs 1,000 to 100,000 times greater than any laser built. This estimate was based on naive physics.

Essentially the laser energies required were calculated on the basis of inducing fusion at ordinary densities. As previously documented in New Solidarity, Dr. Gold approached the AEC and Air Force in early 1972 with an approach which could achieve laser fusion at lower laser energies than previously projected.

As was well known to weapons designers at Los Alamos and Lawrence Livermore Laboratories since the early 1950's, fusion reaction rates could be enhanced through increasing the density of the reactants- as was done in the hydrogen bombs. By the early 1960's Livermore scientists carried out secret calculations which showed that a laser pulse could be used to first compress a pellet of fusion fuel to high densities and that a second pulse of laser light could then ignite fusion.

These calculations showed that fusion could be achieved with laser outputs 10 to 1,000 times less than that calculated in the naive model which was released for public consumption. As seen in the Disclosure to the AEC (see box) Dr. Gold's approach went significantly beyond even these secret calculations.

Vincent LoDato, an unemployed physicist who had worked for the RAND Corporation, tried to publish his own work-along the same lines as Dr. Gold's-at the same time that Gold was independently lobbying in Congress for an experimental program to verify his hypothesis. LoDato's work was confiscated by the AEC as reported in Time Magazine in August 1972.

Simultaneously, during the Montreal VII International Quantum Electronics Conference, Edward Teller publicly released the information on the secret calculations carried out at Livermore 10 years previously. Gold was warned previous to Teller's disclosure- by the AEC and the Air Force- not to publicly reveal his concepts.

Teller's revelations were obviously designed to divert attention from Gold's lobbying efforts and from the outright suppression of LoDato's work. Gold was prevented from publishing his concepts and strung along by the AEC and Congressman Chet Holifield until Gold's chief supporter in Congress, John Dow, was defeated in the November elections. LoDato was given a plush job at Xonics, a private research firm. John Gilvarry, LoDato's chief sponsor at Rand, a top laser expert, and a close friend

of Louis Gold's, lost his job at Rand shortly after he endorsed Gold's laser fusion proposals.

As for KMS fusion, it was founded by scientist entrepreneur Kip Siegel, who received his first briefing on laser fusion from Dr. Louis Gold, whom he no longer speaks to. The KMS approach to fusion is based on laser compression of nuclei in tiny balloon pellets.

Analysis shows that the balloon-pellets which Rockefeller allowed KMS to obtain aren't capable of leading to fusion energy systems because they require a laser with greater than 50% efficiency. At present, top laser efficiency is 3-4 per cent. And in fact the results which KMS has achieved are based on an approach which may not even be producing fusion at all.

In any case, the Watergating of the AEC gives a convenient cover to the actual suppression and creates a meaningless controversy over KMS's results. At the same time, physicists in the AEC laser fusion program become the targets of this scientific Watergate, Edward Teller is given an open field to continue to justify the suppression of fusion research.

The Fusion Energy Foundation is compiling a complete proposal to follow up Dr. Gold's hypothesis. This approach would not involve more than \$2 million in research funds. When Congress meets in January, the United States Labor Party will present this exact proposal and proposals for a broad program of fusion research in both magnetic containment and inertial confinement to the legislators.