Eyewitness Report:

Soviet Scientist Opens Int'l Nuclear Energy Drive

by Chuck Stevens

Coming directly from the meeting of the Supreme Soviet of the USSR, Academician Nikolai G. Basov, the Soviet Union's leading laser scientist, made an unexpected appearance at the International Scientific Forum On An Acceptable Nuclear Energy Future of the World, and told that conference of the U.S.'s leading nuclear scientists, industry representatives, and electric power utilities that an international crash program to develop laser fusion must begin immediately. The conference, sponsored by the University of Miami Center for Theoretical Studies and held in Ft. Lauderdale, Florida, Nov. 7-11, also concluded that despite the Carter Administration's expanded nuclear energy program, plutonium recycling and fast fission breeder reactors were essential to the future of not only the U.S. but the whole world.

Before an audience which included more than a half dozen Nobel laureates and representatives of the U.S., French, West German and Japanese governments, Academician Basov stated: "We consider the task of this talk (both laser fusion and the energy question) solved, if the participants of the present meeting could see not only our results and conclusions...but at the same time the vital necessity to concentrate the efforts of scientists and to coordinate the investigations in this field on a larger scale than we have now."

The Basov call confirms that the Soviet Union has elected to mount a full-scale political offensive for international collaboration in the development of fusion power. Last summer, when Soviet Academician E. Velikhov, the head of the USSR's fusion program, presented an offer for U.S.-Soviet collaboration in the Liner experiment at Los Alamos, experts saw the thrust of his proposal as directed toward a then still-unresolved debate within the Soviet Union, as well as toward the U.S.

The choice of Basov to present the Soviet policy — in a speech which was translated and handsomely printed for distribution at the conference — is also considered significant. In addition to Basov's membership on the Supreme Soviet, it is believed that the Basov research group has the chief responsibility for Soviet nuclear weapons research, and lies in a chain of command connected to the top echelons of the Soviet military. Consequently, experts view the Basov announcement as reflecting the policy of the Soviet military leadership, which usually represents the most advanced Soviet scientific and political-strategic thinking.

Analysis of Basov's proposal indicates that, if adopted by the U.S., it could shave five to ten years off of previous "best-case" estimates for the bringing on-line of working fusion power reactors. The timetable implied by the Basov proposal would yield laser-fusion prototype reactors by the mid-1980s and working power reactors by 1990.

Breakeven Confinement Achieved

Basov is a director of the P.N. Lebedev Institute in Moscow and received a Nobel Prize in 1964 for his work on quantum electronics which resulted in the creation of lasers. He is also responsible for the declassification of much of the Soviet Union's work in laser fusion in the late 1960s. At the Ft. Lauderdale meeting, he detailed the experimental results that his research teams had recently obtained, and released laser fusion reactor designs prepared by the Moscow Institute for High Temperatures, the institute which is internationally renowned for its successful work on MHD electric power generators.

Basov reported that scientists working on the Kalmar laser system at the Lebedev Institute had obtained pellet compressions of up to 8 grams per cubic centimeter. This, according to Basov, corresponds to a Lawson breakeven parameter of 500 trillion seconds-nucleii per cubic centimeter, a factor of 10 greater than what is needed for breakeven.

This result is the subject of great controversy among U.S. scientists who first heard it at the Oxford, U.K., laser conference in October. But, as Basov explained, while there are some disagreements on particulars, both he and his U.S. colleagues concur that high gain fusion pellets, such as indicated by this result, are possible.

Basov proceeded through further detailed experimental results and then outlined the international status of laser fusion research laboratories, pointing out particular areas where intensified international cooperation is needed. "Realization of such lasers (lasers needed for actual power reactors — ed.) is a severe problem, which demands, in my opinion, the concentration of efforts on (an) international scale," Basov declared.

Power Reactor Designs

Basov concluded his presentation by detailing the plans for two laser fusion energy reactors, the LTPS and LTB-500.

Basov first noted that "In principle, thermonuclear microexplosion giving rise to monoenergy particle flux is a unique source of low entropy energy." However, he went on, it is difficult to take full advantage of this property with existing technology or even near-term technology. The first generation of laser fusion plants will therefore have to rely on an inefficient (high entropy) thermal cycle.

The pure fusion LTPS would have a capital cost of 400 rubles per kilowatt of electrical output to the consumer. The cost of electricity from this plant would be .5 kopecks

per kilowatt hour. As Basov pointed out, these projected capital costs were of the same magnitude as those for fission fast breeder reactors.

