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ARGONNE NATIONAL LABORATORY 1980-81 TANDEM-LINAC ACCELERATOR REPORT

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The FN has operated reliably during the year. Scheduled beam time from October 1, 1980 - October 1, 1981 was 246 days. For most of the year, however, operation was limited to a five day work week due to insufficient operating funds.

During the last year the FN tandem accelerator has completed the transition to injector for the superconducting linac booster. The linac is now operating on a nearly continuous schedule, interrupted only occasionally for engineering improvements. Figure 1 shows the proportion of total available time devoted to linac operation, development, and construction during recent years.

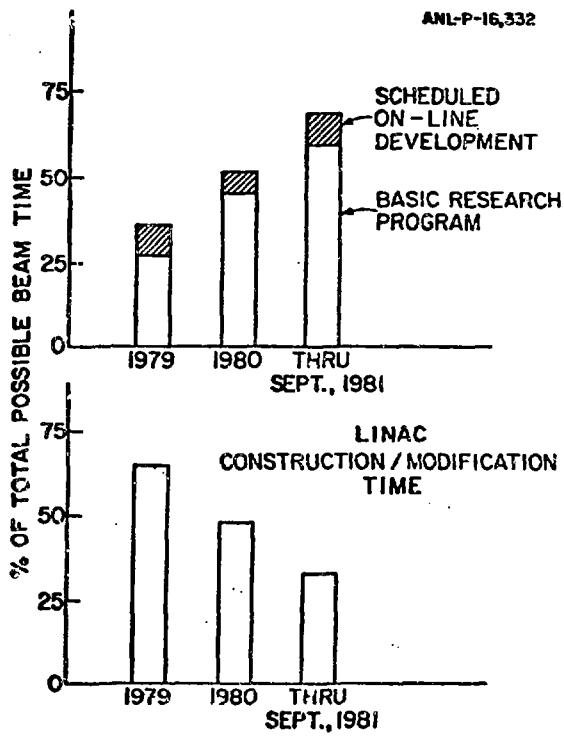

Fig. 1

The progression from experiment to operating accelerator is clearly evident. For the series of experiments beginning October 12 the linac itself will provi a voltage gain of 19 MV. The tandem operates at a nearly constant 8.6 MV. Th resulting representative beam energies are shown below in Table 1.

Table 1

Ion	Stripper #1 (q_1)	Stripper #2 (q_2)	Tandem Energy (MeV)	Linac Energy (MeV)
^{16}O	6	8	60	190
^{32}S	8	13	77	295
^{58}Ni	10	19	94	430

The median mass of particles accelerated at the facility continues to increase. Figure 2 is a histogram of the percentage of tandem-linac operati time for different masses. The source inflection magnet presently limits the mass range to A < 66, due to insufficient cooling. This problem should be rectified within the next several months. A more serious obstacle is the mass-energy product of the high energy beamline transport system and the optics of

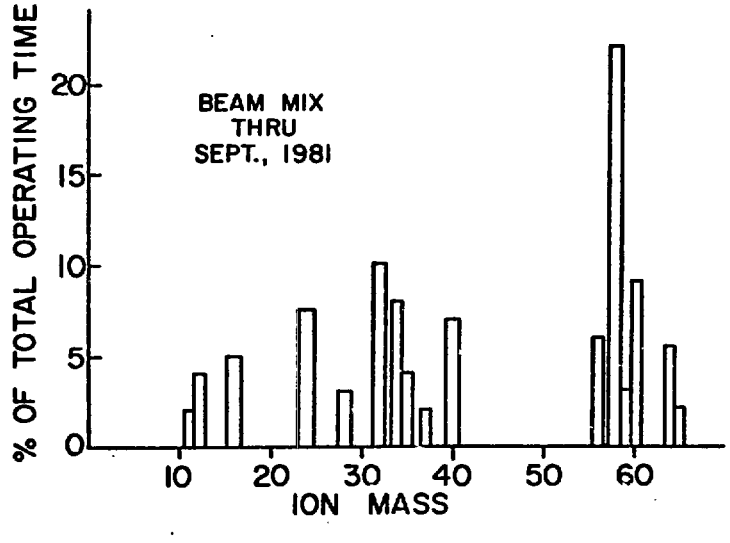

Fig. 2

the high energy accelerator tubes themselves. Figure 3 shows how the tandem transmission for ^{58}Ni depends on the multiple straggling introduced by terminal strippers of varying thickness. It is expected that the problem will be even more severe for A > 58. To reduce this effect we intend to install a 40 KV electrostatic quadrapole triplet after the stripper in the terminal. Also, higher mass-energy product magnetic quadrapoles will be installed this year or next when funds become available.

