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October 20, 1970

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This document consists of 4 pages

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CTR LASERS, FOURTH EUROPEAN CONFERENCE ON PLASMA

Note by the Secretary

The General Manager has requested that the attached memorandum of October 2, 1970 from the Director of Research, with enclosure, be circulated for the information of the Commission.

W. B. McCool

Secretary of the Commission

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UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

OCT 2 1970

R. E. Hollingsworth, General Manager

THRU: S. G. English, AGMRD

LASERS FOR CTR AS DISCUSSED AND PRESENTED AT THE IV EUROPEAN CONFERENCE ON PLASMA PHYSICS AND CONTROLLED FUSION

At the above referenced conference there was considerable discussion on lasers for CTR. The attached memorandum summarizes this aspect of the conference.

Since these developments are in a sense related to the KMS matter, you may wish to bring this to the attention of the Commission.

Paul W. McDaniel

Paul W. McDaniel, Director
Division of Research

Enclosure:
Memorandum

~~CONTAINS RESTRICTED DATA~~

(Insert proper classification)

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[redacted]

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

September 29, 1970

Roy W. Gould, Assistant Director for
Controlled Thermonuclear Research, R

LASERS FOR CTR AS DISCUSSED AND PRESENTED AT THE IV EUROPEAN CONFERENCE ON PLASMA PHYSICS AND CONTROLLED FUSION

The laser-CTR papers at the Rome Conference were attended by an unusually large number of physicists. This interest led to a hastily assembled (30 minute notice) informal session on the subject. Briefly, the following is a summary of the concepts and results presented:

1. A. Caruso, Frascati, Italy, presented calculations on laser absorption and thermonuclear energy release. He observed that neutrons have been produced by the laser irradiation of deuterium baring targets at the Lebedev Institute (USSR), Frascati, and Sandia. For CTR he calculated breakeven* at 10^5 joules. With magnetic fields and inertial confinement this can be reduced to 2×10^4 joules. Higher densities can be produced using shock waves.

2. J. Bobin, et al, Lemeil, France, presented calculations on "Fusion by Laser Driven Flame Propagation in Solid DT Targets." This work dealt with a crude model of a propagating burn in which a 17×10^3 joule, 300 nanosecond laser produces breakeven with a DT target of 100 square microns by 3 centimeters long.

3. At the informal session O. N. Krokhin, Lebedev Institute, USSR, presented calculations on an inertially confined system. Breakeven was determined to occur at 3×10^4 - 10^5 joules in a one nanosecond pulse. When asked about laser induced shock waves, Krokhin said that shock heating would be small, but Krokhin hastily remarked, "Yes, but compression can be high." Krokhin went on to say [illegible] there are many ideas that could help here," like "increasing density [illegible] mass flow."

In summary, many of the key physics concepts which have resulted in the recent wave of optimism at LRL, LASL and KMS are known to others and are being openly discussed. These people have not [illegible] all of the

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* The laser energy output required to [illegible] of thermonuclear energy. This level is [illegible] threshold of interest."

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elements together in the proper order as yet, but they are nevertheless calculating attractively low input energy requirements. It is anyone's guess as to how soon this matter could crystallize but it could occur at any time.

Robert L. Hirsch
Controlled Thermonuclear
Research Program
Division of Research