PHOTODISINTEGRATION OF ^{12}C AND ^{16}O

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Photonuclear reactions $^{12}C(\gamma,3\alpha)$ and $^{16}O(\gamma,4\alpha)$ were studied in nuclear emulsions. The experiment was performed by exposing nuclear plates to the bremsstrahlung beam of a 42 MeV betatron. The beam was filtered through an aluminium filter to cut off the lower part of the spectrum. In order to evaluate absolute cross sections careful attention was paid to the measurement of γ ray intensities. The latter were obtained simultaneously by measuring proton spectra from the reaction $^{12}C(\gamma,p)^{11}B$[1]. The cross sections, corrected for possible loss of low energy alpha particles, were measured in the energy region from threshold to 40 MeV. The results are shown in Figs. 1 and 2. The excitation curve for the reaction on ^{12}C

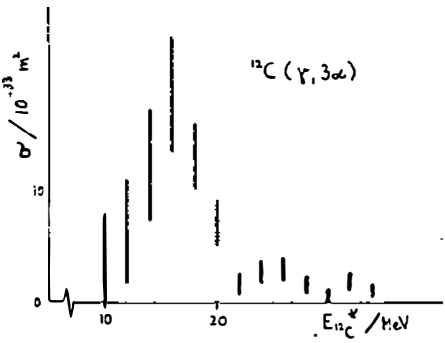

Fig. 1

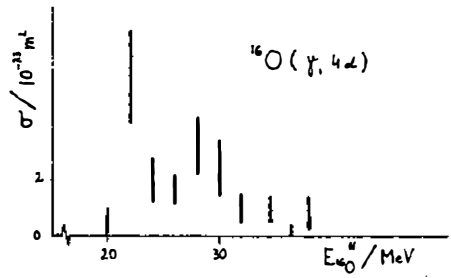

Fig. 2

shows several excited levels in ^{12}C. Some of the strongest among them have been further analysed through Dalitz plots. It has been found that the 16.1 MeV state decays via the ground and the first excited state of ^{8}Be (at 2.9 MeV). Evidence for the decays $^{12}C_{19MeV} \rightarrow \alpha + {}^{8}Be_{2.9MeV}(2\alpha)$ and $^{12}C_{29MeV} \rightarrow \alpha + {}^{8}Be_{16.9MeV}(2\alpha)$ has been found.

The analysis of the mechanism of the reaction $^{16}O(\gamma,4\alpha)$ indicates transitions through excited states of ^{12}C which further decays through the ground and first excited states of ^{8}Be. No evidence was found of double final state interaction $^{16}O(\gamma, {}^{8}Be)^{8}Be$.

1) M. Turk, J. Makjanić, M. Bistrović, Fizika 12 (1980) 249.