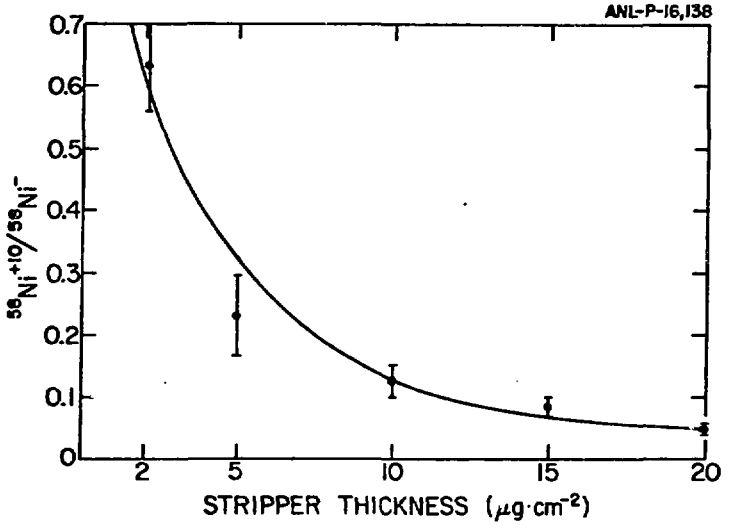

Fig. 3

Hydrocarbon cracked and slackened stripping foils are now being used extensively. Lifetime and transmission measurements were made for stripping foils produced by a number of laboratories and the results were reported at the International Conference on the Technology of Electrostatic Accelerators.[1] Figures 4 and 5 show the results obtained with standard arc-evaporated carbon foils and for RF discharge foils furnished by the University of Pittsburgh.

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[1] P. Den Hartog, G. Thomas, W. Henning, R. Pardo, J. Yntema, P. Maier-Komor, and D. Tolfree, Proc. of Third International Conf. on the Techn. of Electrostatic Accelerators, Oak Ridge, Tenn., April 13-16, 1981.

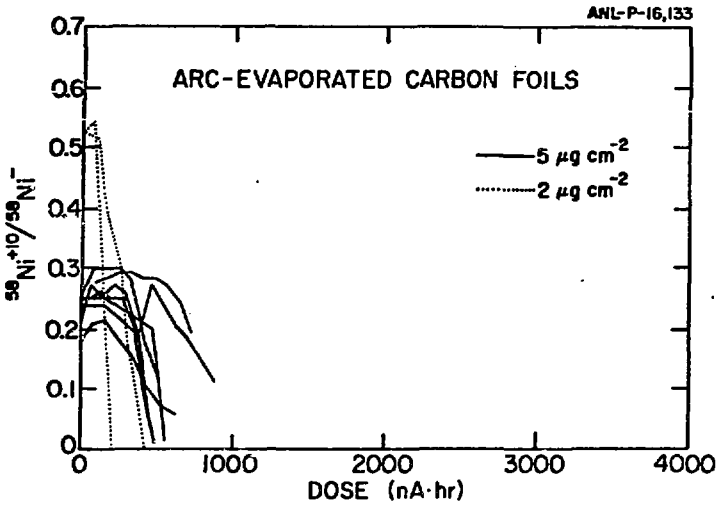
ANL-P-16,133
ARC-EVAPORATED CARBON FOILS
5 μg cm⁻²
2 μg cm⁻²
$^{58}Ni^{+10}/^{58}Ni^{-}$
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
1000
2000
3000
4000
DOSE (nA·hr)

Fig. 4

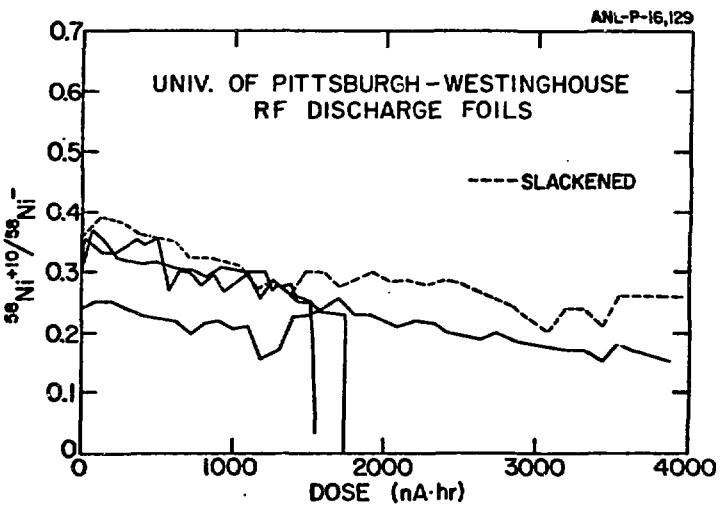
ANL-P-16,129
UNIV. OF PITTSBURGH-WESTINGHOUSE
RF DISCHARGE FOILS
SLACKENED
$^{58}Ni^{+10}/^{58}Ni^{-}$
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
1000
2000
3000
4000
DOSE (nA·hr)

