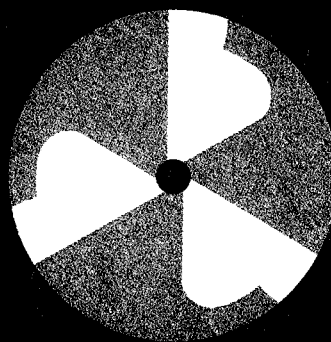


Annual Reports

1974-75

1975-76



Cyclotron Laboratory

Michigan State University

ANNUAL REPORT
of the
MICHIGAN STATE UNIVERSITY
CYCLOTRON LABORATORY*
for the period
July 1, 1974 to June 30, 1976

By
Project Staff

September 1976
East Lansing, Michigan

*Supported jointly by U.S. National Science Foundation, U.S. Energy Research and Development Administration, Office of Naval Research and Michigan State University (see Preface for details).

PREFACE

This "double" issue of our annual report is really a biennial report, namely a single report covering the two-year period July 1, 1974 through June 30, 1976. This situation is more accidental than deliberate choice. Continually throughout most of the past year we have intended to issue an annual report for the year 74-75. The report however was not given high priority due to the press of preparing and typing several major proposals. As a result, material prepared for the 74-75 "Research in Progress" section faded in relevance and we finally decided to eliminate this part of the 74-75 report and issue the present relatively up-to-date joint report for the two-year period. We do this with considerable chagrin and with firm intent not to have the situation recur. A regular annual report has important internal benefits in helping us correlate and review the diverse aspects of our program and we trust it also has significant external value to those who receive it. In the future it is then our strong intent to see that each of you receives an annual report from us for the preceding July-June fiscal year in October of each year.

As in previous years our research was principally supported by grants for experimental research in nuclear physics from the U.S. National Science Foundation and smaller grants for part of the period for experimental research in nuclear chemistry by the U.S. ERDA. The contents of this report include a staff roster, brief summaries of some of the work in progress in the laboratory, abstracts of oral presentations to scientific meetings and of papers submitted for publication, and title pages of articles appearing in print.

The compilation of our annual report helps us see where we have been, where we are, and, to an extent, where we are going. The outside reader is presumably most interested in the section which reports ongoing research projects. We caution that the samples of such work presented here represent preliminary results and that quotation of these results should follow consultation with the individuals concerned.

The period covered by this report has been one of satisfying activity and achievement. The

cyclotron has continued on its seven days a week running mode and both it and the major research support system have been free of major maintenance problems. We are excited and optimistic about the burgeoning effort centered on developing ideas and apparatus for the new superconducting cyclotron for heavy-ion acceleration. We expect to witness great progress in this area this coming year (see note below).

One faculty change has occurred. Chuck Gruhn, one of our senior faculty members, resigned to accept a position at Los Alamos, where he will continue the research on nuclear detectors he initiated with such success here and, while on leave, at CERN. We received approval from the University to fill this faculty vacancy and were very happy to secure the talents of Hamish Robertson for the position. Hamish took his Ph.D. at McMaster with Bob Summers-Gill and has been with us since then as research associate and assistant professor, with detours at Julich and Princeton.

Let me close this preface, as has been done in the past, by soliciting your comments on the form and contents of this document and on your impressions of the general state of our program. Also, may I again remind you that we welcome requests to use our facilities from non-MSU scientists. Several significant collaborative projects with faculty and students from other institutions have been carried out on the cyclotron during the last year with mutually satisfactory results. If you have an idea which seems well suited to our laboratory's capabilities we would receive the suggestion for outside use of the cyclotron or a collaboration enthusiastically.

B.H. Wildenthal
Associate Director

NOTE ADDED IN PROOF: We now (Sept. 1976) have a functioning heavy ion source in the present cyclotron--see note on page 108--experiments with a variety of heavy ion beams are in progress.

TABLE I.--Sources of support for experimental program at the MSU Cyclotron Laboratory for the period July 1974-June 1976.

Institution or Agency		Per Cent of Total
National Science Foundation	Grant GP 27483 and MPS75-02675 (experimental nuclear physics)	67
Energy Research Development Administration	Grant AT-11-1-1779 (nuclear chemistry)	8
Office of Naval Research	Contract N00014-68-0109-0008	3
Michigan State University		22

The above figures do not include the funding of the Nuclear Theory Group nor the funding, essentially all for capital equipment, for the construction of the prototype superconducting magnet.

