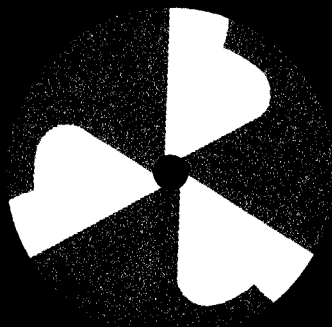


Annual Report

1976-77



Cyclotron Laboratory

Michigan State University

ANNUAL REPORT
of the
MICHIGAN STATE UNIVERSITY
CYCLOTRON LABORATORY
for the period
July 1, 1976 to June 30, 1977

By
Project Staff

October 1977
East Lansing, Michigan

PREFACE

This Annual Report is a composite document, covering all nuclear programs of the MSU Cyclotron Laboratory for the period from July 1, 1976 to June 30, 1977. We call special attention to the fact that the National Science Foundation was responsible for the construction of the Laboratory and in this way contributes substantially to the support of other agency research programs which use the facility. As is clear from Table I, the major operating support also comes from the NSF, with substantial support from Michigan State University.

The contents of this report include a staff roster (Table II), 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 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 should follow consultation with the individuals concerned.

The period covered by this report has been one of satisfying activity and achievement. The 50 MeV cyclotron has continued on its seven day a week running mode and both it and the major research support systems have been free of major maintenance problems. Perhaps, the most exciting developments concern the superconducting cyclotron project. The prototype 500 Q²/A MeV superconducting magnet was tested to full current in May 1977 and all preliminary observations were in complete accord with predictions. Funding for converting the magnet to a superconducting cyclotron (SCC) has been granted by the NSF and design studies for acceler-

ator sub-systems are well underway. The first internal beam is expected in mid-1979 and routine physics use in early 1980. A building addition to house the SCC, funded by Michigan State University, will be ready at the end of this year. Planning regarding experiments and equipment for the first beam has begun. While the internal staff and members of the Midwestern Users Group will be primarily responsible for planning, we welcome suggestions and comments from all interested parties.

During the past year an additional nuclear physics faculty position was made available by the University; Dr. Konrad Gelbke was subsequently appointed to fill this position and has just arrived at the Laboratory. Konrad took his Ph.D. at Heidelberg and has since been involved in a variety of heavy ion experiments at Heidelberg, Seattle, Brookhaven, and Berkeley. He will be strongly involved in planning use of the new SCC facility.

Let me close 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 outside requests to use our facilities. Several significant collaborative projects with faculty and students from other institutions have been carried out during the last year with mutually satisfactory results. If you have an experiment which seems well suited to our laboratory's capabilities we would receive the suggestion enthusiastically.

Sam Austin
Associate Director

TABLE I.--Sources of support for the experimental program at the MSU Cyclotron Laboratory for the period July 1976-June 1977.

Institution or Agency		Per Cent of total
National Science Foundation	Grant PHY76-02206 (Experimental Nuclear Physics)	65.2
National Science Foundation	Grant PHY76-04912 (Experimental Nuclear Chemistry)	4.4
National Science Foundation	Grants MPS74-18194 and PHY76-20097 (Theoretical Nuclear Physics)	5.0
Michigan State University		25.4

The above figures do not include 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, 1976-June 30, 1977 and their principal sources of support.

