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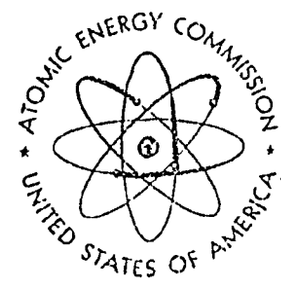
PULSED HIGH INTENSITY FISSION NEUTRON SOURCES

held at

USAEC, Washington, D.C. February 1965



Division of Technical Information

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PULSED HIGH INTENSITY FISSION NEUTRON SOURCES

Proceedings of a symposium on uses of high intensity pulses of neutrons and the methods for producing them.

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I. F. Zartman

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INTRODUCTION

During the past years, the Atomic Energy Commission (AEC) has supported a research and development program for reactors producing high neutron fluxes. This program has resulted in the construction of the Brookhaven High Flux Beam Reactor (HFBR) at Brookhaven National Laboratory and the High Flux Isotope Reactor (HFIR) at Oak Ridge National Laboratory, the former to produce primarily neutron beams for cross section measurements and other types of beam research while the latter's main purpose is to produce transplutonium isotopes. Both of these reactors operate at high fluxes in the 10^{15} n/cm^2/sec range. The Advanced Test Reactor (ATR) now nearing completion of construction at the National Reactor Testing Station (NRTS) will provide test spaces for engineering tests in the 10^{15} n/cm^2/sec range. A further result of this program is the Argonne Advanced Research Reactor (AARR) now being designed to attain still higher neutron fluxes.

The technical problems faced in attempting to develop research reactors providing neutron fluxes in the 10^{16} or higher range are formidable; in addition, the high construction and operating costs of such higher flux reactors suggest the examination of other methods for utilizing the fission process in the production of intense fluxes of neutrons for research uses.

An area which we consider to have considerable promise is the pulsed fast assembly, which is able to produce thermal neutrons by using a hydrogeneous moderator in the beam. While providing neutron intensities during a pulse equal to and greater than the high flux reactors now being built, these pulsed assemblies also appear to offer lower capital and operating costs. They also seem especially suited to research using neutron time-of-flight measurements and low counting rate experiments requiring high signal to background ratios.

In order to explore the potential uses for a pulsed assembly source of "primarily thermal" neutrons, to examine the technical and development problems associated with the pulsed assembly and to determine the merits for undertaking a program of feasibility studies, a small symposium of technical experts in reactor design, accelerator technology and experts in various research fields which might utilize advanced pulsed neutron sources was convened at AEC Headquarters, Washington, D. C.

These proceedings contain the papers presented at the symposium.

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