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PSCC/M87
9 April, 1981

STATUS REPORT ON STUDIES OF 86 MeV/N ^{12}C REACTIONS

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The ISOLDE Collaboration, CERN.

We report here on results obtained under the proposal CERN-SCC/78-12/SCC-P-6 from the ISOLDE Collaboration.

We have initiated a systematic study of a target fragmentation in light, medium and heavy targets using radiochemical methods.

We have obtained information by determining a) absolute cross sections and b) thick target/thick catcher recoil data for the targets V, Cu, Ag, La, Au, Pb and U.

For all targets the activity measurements have been done with high resolution Ge(Li)-spectrometers directly on the bombarded foils. For the heavier targets some of the data were obtained from measurements of chemically separated samples (Ag, Alkalis, Halogenides, Lanthanides).

For the targets Au, Pb and Bi we also bombarded thin targets for non-destructive α-measurements to determine cross sections of transtarget products.

The decay of activities in the foils was followed several months after end of bombardment, and the (A, Z) of decaying nuclides were determined over γ-ray energy and halflife.

Some results are presented. In Fig. 1 is shown measured independant and cumulative yields with Cu-target. The curves are derived isotopic yield distributions. We obtain a typical spallation-type yield distribution with a slope (average deposition energy) scaling

with the total input energy. For this system we observe a sharp drop in cross section for transtarget products - only yields for one proton transfer products (Zn) could be determined.

For a heavy target (Pb) the yields of transtarget products (Bi, Po) are much higher. Measured yields for Pb are shown in Fig. 2. The plot shows a clear separation of the spallation and fission product yield distribution. We find that in a typical process leading to fission the momentum transferred to the system is about 1/3 of full momentum transfer. We find further compared to proton induced reactions at comparable energies a) a strong enhancement of yields of neutron-deficient fission products and b) a fission cross section about a factor four higher.

We have further made the first experiments to determine angular distributions (Ag, Au, U).

Beam time request:

We will continue the experiments with ^{12}C and determine

a) Angular distributions
b) Differential ranges for selected reactions.

With 70 MeV/A ^{20}Ne we propose to determine yields and thick target/thick catcher recoil properties to study effects of ion size.

Requested beam time: ^{12}C : 10 shifts

^{20}Ne: 5 shifts

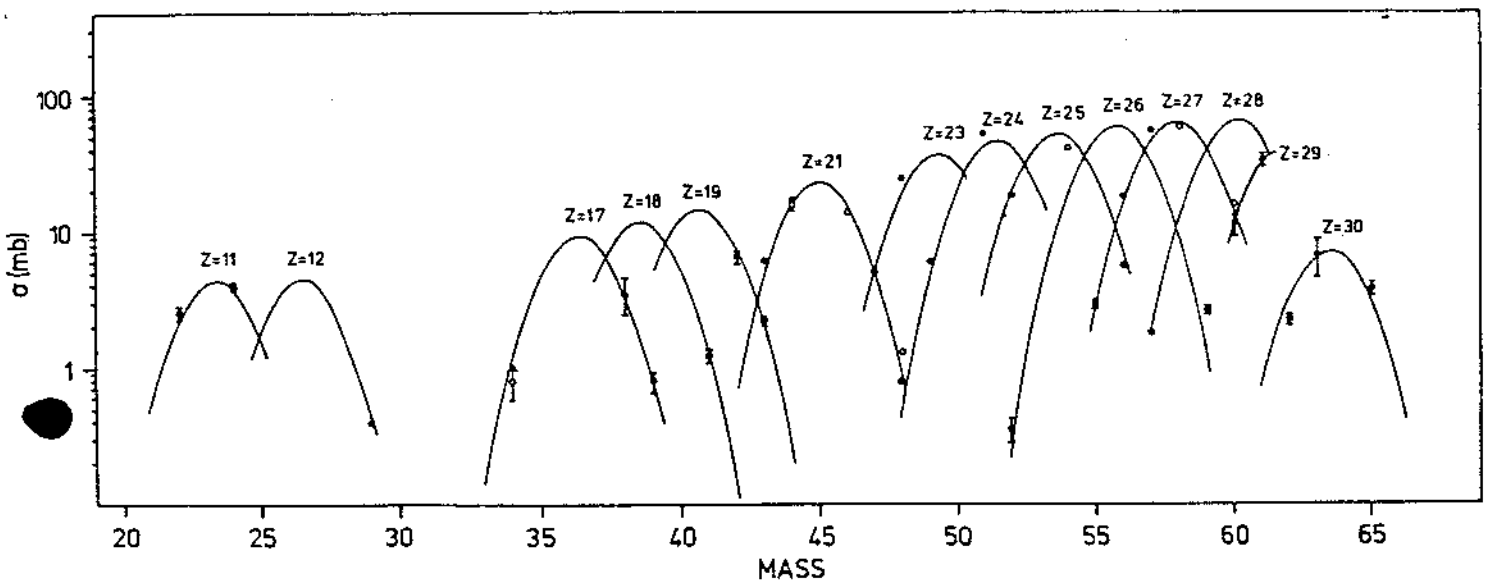
100
10
1
σ (mb)
Z=11
Z=12
Z=17
Z=18
Z=19
Z=21
Z=23
Z=24
Z=25
Z=26
Z=27
Z=28
Z=29
Z=30
20
25
30
35
40
45
50
55
60
65
MASS

