

ANNUAL REPORT
of the
MICHIGAN STATE UNIVERSITY
CYCLOTRON LABORATORY*
for the period
July 1, 1968 to July 1, 1969

by
Project Staff

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FORWARD

As in past years, this annual report consists primarily of reprints of published research articles from the Michigan State University Cyclotron Laboratory for the period July 1, 1968 thru June 30, 1969. In addition abstracts of papers presented at meetings or submitted for publication but not yet published (Sept. 1969) are included, as well as a list of the staff and students working at the laboratory as of Sept. 1969 and the thesis topics for students completing their PhD's in the year 68-69.

The year has been in total one of high productivity for the laboratory. Extensive instrumentation programs of previous years were in this year put to extensive use. As a result the output of nuclear physics information increased by a large step. The number of journal articles in nuclear physics in 68-69 is for example nearly twice the number for the 67-68 period. In addition the instrumentation activities in the laboratory continue at a substantial level and just recently several unique new capabilities have come into operation which should in the coming year allow time-of-flight experiments of unprecedented precision. (A phase selection system in the center of the cyclotron routinely produces 0.2 nanosecond pulses at intensities up to 15 μ a time average or 6×10^6 particles/pulse—a pulse selection system allows the deadtime between pulses to be any digital multiple of the ~ 60 ns cyclotron period.) The energy spread of the raw beam from the cyclotron has been reduced to 0.04% which is an exceptional

figure for cyclotrons. In these conditions the cyclotron energy spread is generally a minor contribution to the overall resolution in direct-reaction experiments with counters, experiments which have accounted for the bulk of the lab activity in the year. Initial runs with the magnetic reaction products spectrometer have yielded extremely promising results and experiments at resolutions of 1 in 10^4 should be proceeding in the near future. The data processing capability of the laboratory has also expanded greatly due principally to the successful operation of the MSU time sharing system, JANUS, on the Sigma-7. With this system the computer can concurrently handle many assignments including data taking and display from one or several experiments using four on-line ADC's, data processing using auxiliary display scopes, normal Fortran computation on or several problems, etc. With the distorted wave program JULIE running on the Sigma for most of the year, experimenters have been able to proceed smoothly and rapidly from data taking to interpretation and extraction of spectroscopic factors. Studies of parameter effects in such computations have been greatly facilitated.

The laboratory has benefited greatly from the addition of Prof's. G. Crawley and B. Wildenthal to the Physics faculty and from new research associates Hinrichs, Jolly, Miller, St.Onge and Warner. The number of graduate students is slightly lower than at this time last year primarily due to the draft, and the number of technicians has been reduced by ~30% due to budget difficulties. In spite of these last problems the level of activity is high, and

the program is exciting and pursued with much enthusiasm on the part of all concerned. The laboratory looks forward to continued stimulating research and training activity in the approaching year.

H. Blosser

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