	supported	Present Address	supported by	Present Address
<u>Professors</u>				
Sam M. Austin	NSF-exp, MSU		NSF-Chem	
Walter Benenson	NSF-exp, MSU		NSF-exp	
George F. Bertsch	NSF-theory, MSU		NSF-theory, exp	Julich
Henry G. Blosser	NSF-exp, MSU		NSF-chem	
Gerard M. Crawley	NSF-exp, MSU		NSF-exp	
Aaron I. Galonsky	NSF-exp, MSU		NSF-chem	
Morton M. Gordon	NSF-exp, MSU		NSF-exp	
Carl J. Herriander	NSF-exp, MSU	Res. Inst. of Phys, Stockholm	NSF-chem	Purdue
Edwin Kashy	Res. Inst. of Phys.		NSF-Chem	
Wm. H. Kelly	NSF-exp, MSU		NSF-Chem	Los Alamos
Wm. C. McHarris	NSF-exp, MSU		NSF-Chem	
Hugh McManus	NSF-theory, MSU		NSF-exp	
B.H. Wiidenthal	NSF-theory, MSU	(on leave 77, GSI(W. Germany), ORSAY, (France))	NSF-exp	MSU Physics Dept.
<u>Associate Professors</u>				
Fred M. Bernthal	NSF-chem, exp, MSU	(on leave 76, Niels Bohr Inst., Copenhagen)	NSF-chem	Univ. of Uruguay
Jerzy Borysowicz	NSF-theory, MSU		NSF-exp	IBM, Maryland
Jerry A. Nolen, Jr.	NSF-exp, MSU	(on leave 77, MPI, Heidelberg, W. Germany)	NSF-exp	Princeton
<u>Assistant Professors</u>				
Teng Lek Khoo	NSF-exp, MSU	Argonne	NSF-exp	
Charles King	NSF-exp, MSU	Lawrence Berkeley Lab.	NSF-exp	
Roger Markham	NSF-exp, MSU	Los Alamos	NSF-exp	
Hermann Nann	NSF-exp, MSU		NSF-exp	
Dan O. Riska	NSF-theory, MSU		NSF-exp	
R.G.H. Robertson	NSF-exp, MSU		NSF-exp	
Ray Warner	NSF-exp	Batelle Northwest	NSF-theory	
<u>Research Associates</u>				
Jason Bishop	NSF-exp		NSF-theory	
B.Alex Brown	NSF-exp		NSF-exp	
Wilton Chung	NSF-exp	Julich, W. Germany	NSF-exp	
Piotr Decowski	NSF-exp	Univ. of Warsaw, Poland	NSF-exp	
Robert Doering	NSF-exp	Univ. of Virginia	NSF-exp	
Carol Dors	NSF-exp	Purdue	NSF-exp	
Geoffrey Epstein	NSF-theory	Univ. of Pittsburgh	NSF-theory	
Richard Firestone	NSF-chem		NSF-chem	
Hans-Peter Morsch	NSF-exp	Julich, W. Germany	NSF-exp	
Dennis Mueller	NSF-exp	Princeton	NSF-exp	
Richard Pardo	NSF-exp		NSF-exp	
Mark Radomski	NSF-theory	Carnegie-Mellon	NSF-theory	
Jan van Hienen	NSF-exp, Niels Stenson Found.	The Free Univ., Amsterdam	NSF-exp	
David Weber	NSF-exp		NSF-theory	
Lawrence Young	NSF-exp		NSF-exp	
Bogusław Zwiegłinski	NSF-exp		NSF-exp	
<u>Graduate Students</u>				
Rahmat Aryaeinejad			NSF-Chem	
Wayne Bentley			NSF-exp	
Jim Carr			NSF-theory, exp	Julich
Wilton Chung			NSF-chem	
Dan Coyle			NSF-exp	
Paul Deason			NSF-chem	
Ray devito			NSF-exp	
Carol Dors			NSF-chem	Purdue
Marcello Distasio			NSF-Chem	
Mike Edmiston			NSF-Chem	Los Alamos
Steve Faber			NSF-exp	
Joe Finck			NSF-exp	
Michael Goetz			NSF-exp	
Robert Huffman			NSF-exp	
Arno Ledebuhr			NSF-exp	
Mike Marshall			NSF-chem	
Felix Marti			NSF-chem	Univ. of Uruguay
Robert Melin			NSF-exp	
Mike Metzler			NSF-exp	IBM, Maryland
Steve Motzny			NSF-exp	
Dennis Mueller			NSF-exp	Princeton
Janaki Narayanawamy			NSF-exp	
Lawrence Robinson			NSF-exp	
Ken Shafer			NSF-exp	Fermi Lab
Paul Smith			NSF-exp	Univ. of Colorado
Karen Stricker			NSF-theory	

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