

STUDY OF THE DIFFERENT PATHS LEADING FROM A COMPOUND NUCLEUS
(^{61}Ni AT 55 MeV) TO SPECIFIC RESIDUAL NUCLEI

H. Dumont, E. Bozek[†], A. Brondi^{*}, B. Delaunay, J. Delaunay, A. D'Onofrio^{*},
D. Rizzo, M.G. Saint Laurent, F. Terrasi^{*}
DPH-N/BE, CEN Saclay, 91191 Gif-sur-Yvette Cedex, France

To deepen our comprehension on the evaporation process based on the statistical model to predict the yields of the various residual nuclei, it is interesting to follow also the possible paths from the compound nucleus to a specific residual. This is in general not possible due to experimental difficulties. In this paper we want to show that the selection of particle in coincidence with γ rays permits such investigation.

We study the system $^{60}\text{Ti} + ^{13}\text{C}$ at 46 MeV. The experimental arrangement was already described¹⁾. The compound nucleus is ^{61}Ni at 55 MeV of excitation.

Table 1 presents the absolute cross sections for the various residual nuclei that we measure previously²⁾. We compare these results with the predictions of a new version of the evaporation code CASCADE³⁾ which permits also evaporation of d or another particle in addition of n,p, α , γ . For a total cross section of 1223 mb, this code predicts for the protons and deuterons cross sections of 937 mb and 50 mb respectively. Fig. 1 shows the light particles spectra.

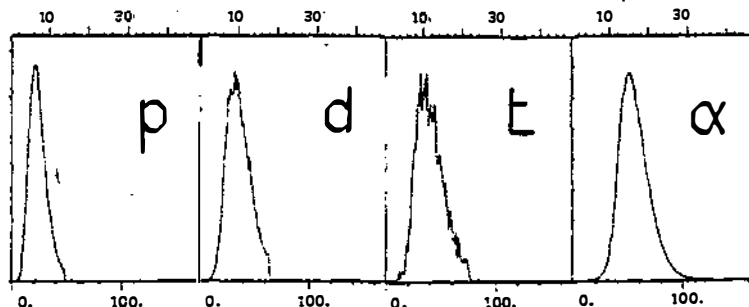
Table 1 presents also for each residual the various paths observed by the particle- γ coincidence.

For example ^{56}Fe is produced by the 2p 3n channel (42 %), dp 2n (21 %), tpn (37 %) and not by the th(an) channel, in the limit of our experimental accuracy. The selection by the particles is so strong that even with a poor statistics, the γ ray spectrum is a good signature of the residual nucleus involved : fig. 2 presents the γ spectrum coincident with the tritons.

- 1) H. Dumont et al., this Conference
- 2) A. D'Onofrio et al., to be published
- 3) CASCADE I : new version of F. Pühlhofer, Nucl. Phys. A280 (1977) 267.

[†]On leave of Institute of Nuclear Physics of Krakow (Poland)

^{*}Istituto di Fisica Sperimentale Università di Napoli (Italy).



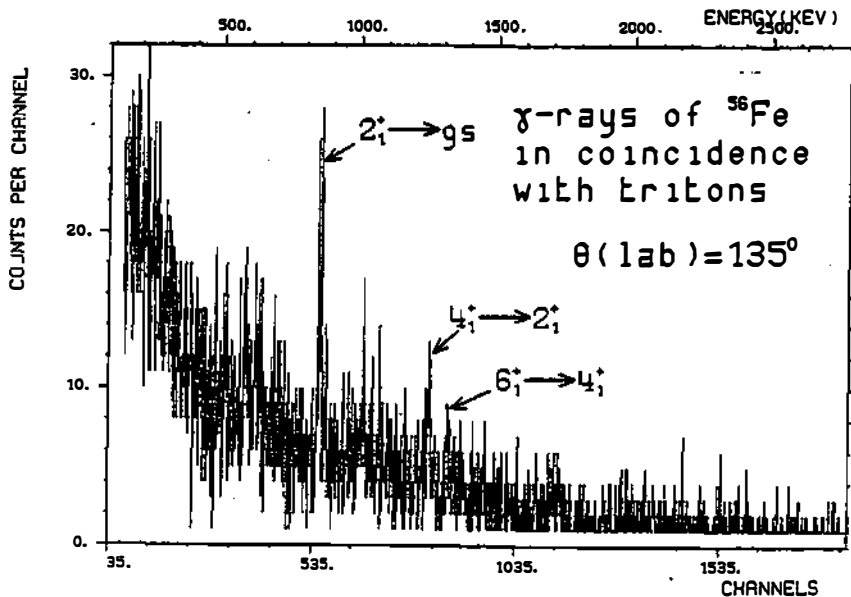


Fig. 2

Table 1

| Residual | $\sigma(\text{mb})$ experimental | $\sigma(\text{mb})$ CASCADE | Observed channels | | | |
|------------------|-------------------------------------|--------------------------------|-------------------|--------------|-------------|-----|
| | | | α | p | d | t |
| ^{58}Co | > 97 | 256 | | p2n | dn | x |
| ^{57}Co | 106 | 226 | | p3n | d2n | tn |
| ^{56}Co | < 5 | 0 | | p4n | x | tn |
| ^{58}Fe | 33 | 40 | | 2pn | x | x |
| ^{57}Fe | 34 | 62 | x | 2p2n | dpn | x |
| ^{56}Fe | 39 | 23 | x | 2p3n | dp2n | tpn |
| ^{55}Fe | 230 | 252 | α 2n | x | x | x |
| ^{54}Fe | 31 | 55 | α 3n | x | x | x |
| ^{55}Mn | 82 | 127 | α pn | α pn | x | x |
| ^{54}Mn | 68 | 99 | α p2n | α p2n | α dn | x |