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Particle Beam Fusion Program Publications and Related Reports: A Bibliography January 1971 to July 1979

Gerold Yonas, Editor

Prepared by Sandia Laboratories, Albuquerque, New Mexico 87185
and Livermore, California 94550 for the United States Department
of Energy under Contract DE-AC04-76DP00789

Printed March 1980

Sandia National Laboratories

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Printed in the United States of America

Available from
National Technical Information Service
U. S. Department of Commerce
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PARTICLE BEAM FUSION PROGRAM PUBLICATIONS AND RELATED REPORTS: A BIBLIOGRAPHY

January 1971 to July 1979

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Introduction

Fusion is widely regarded as one of the most promising means of generating electric power for the next century and beyond. Many people now believe that the scientific feasibility of fusion power will be determined within the next decade. Efforts to duplicate the fusion process on a controlled basis have centered principally on magnetic-confinement schemes and to a lesser extent on an inertial-confinement scheme that will rely on powerful laser beams to implode tiny pellets of deuterium and tritium. Over the past seven years, Sandia Laboratories has undertaken a different approach to fusion by inertial confinement. Instead of laser beams we have employed intense beams of electrons (and more recently ions) generated by very-high-current, high-voltage electric pulses. This approach to fuel-pellet implosion is potentially efficient, simple and economically competitive, but like all other approaches to fusion it requires solutions to a series of formidable technical problems. This document provides a record of the progress made in solving those problems.

The particle-beam approach to fusion has been made possible by the growth of pulsed-power technology, which began in the mid-1960's. This technology was supported by the Atomic Energy Commission (now the Department of Energy) and the Defense Nuclear Agency to provide radiation sources to test the survivability of intercontinental ballistic missiles against bursts of radiation from anti-ballistic-missile warheads. To simulate these radiation effects, powerful bursts of X rays were needed. To meet the need for intense X rays as well as gamma rays, Sandia developed in 1967 a trillion watt electron-beam accelerator, Hermes. This accelerator and similar devices developed by the Defense Nuclear Agency paved the way for the technology development and fusion research to follow. The Sandia fusion effort formally began in 1973 with the initial concepts based on electron beams formulated in 1972.

This bibliography documents the evolution of this program and consolidates its 207 entries into a handy source book. The entries represent documents published by Sandia between January 1, 1971, and July 31, 1979. In order to assist the reader, the reports have been categorized into the general topics of Reviews, Beams and Plasmas, Deposition Physics and Targets, Pulsed Power Technology, and Reactors and Repetitive Pulsed Technology, and arranged in chronological order, with the most recent report in each area presented first. The reports are also cross-indexed by author and by publication number (SLA, SAND, etc).

Sandia Laboratories, a multiprogram laboratory operated by the Western Electric Company for the United States Department of Energy, has major facilities in Livermore, California, and Albuquerque, New Mexico. The Laboratories' principal mission has been and remains systems engineering for the nonnuclear portions of nuclear weapons systems. However, a few years ago Sandia, recognizing an inherent match of its technical capabilities to energy problems of national importance, applied its attributes and experience to the needs for new energy technology. Sandia is now responsible for major programs in fossil, solar, inertial confinement fusion, and fission energy. In addition, the Nuclear Regulatory Commission is sponsoring major projects in advanced reactor research and nuclear fuel cycle safety. On a smaller scale, Sandia is also conducting energy programs in geothermal, magnetic fusion, environment, conservation, and basic energy sciences. To obtain reports pertaining to these programs, contact the Department of Energy Technical Information Center, Post Office Box 62, Oak Ridge, Tennessee, 37830.

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