The LTB-500 is a fusion-fission hybrid reactor. Three hundred tons of natural uranium is put in a blanket around the fusion reaction chamber. The fusion microexplosions produce neutrons which convert the natural uranium to plutonium which eventually undergoes fission reactions and thus greatly multiplies the total reactor energy output. Throughout the lifetime of the LTB-500 power plant, the rate of fusion microexplosions would be decreased as more and more fission fuel, and therefore fission reactions, are generated. Fifty percent of the natural uranium would be burned up after 30 years. The capital costs of the LTB-500 is 200 rubles per kilowatt of electricity, and it has a production cost of .9 kopecks per kilowatt hour.

Dr. Basov noted in conclusion that the cost of energy production could be dramatically decreased, even below present-day energy costs, through utilizing fusion hybrids to produce fuel for fast fission breeder reactors.

Nuclear Energy Essential

While every aspect of energy, from fossil fuels to even solar and geothermal power, was discussed in detail at the Ft. Lauderdale conference by the world's leading experts, the overwhelming conclusion of the participants was that existing nuclear power technology must be immediately increased; plutonium fuel recycling for increasing the amount of available fission fuel must proceed; the fission fast breeder must be brought on line as soon as possible; and fusion, both pure fusion and fusion-fission hybrid reactors, must be developed as rapidly as possible.

The detailed conference proceedings, which will be published in three months, provide a devastating demonstration of the idiocy of the Schlesinger energy plan. Nuclear power is safe, economic, and environmentally clean (in fact the carbon dioxide released from burning fossil fuels may already be laying the basis for a world-wide environmental disaster), the participants concluded. Proliferation of nuclear weapons — the tired saw put forward by the Administration to justify its anti-nuclear export policy — is a *political*, not technological question, the participants said, and the Carter Administration has already done more harm than good in this area. Projected uranium resources are definitely insufficient to meet world needs without the plutonium breeder and plutonium recycling — no other fuel cycle will work. Magnetic and laser fusion can confidently be projected to achieve power reactors. Whatever Carter and Schlesinger do, the participants concluded, Europe and Japan are going ahead with their nuclear power programs in any case.

Several score of leading representatives from U.S. industry were present at the conference (for example, the president of Jersey Central Power and Light, Phillips Petroleum, Exxon Nuclear Corp.), a half dozen congressmen, and many Nobel laureates. Organized by Dr. Behram Kursunoglu, director of the Center for Theoretical Studies, the conference was apparently, primarily, directed at long term organizing for a U.S. pro-nuclear energy policy.

A special scientific committee of the conference participants will shortly be issuing a major statement on the conference's findings. The members of the committee are Academican Nikolai G. Basov, Prof. Hans A. Bethe, Dr. Robert Hofstadter (chief scientist, KMS Fusion), Dr. Behram Kursunoglu, Ted Taylor, Edward Teller, Alvin Weinberg (former director of Oak Ridge Nat. Lab.), Eugene P. Wigner, W.B. Lewis (inventor of the Canadian Candu fission reactor), Pierre Zaleski (French nuclear energy attaché to the U.S. and former director of the French breeder program), E.L. Zebroski of the Electric Power Research Institute, and a Japanese representative.

Miami Conference: Fission-Fusion Technology Feasible, Necessary

The following is the text of the communiqué released by the International Scientific Forum on an Acceptable Nuclear Future on Nov. 11.

On the occasion of the International Scientific Forum on an Acceptable Nuclear Energy Future of the World, held at Fort Lauderdale, Florida From Nov. 7 through 11, 1977, and sponsored by the University of Miami's Center for Theoretical Studies, the undersigned have considered global energy requirements for the future and also world development to meet this demand. It was generally agreed that:

1. World demand for energy will increase strongly as the standard of living and the size of presently disadvantaged populations increase over the next several decades.

2. Failure to meet this demand will result in extensive social evil such as poverty, starvation, unrest, epidemics, riots, and wars.

3. No single technology can meet the world future demand. It is likely that all technologies, such as conventional fossil, nuclear fission, nuclear fusion, geothermal and solar technology will be required to meet the qualitative and quantitative aspects of this demand, just as today no single technology meets all demand.

4. Nuclear fission must play a significant role in meeting world demand over the next several decades, and over this period full exploitation cannot be foregone without excessive risk.

5. An assured nuclear fuel supply of utmost importance to many nations cannot be guaranteed by uranium mining alone. Although the urgency will vary from