Fig. 5

A new method of simultaneously slackening and loading the foil holder has been developed which greatly expedites the process and eliminates the use of organic adhesives in the terminal.

The tandem Pelletron charging system has been improved by the installation of new high voltage feedthroughs and a capacitive pickup pellet monitor modeled after systems developed at Brookhaven and Chalk River. It has proven to be a very useful and sensitive, albeit not completely understood, diagnostic tool.

The physical environment of the tandem-linac facility has undergone significant changes during the past year. The control room was completely revamped in order to fully integrate the linac control system and to provide a more pleasant work environment. Also, a new target room was added to the previously existing linac target area. Figure 6 shows the layout of the facility as it presently exists. The cross-hatched area is the new addition.

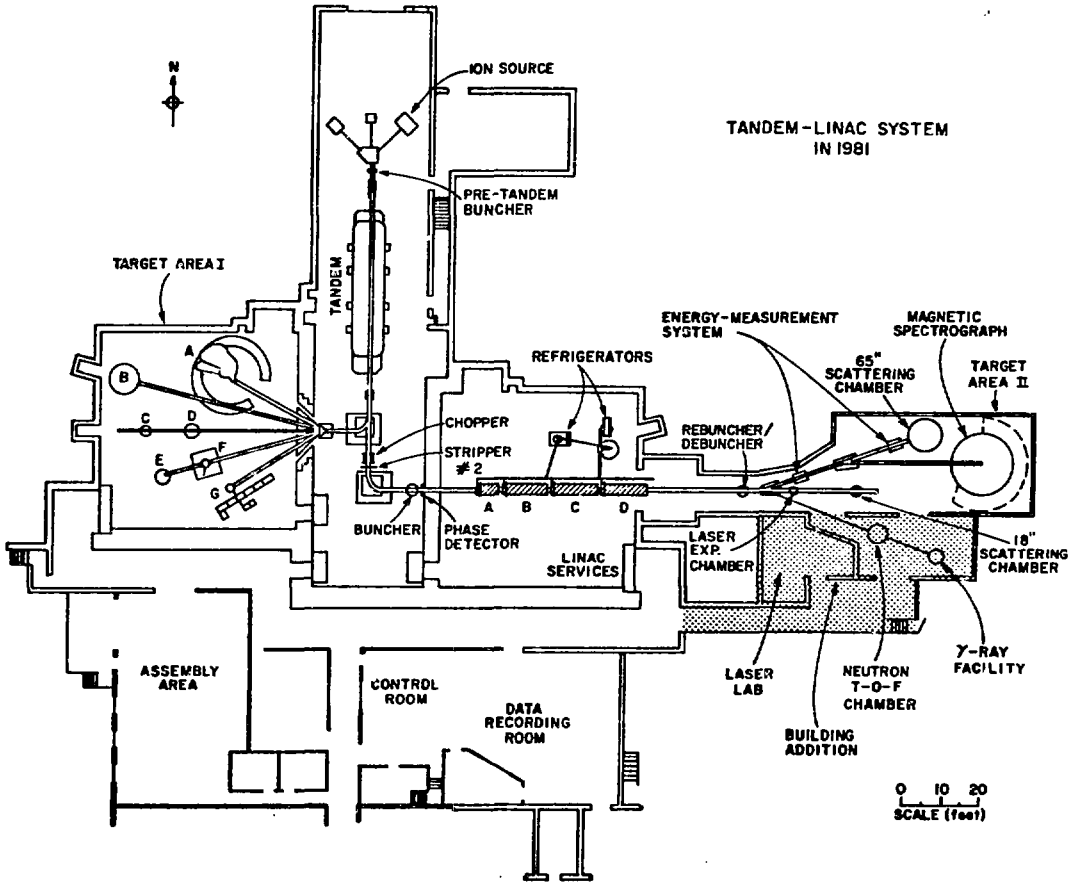

Fig. 6

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