DO RESONANCES IN SYSTEM $^{9}Be+^{12}C$ REALLY EXIST?

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Since the discovery of molecular resonances in heavy ion systems a broad search for such phenomena was attempted. For the system $^{9}Be+^{12}C$, indicated as a very good candidate for this type of resonances, the observed structures in excitation curves for emission of alpha and ^{8}Be particles were ascribed to such processes [1,2,3].

However the analysis of experiments [4] performed in the Cracow-Zürich cooperation does not seem to confirm such a conclusion. The analysed data contained 250 excitation curves for many reaction channels with emission of p, d, t, alphas, ^{8}Be and ^{9}Be to different states or group of states of residual nuclei, measured at the ETH Tandem in Zürich for different forward and backward angles in energy range 6-15 MeV c.m.

The performed analysis consisted of:

1. Study of inter-channel correlations for different combination of channels through: a) determination of deviation function ([5] and Fig. 2 therein); b) counting of maxima method (Fig. 1); c) calculation of energy dependent cross correlation function (Fig. 2). No significant correlation within 1 % confidence limits was observed (no such limits could be given in case c)).

2. The statistical fluctuation analysis based on performed compound nucleus contribution determination:

a) in the structure of excitation curves no significant maxima exceed 1 % significance limits for fluctuations calculated from the statistical analysis (see Fig. 1 in [5]);

b) the coherence width Γ_{coh} as determined from auto-

correlation functions (455±145 keV) or from counting of maxima method (490±130 keV) agrees reasonably well with values expected for compound nucleus in the investigated excitation region;

c) the distribution of $d\bar{\sigma}/\langle d\bar{\sigma}\rangle$ is in accord with the theoretical probability distribution following from statistical analysis (Fig. 3).

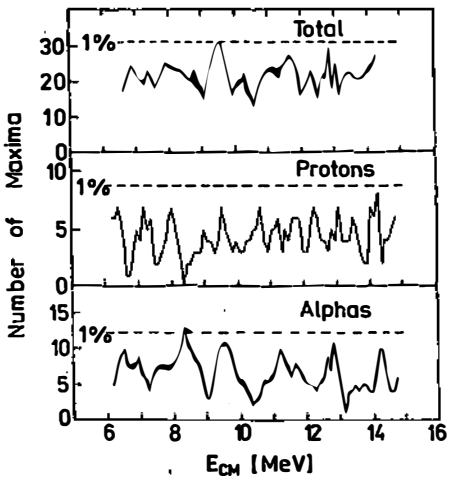

Fig. 1.

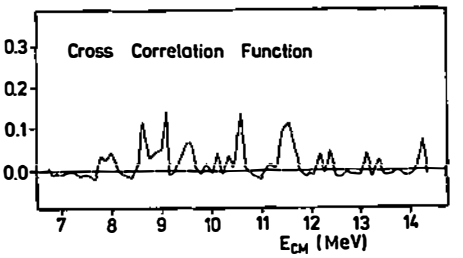

Fig. 2.

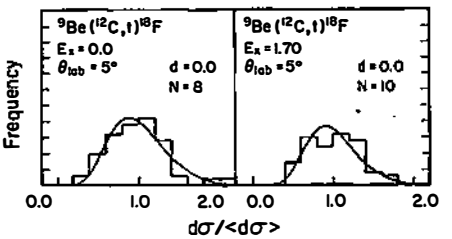

Fig. 3.

In conclusion it could be stated that structures observed in excitation curves for reactions in $^{9}Be+^{12}C$ system could be sufficiently well explained as arising from the statistical fluctuations without necessity of assumption of resonant component. The averaged behaviour of cross sections for alphas, ^{8}Be and ^{9}Be channels could be reasonably well reproduced taking into account rather large contributions from direct reaction mechanism in these channeks.

1) J.F. Mateja et al., Phys. Rev. C18 (1978) 2622,
2) X. Aslanoglou et al., Conf. on Reson. Behaviour, Greece (1980)
3) L.C. Dennis et al., Nucl. Phys. A357 (1981) 521 ,
4) K. Bodek et al., Phys. Lett. 82B, (1979) 369,
5) M. Hugi et al., contribution at this Conference.