Fig 1

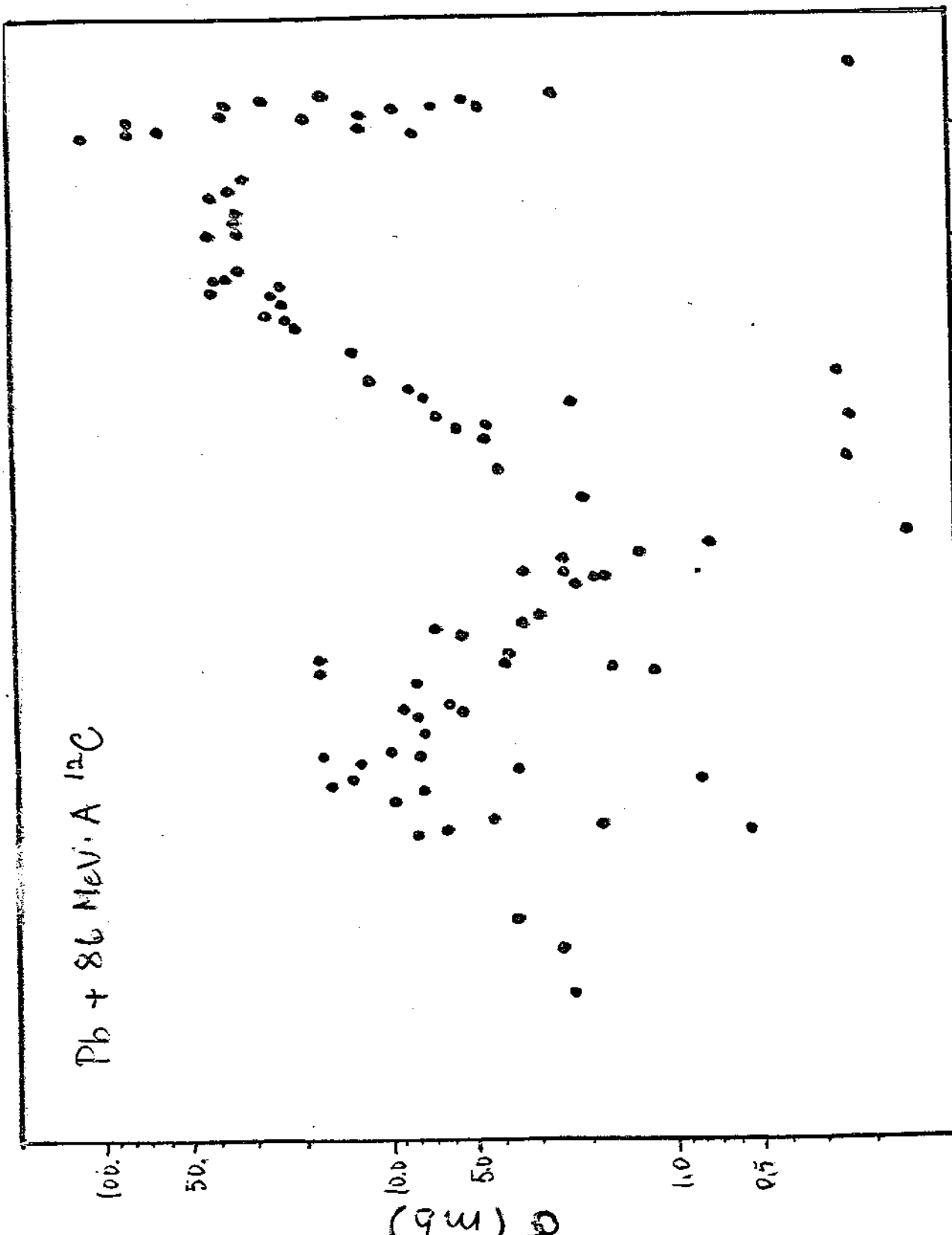
Pb + 86 MeV, A 12C
σ (mb)
100.
50.
10.0
5.0
1.0
0.5
40
60
80
100
120
140
160
180
200
MASS

Fig 2