TABLE II.--List of faculty, research associates, and graduate students working at the MSU Cyclotron Laboratory in the period July 1, 1974-June 30, 1976 and their principal sources of support.

<u>Professors</u>	supported by	Present Address
Sam M. Austin	NSF-exp, MSU	
Walter Benenson	NSF-exp, MSU	
George F. Bertsch	NSC-theory, MSU*	
Henry G. Blosser	NSF-exp, MSU	
Gerard M. Crawley	NSF-exp, MSU	
Aaron I. Galonsky	NSF-exp, ONR, MSU	(on leave 74-75, Australia)
Morton M. Gordon	NSF-exp, MSU	(on leave 75-76, NSF)
Edwin Kashy	NSF-exp, MSU	(on leave 75-76, W. Germany)
Wm. H. Kelly	NSF-exp, MSU	
Wm. C. McHarris	ERDA-chem, MSU	
Hugh McManus	NSF-theory, MSU*	
B.H. Wildenthal	NSF-exp, MSU	
<u>Associate Professors</u>		
Fred M. Bernthal	ERDA-chem, MSU	
Jerry R. Borysowicz	NSF-theory, MSU*	
Jerry A. Nolen, Jr.	NSF-exp, MSU	
<u>Assistant Professors</u>		
Teng Lek Khoo	NSF-exp, ERDA-chem, MSU	
Charles King	NSF-exp, MSU	
Roger Markham	NSF-exp, MSU	
Hermann Nann	NSF-exp, MSU	
Dan O. Riska	NSF-theory, MSU*	
R.G.H. Robertson	NSF-exp, MSU	(on leave 75-76, Princeton)
Ray Warner	ERDA-chem, NSF-exp, MSU	
<u>Research Associates</u>		
Jason Bishop	NSF-exp	
B.A. Brown	NSF-exp	
W.S. Chien	NSF-exp	
P. Decowski	NSF-exp	
R. Doering	NSF-exp	
G. Epstein	NSF-theory*	
R. B. Firestone	NSF-exp	
Kenneth Kosanke	ERDA-chem	
Amnon Moalem	NSF-exp	
Hans-Peter Morsch	NSF-exp	
Mark Radomski	NSF-theory*	
Hermann Rossner	NSF-exp	
Lawrence Samuelson	NSF-exp, MAS-NIRA	
M.A.M. Shahabuddin	NSF-exp	Purdue University
Shalom Shlomo	NSF-theory*	Racah Inst., Israel
Shang-Fang Tsai	NSF-theory*	University of Minnesota
Jan van Hienen	NSF-exp, Niels Stensen Foundation	
Lawrence Young	NSF-exp	
<u>Graduate Students</u>		
Wayne Bentley	NSF-exp	
Jim Carr	NSF-exp	
Wilton Chung	NSF-exp	
Dan Coyle	ERDA-chem	
Paul Deason	NSF-exp	
Ray DeVito	NSF-exp	
Carol L. Dors	ERDA-chem	
Marcello Distasio	ERDA-chem	
Mike Edmiston	ERDA-chem	
Steve Faber	NSF-exp	
Neil Faiman	NSF-exp	
Joe Finck	NSF-exp	
Kenneth Gilbert	NSF-exp	I.N.A., Washington, DC
Robert Gleitsmann	NSF-exp	Nirvana, Calif.
Michael Goetz	NSF-exp	
Greg Hamilton	NSF-exp-theory*	MSU Engineering Dept.
G. Richard Hammerstein	NSF-theory*	E. Lansing, MI
Robert Howard		
(computer Science)		
Brian Jeltema	NSF-exp	MSU Specialist, Cyclotron
Larry Kneisel	ERDA-chem	Ann Arbor, MI
Felix Marti	NSF-exp	Natl. Semiconductor, Co., C
Robert Melin	NSF-exp	
Mike Metzler	NSF-exp	
Clare B. Morgan	NSF-exp	
Mike Marshall	ERDA-chem	
Dennis Mueller	NSF-exp	
Lawrence Robinson	NSF-exp	
Ken Shafer	NSF-exp	
David L. Show	NSF-exp	Nyanza, Rwanda
Paul Smith	NSF-exp	
Wm. F. Steele	NSF-exp	Univ. of Calif., Berkeley
Karen Stricker	NSF-theory*	

* Explicit contributions from the separately funded Nuclear Theory Group officed in the Cyclotron Building are not included in the present report. The experimental and theoretical groups enjoy a very productive continuing interaction and significant facilities, particularly the computer, which are largely funded from the experimental grants are shared by the two groups.

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